

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

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

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

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N/P-CHANNEL MOS FIELD EFFECT TRANSISTOR  
 FOR SWITCHING

DESCRIPTION

The  $\mu$  PA679TB is a switching device, which can be driven directly by a 2.5 V power source.

The  $\mu$  PA679TB 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
  - N-ch  $R_{DS(on)1} = 0.57 \Omega$  MAX. ( $V_{GS} = 4.5 V, I_D = 0.30 A$ )
  - $R_{DS(on)3} = 0.88 \Omega$  MAX. ( $V_{GS} = 2.5 V, I_D = 0.15 A$ )
  - P-ch  $R_{DS(on)1} = 1.45 \Omega$  MAX. ( $V_{GS} = -4.5 V, I_D = -0.20 A$ )
  - $R_{DS(on)3} = 2.98 \Omega$  MAX. ( $V_{GS} = -2.5 V, I_D = -0.15 A$ )
- Two MOS FET circuits in same size package as SC-70

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA679TB	SC-88 (SSP)

Marking: YA

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

Drain to Source Voltage ( $V_{GS} = 0 V$ )	$V_{DSS}$	20 / -20	V
Gate to Source Voltage ( $V_{DS} = 0 V$ )	$V_{GSS}$	$\pm 12 / \mp 12$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 0.35 / \mp 0.25$	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 1.40 / \mp 1.00$	A
Total Power Dissipation (2 units) <sup>Note2</sup>	$P_T$	0.2	W
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ C$

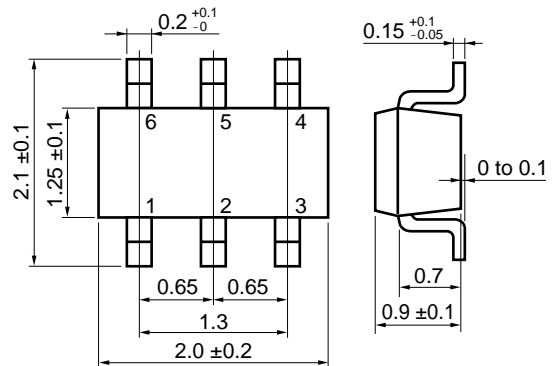
- Notes 1.  $PW \leq 10 \mu s$ , Duty Cycle  $\leq 1\%$   
 2. Mounted on FR-4 board of  $2500 \text{ mm}^2 \times 1.1 \text{ mm}$

**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.

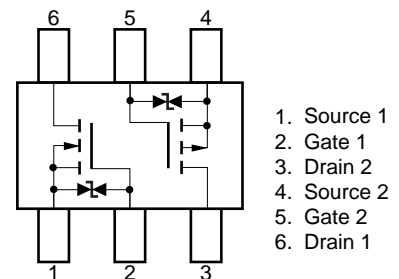
**Caution** This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge.  
 $V_{ESD} = \pm 100 V$  TYP. ( $C = 200 \text{ pF}, R = 0 \Omega$ , Single pulse)

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PACKAGE DRAWING (Unit: mm)



PIN CONNECTION (Top View)



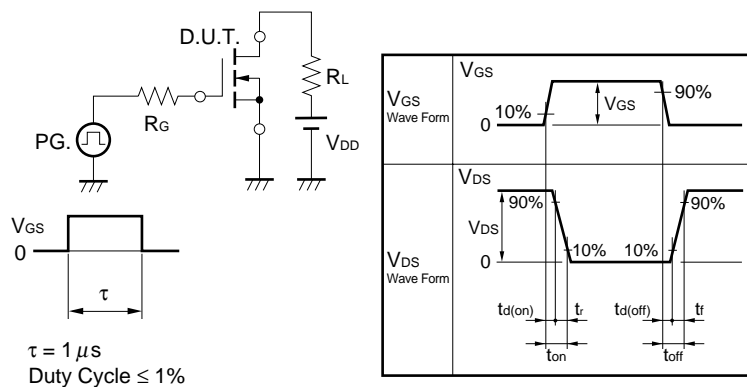
**ELECTRICAL CHARACTERISTICS**

**(1) N-ch PART (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</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	μA
Gate Cut-off Voltage <sup>Note</sup>	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 <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = 10.0 V, I <sub>D</sub> = 0.30 A	0.25	0.75		S
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.30 A		0.38	0.57	Ω
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 0.30 A		0.41	0.60	Ω
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.15 A		0.60	0.88	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10.0 V		28		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		11		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		7		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10.0 V, I <sub>D</sub> = 0.30 A		20		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 4.0 V		51		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		94		ns
Fall Time	t <sub>f</sub>			87		ns
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 0.35 A, V <sub>GS</sub> = 0 V		0.84		V

