

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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MOS FIELD EFFECT TRANSISTOR  
 $\mu$  PA1872B

N-CHANNEL MOS FIELD EFFECT TRANSISTOR  
 FOR SWITCHING

DESCRIPTION

The  $\mu$  PA1872B is a switching device, which can be driven directly by a 2.5 V power source.

The  $\mu$  PA1872B 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  
 $R_{DS(on)1} = 13.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 5.0 \text{ A)}$   
 $R_{DS(on)2} = 13.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 5.0 \text{ A)}$   
 $R_{DS(on)3} = 15.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 3.1 \text{ V, } I_D = 5.0 \text{ A)}$   
 $R_{DS(on)4} = 18.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 2.5 \text{ V, } I_D = 5.0 \text{ A)}$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA1872BGR-9JG	Power TSSOP8

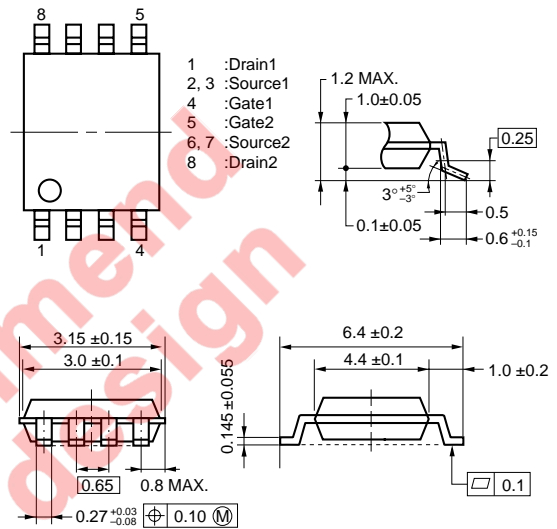
ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	20.0	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±12.0	V
Drain Current (DC) <sup>Note 1</sup>	I <sub>D(DC)</sub>	±10.0	A
Drain Current (pulse) <sup>Note 2</sup>	I <sub>D(pulse)</sub>	±80.0	A
Total Power Dissipation <sup>Note 1</sup>	P <sub>T</sub>	2.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

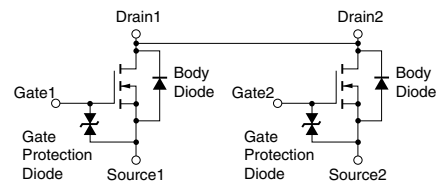
- Notes**
1. Mounted on ceramic board of 50 cm<sup>2</sup> x 1.1 mm
  2. PW ≤ 10 μs, Duty Cycle ≤ 1%

**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



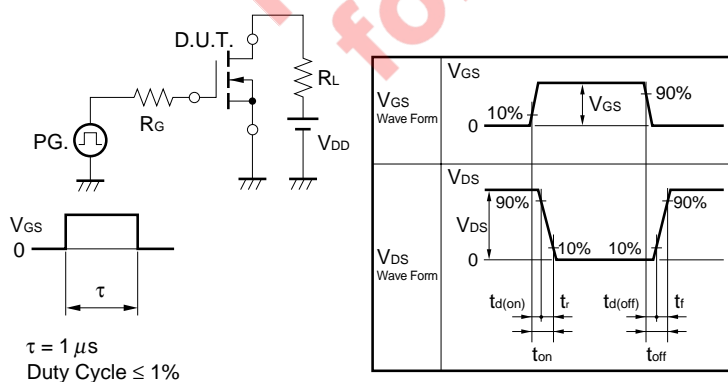
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

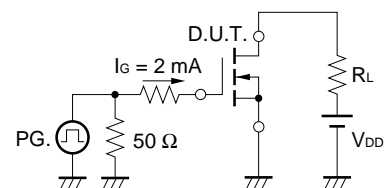
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>bss</sub>	V <sub>DS</sub> = 20.0 V, V <sub>GS</sub> = 0 V			1.0	μA
Gate Leakage Current	I <sub>gss</sub>	V <sub>GS</sub> = ±12.0 V, V <sub>DS</sub> = 0 V			±10.0	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10.0 V, I <sub>D</sub> = 1.0 mA	0.50	1.00	1.50	V
Forward Transfer Admittance <b>Note</b>	y <sub>fs</sub>	V <sub>DS</sub> = 10.0 V, I <sub>D</sub> = 5.0 A	5			S
Drain to Source On-state Resistance <b>Note</b>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 5.0 A	8.0	10.0	13.0	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 5.0 A	8.5	10.5	13.5	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 3.1 V, I <sub>D</sub> = 5.0 A	9.0	11.0	15.5	mΩ
	R <sub>DS(on)4</sub>	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 5.0 A	10.0	13.0	18.0	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10.0 V		945		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		220		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		160		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10.0 V, I <sub>D</sub> = 5.0 A		47		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 4.0 V		315		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		255		ns
Fall Time	t <sub>f</sub>			330		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = 16.0 V		10.0		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = 4.0 V		2.5		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = 10.0 A		4.5		nC
Body Diode Forward Voltage <b>Note</b>	V <sub>F(S-D)</sub>	I <sub>F</sub> = 10.0 A, V <sub>GS</sub> = 0 V		0.83		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 10.0 A, V <sub>GS</sub> = 0 V		240		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 50 A/μs		220		nC