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

**TEST CIRCUIT SWITCHING TIME**

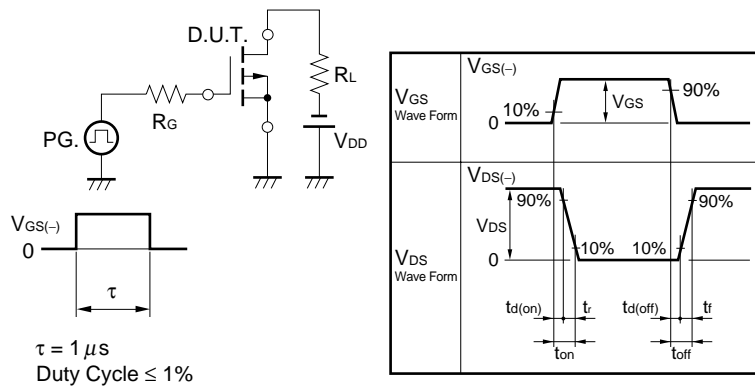


(2) P-ch PART (T<sub>A</sub> = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</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	μA
Gate Cut-off Voltage <sup>Note</sup>	V <sub>GS(off)</sub>	V <sub>DS</sub> = -10.0 V, I <sub>D</sub> = -1.0 mA	-0.80	-1.30	-1.80	V
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = -10.0 V, I <sub>D</sub> = -0.20 A	0.2	0.6		S
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -0.20 A		1.17	1.45	Ω
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -0.20 A		1.25	1.55	Ω
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -0.15 A		2.25	2.98	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10.0 V		29		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		15		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		3		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10.0 V, I <sub>D</sub> = -0.20 A		23		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = -4.0 V		39		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		50		ns
Fall Time	t <sub>f</sub>			33		ns
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 0.25 A, V <sub>GS</sub> = 0 V		0.88		V

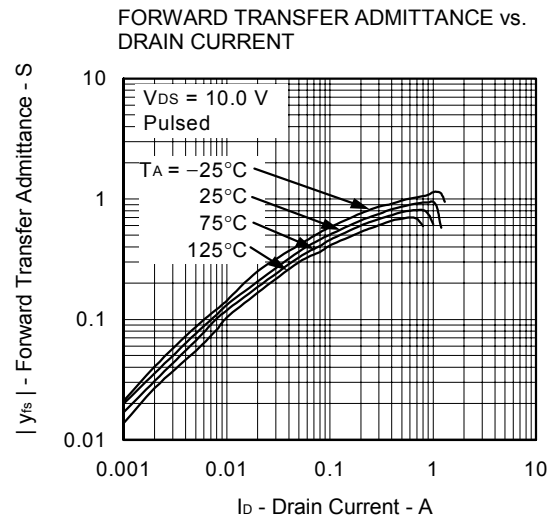
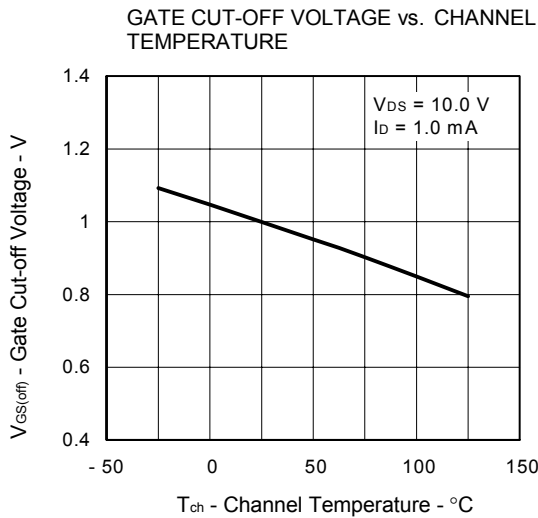
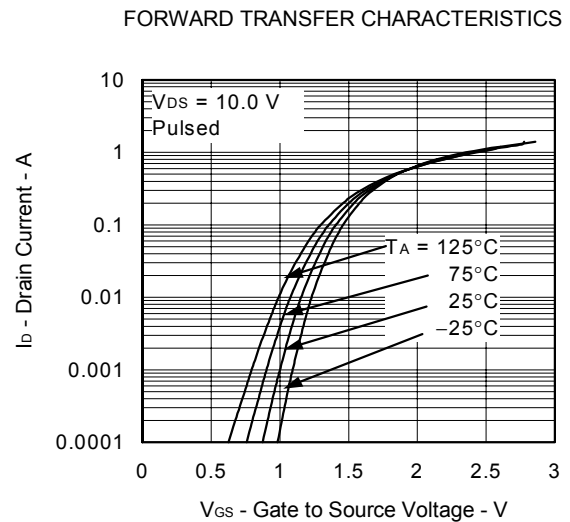
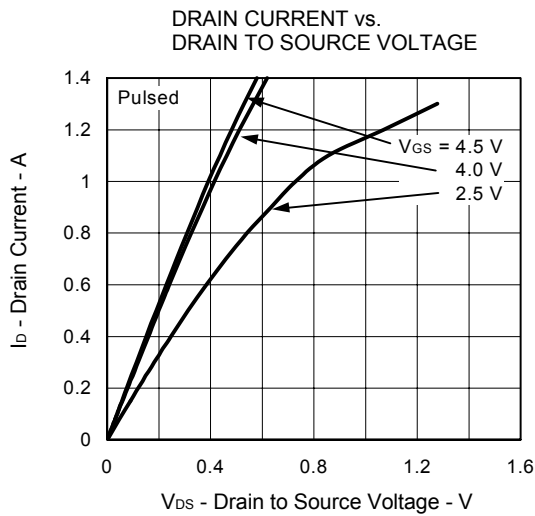
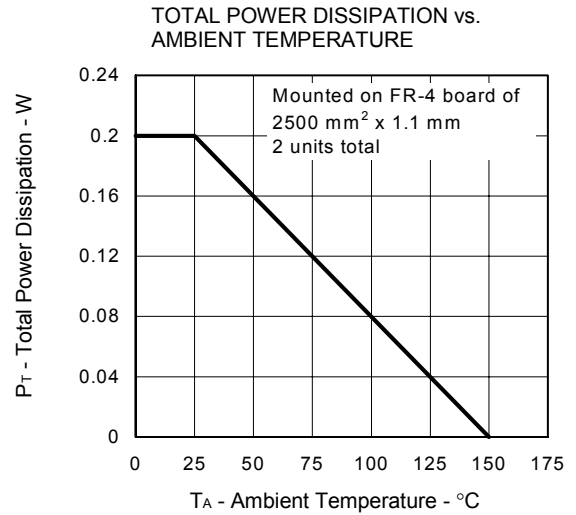
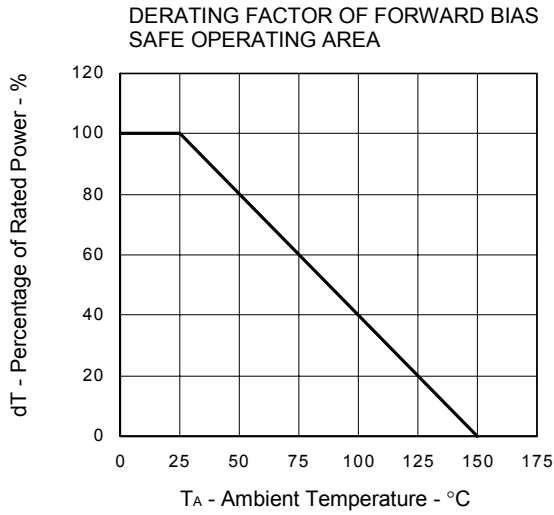
**Note** Pulsed: PW ≤ 350 μs, Duty cycle ≤ 2%