**Note** Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

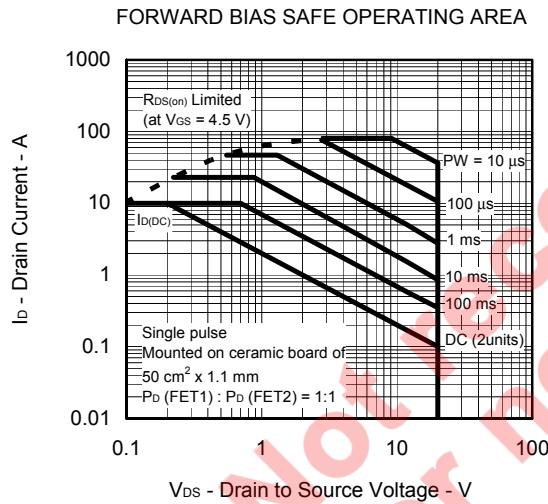
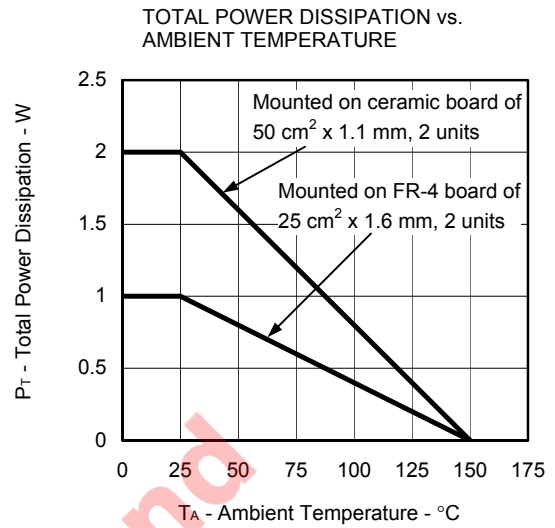
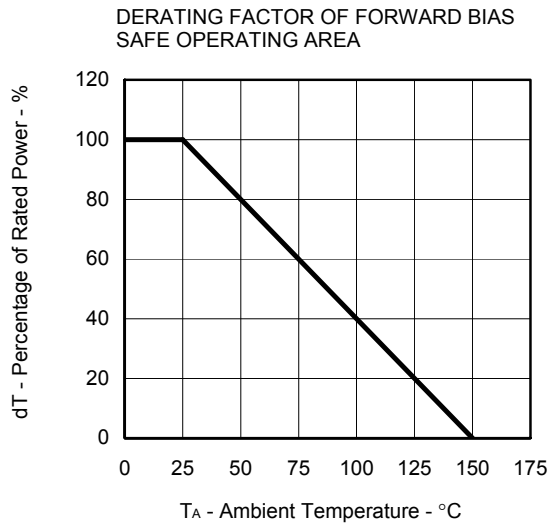
**TEST CIRCUIT 1 SWITCHING TIME**