TEST CIRCUIT SWITCHING TIME

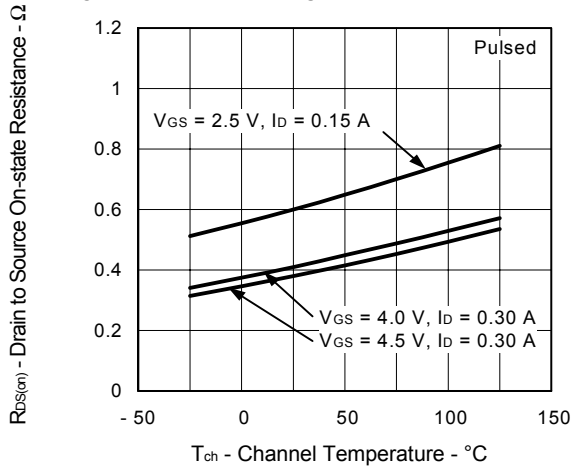


TYPICAL CHARACTERISTICS

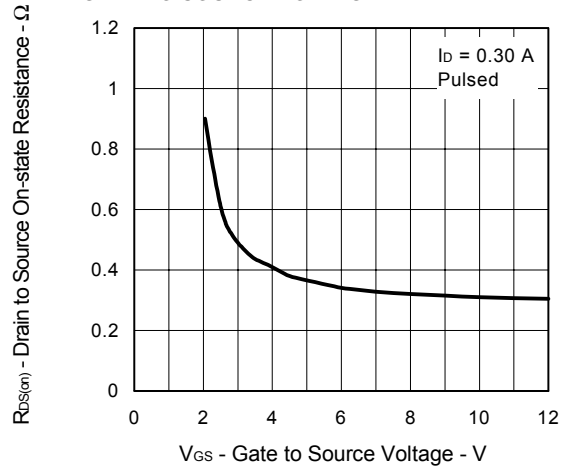
(1) N-ch PART ( $T_A = 25^\circ\text{C}$ )



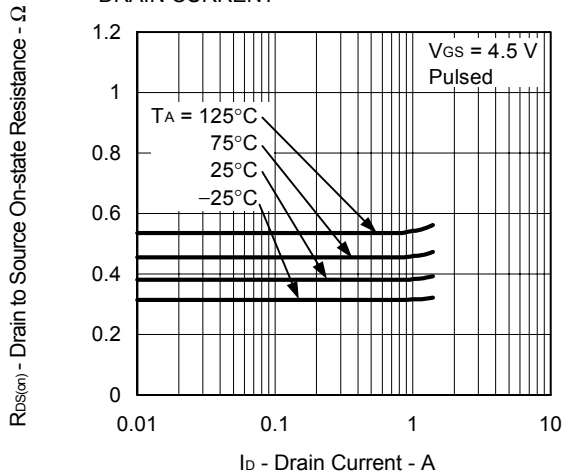
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



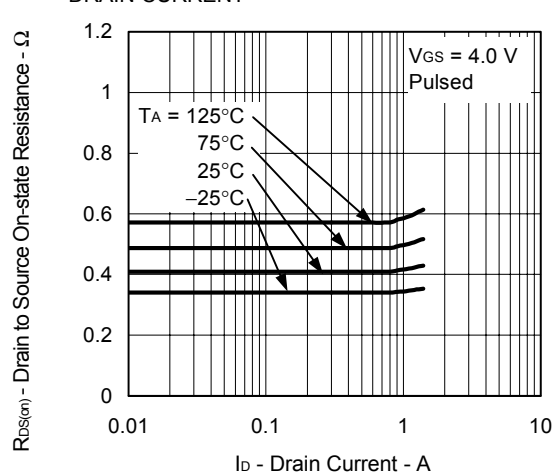
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



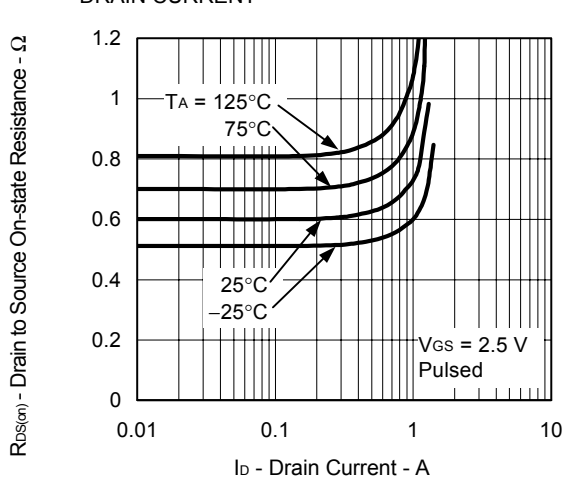
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



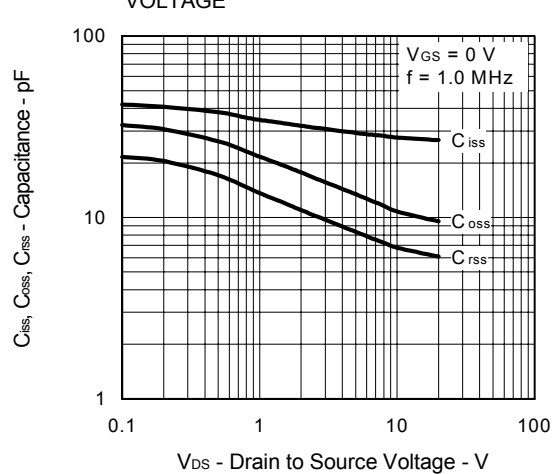
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



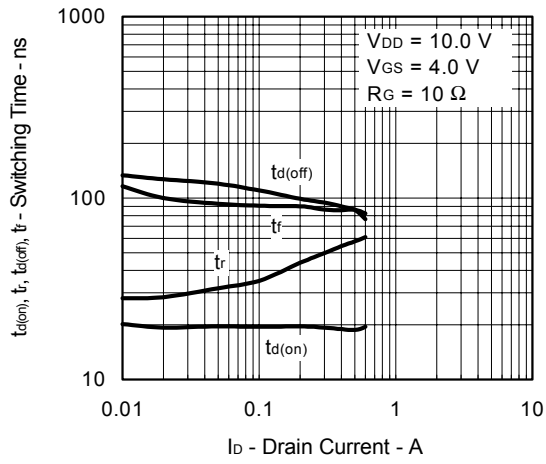
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



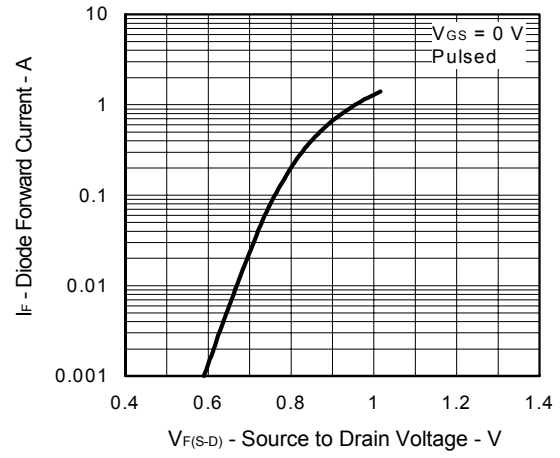
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