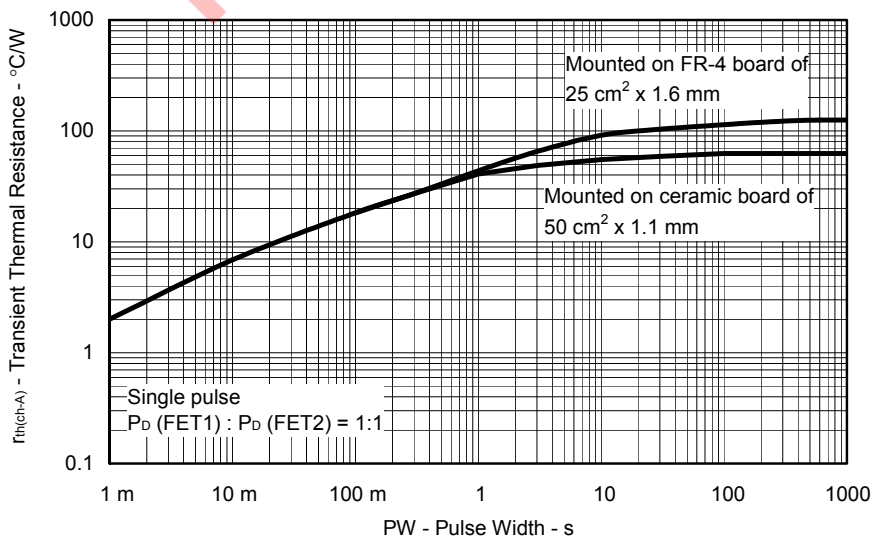
**TEST CIRCUIT 2 GATE CHARGE**



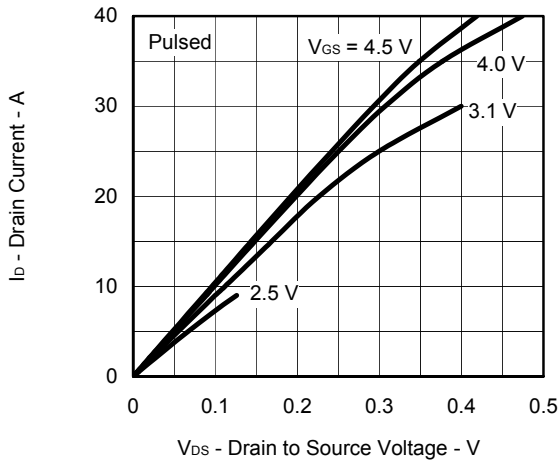
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



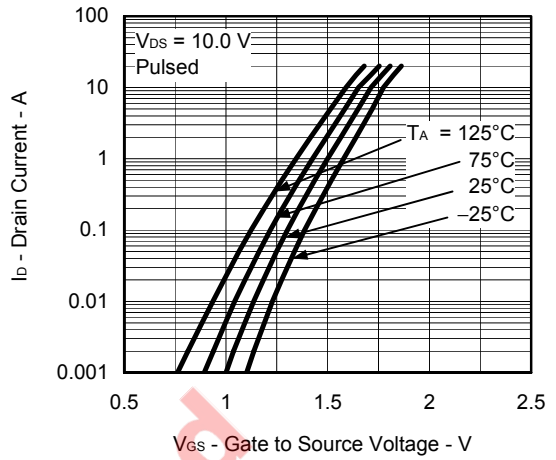
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



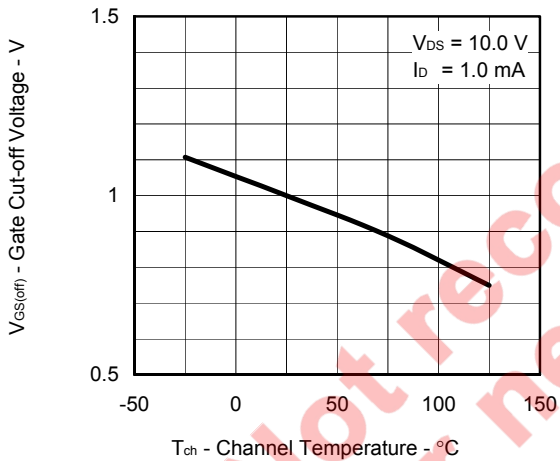
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



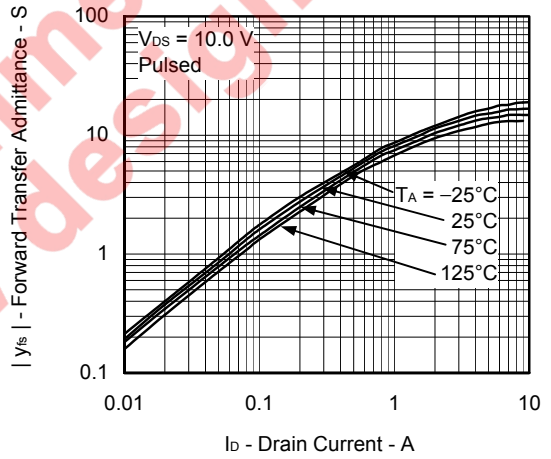
FORWARD TRANSFER CHARACTERISTICS



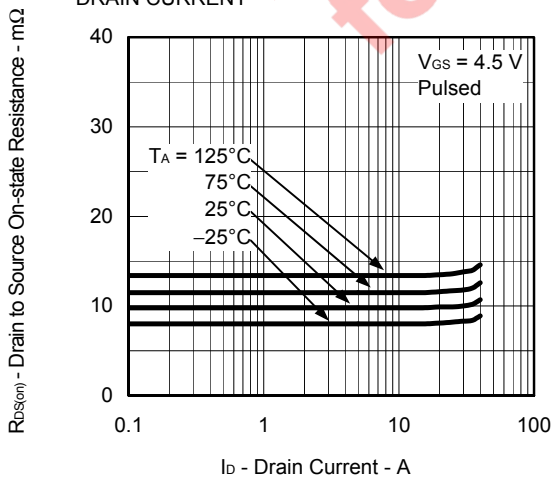
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