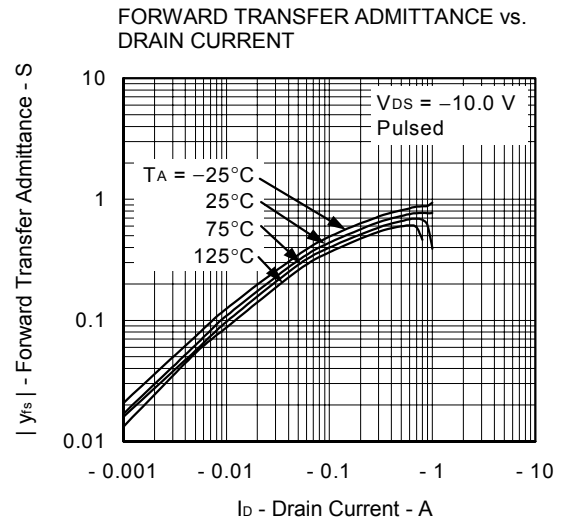
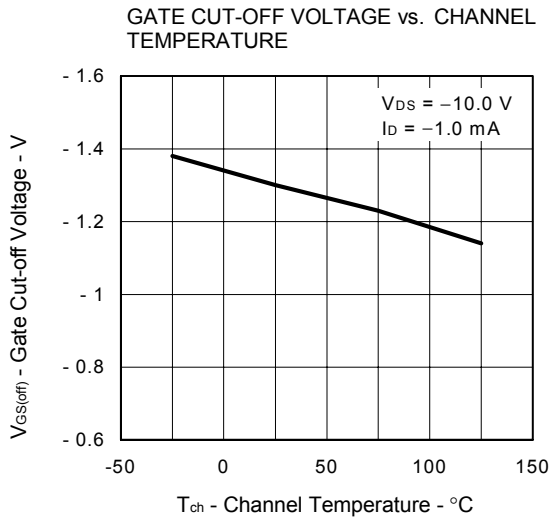
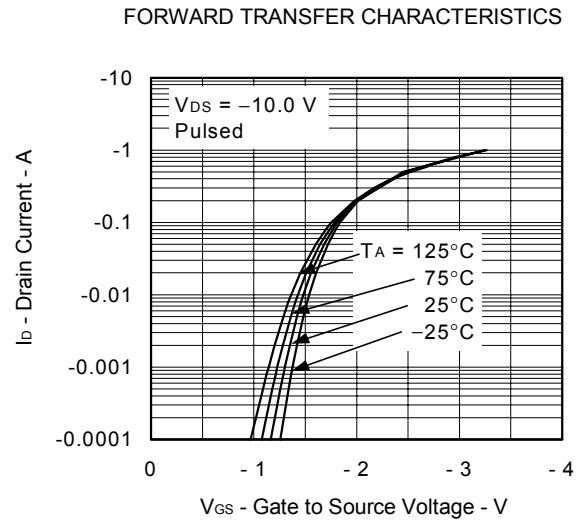
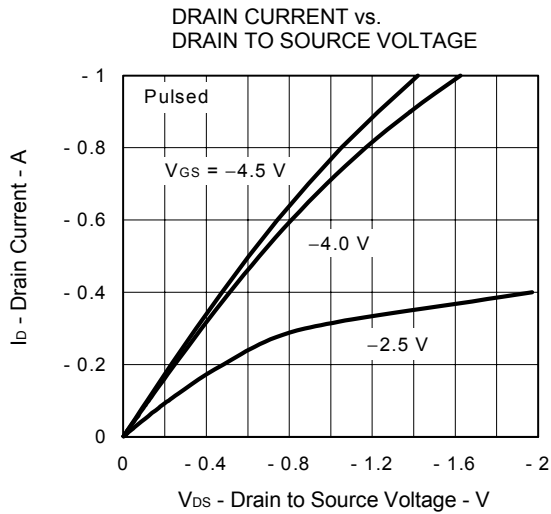
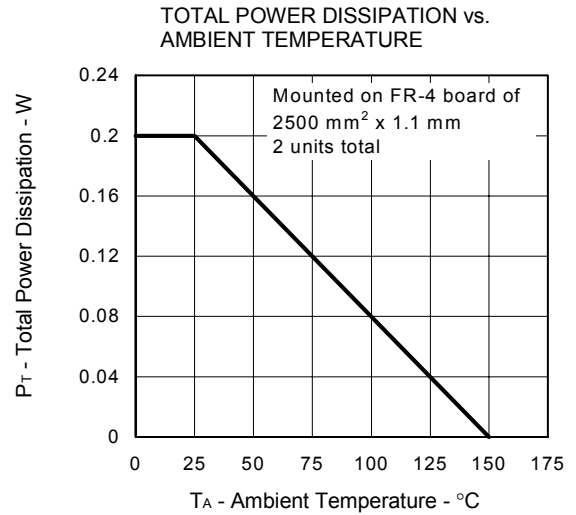
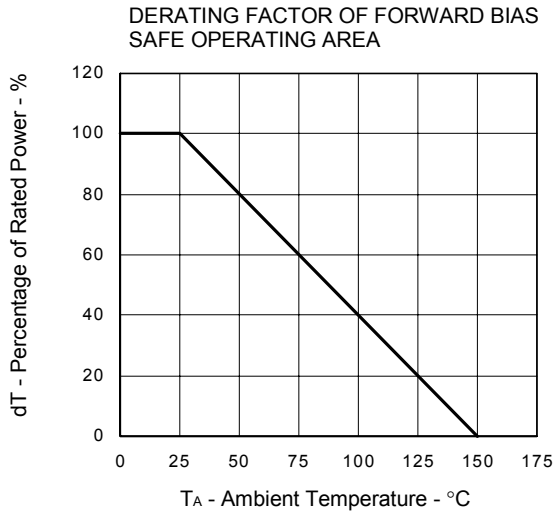
SWITCHING CHARACTERISTICS