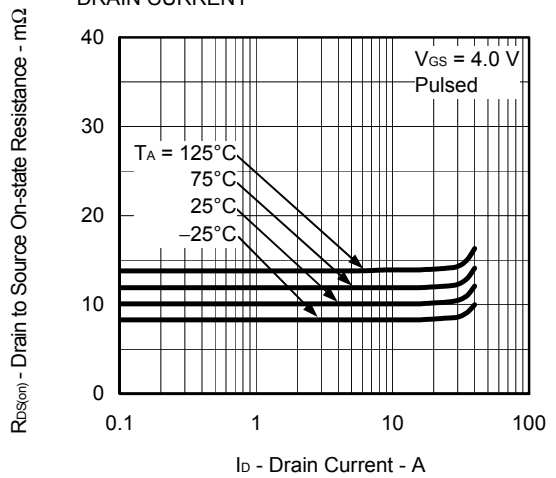
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

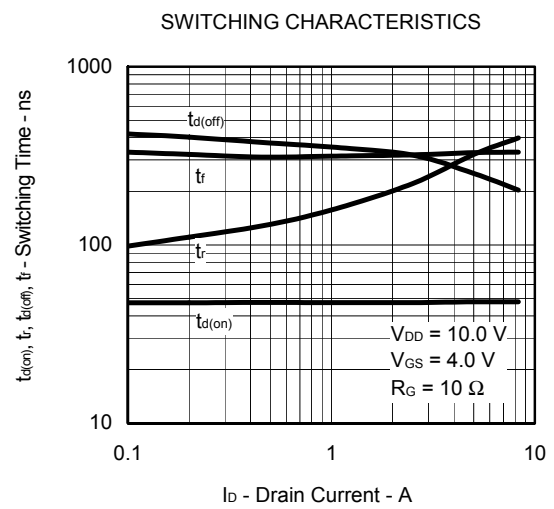
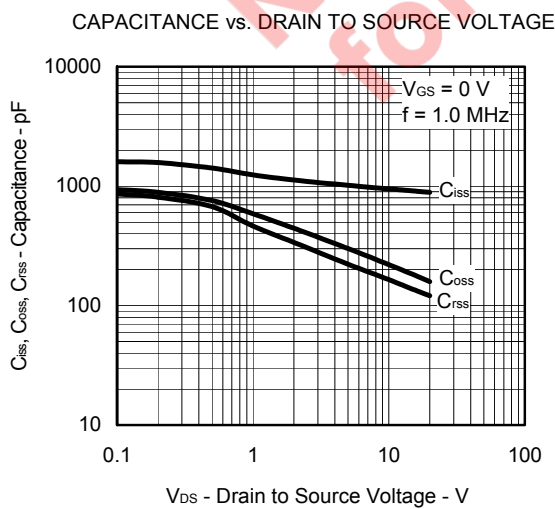
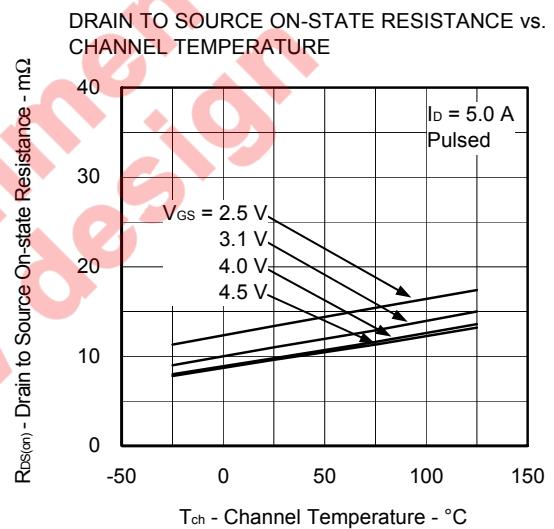
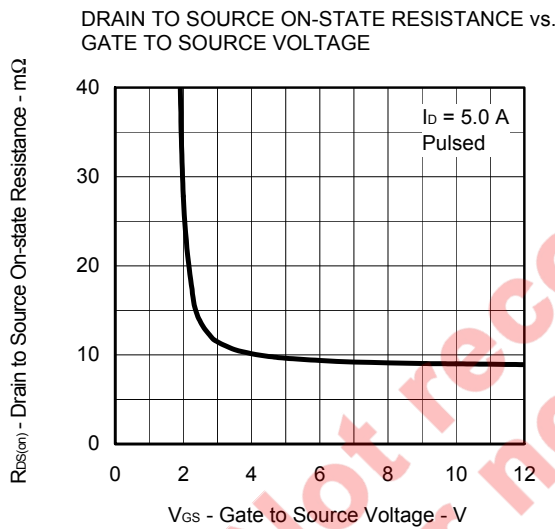
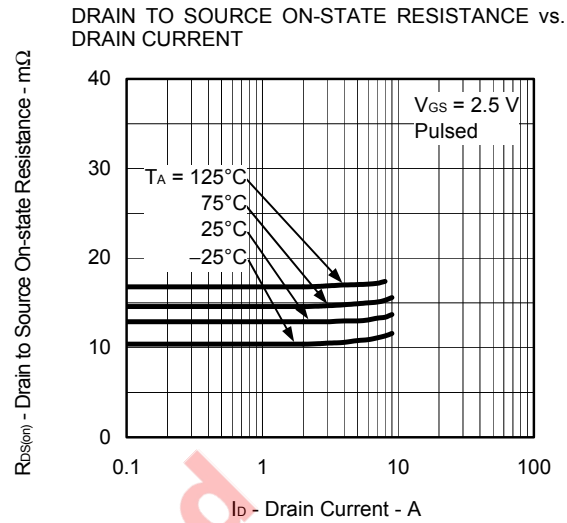
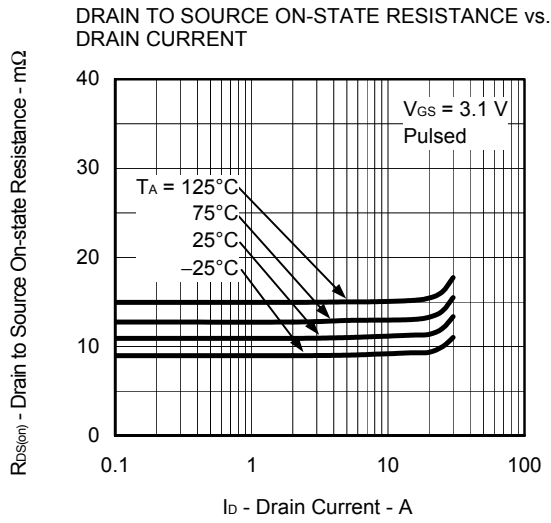


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

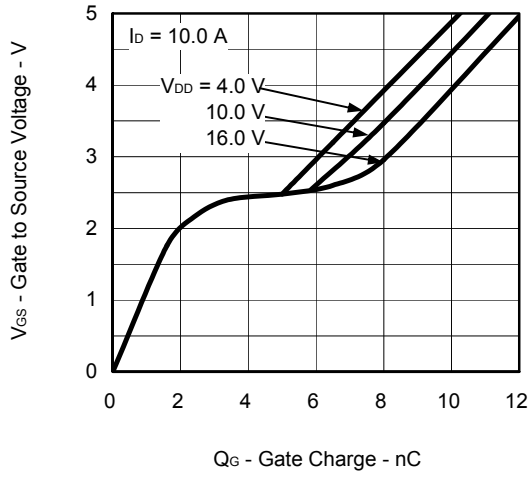


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

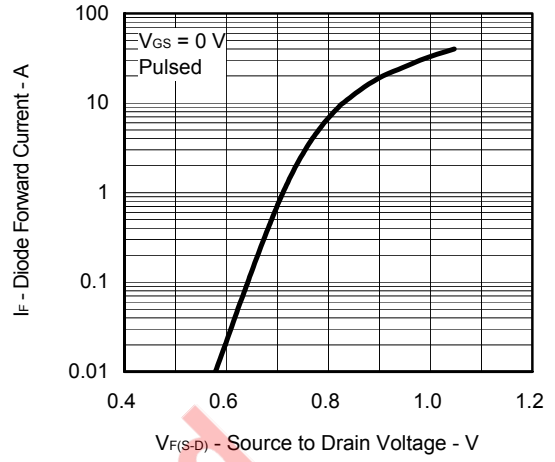




DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



Not recommended for new design



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