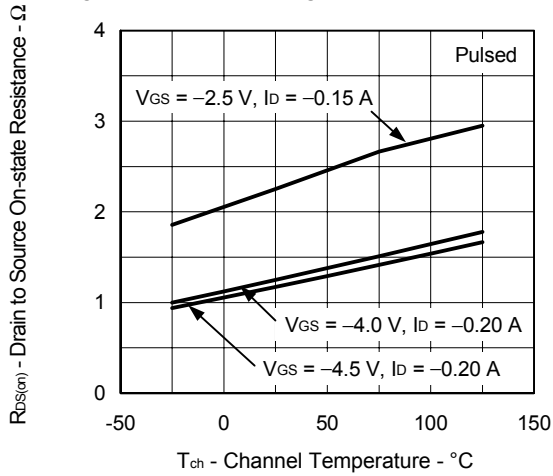
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



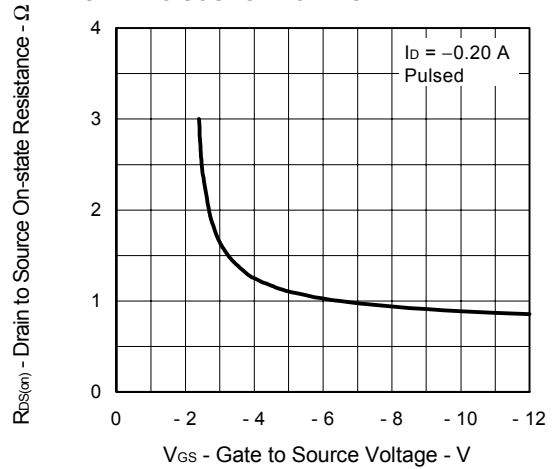
(2) P-ch PART ( $T_A = 25^\circ\text{C}$ )



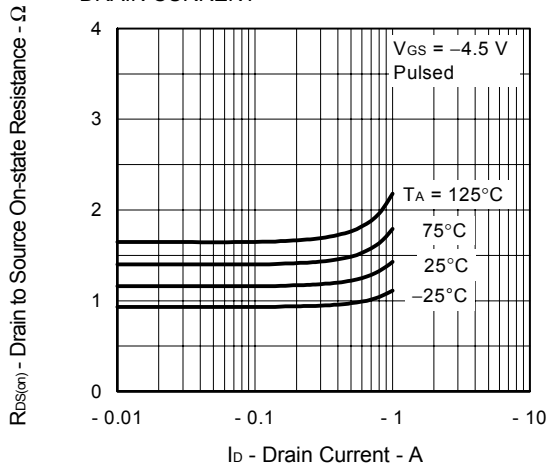
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



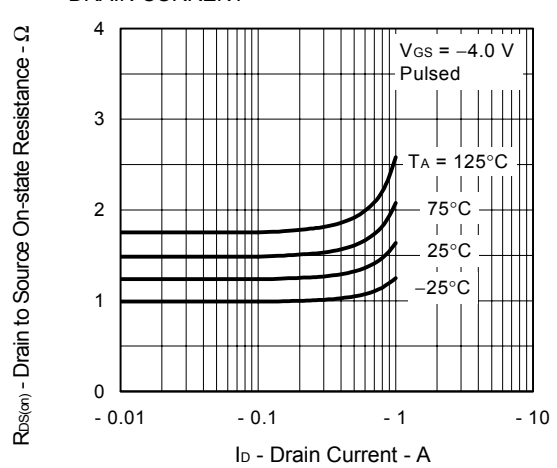
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



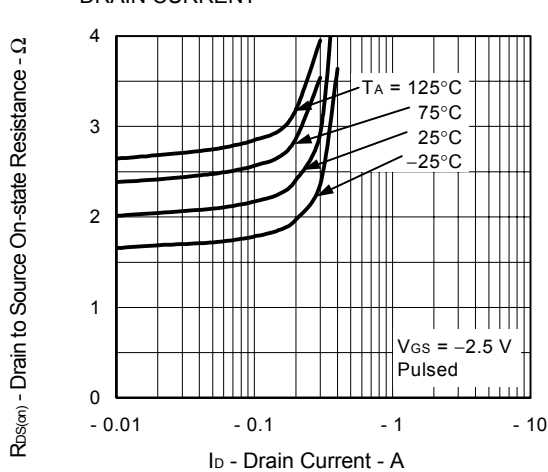
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



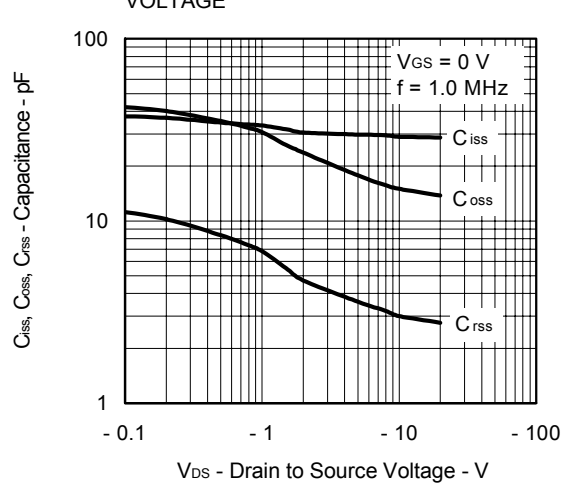
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



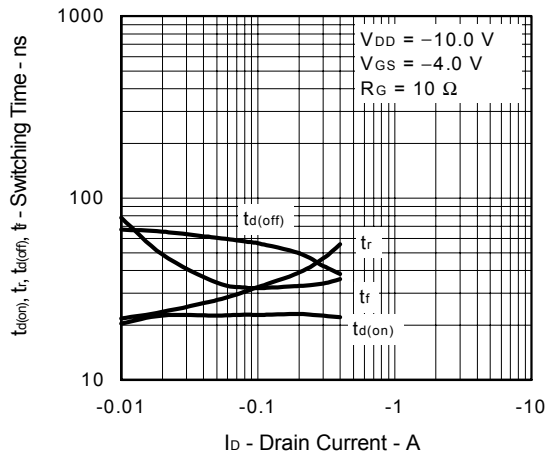
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



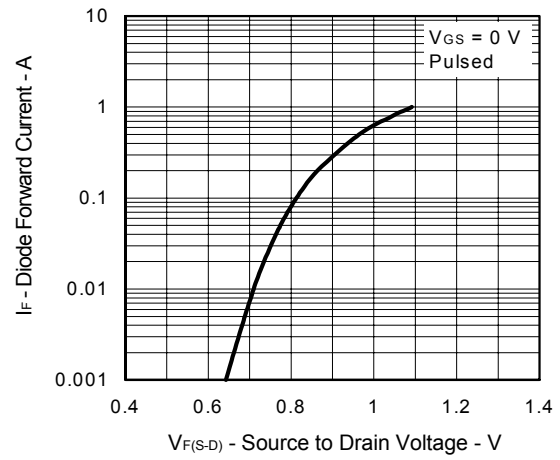
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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