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April 1st, 2010 Renesas Electronics Corporation

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

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MOS FIELD EFFECT TRANSISTOR μ PA679TB

N/P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

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

The μ 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

 $\begin{array}{ll} \text{N-ch} & \text{R}_{DS(\text{on})1} = 0.57~\Omega \text{ MAX. (VGs} = 4.5~\text{V, I}_D = 0.30~\text{A}) \\ & \text{R}_{DS(\text{on})3} = 0.88~\Omega \text{ MAX. (VGs} = 2.5~\text{V, I}_D = 0.15~\text{A}) \\ \text{P-ch} & \text{R}_{DS(\text{on})1} = 1.45~\Omega \text{ MAX. (VGs} = -4.5~\text{V, I}_D = -0.20~\text{A}) \\ & \text{R}_{DS(\text{on})3} = 2.98~\Omega \text{ MAX. (VGs} = -2.5~\text{V, I}_D = -0.15~\text{A}) \\ \end{array}$

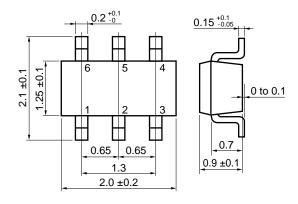
• Two MOS FET circuits in same size package as SC-70

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA679TB	SC-88 (SSP)

Marking: YA

PACKAGE DRAWING (Unit: mm)



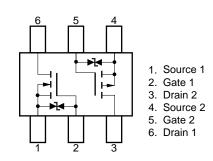
ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C)

VDSS	20 / –20	V
Vgss	±12 / ∓12	V
I _{D(DC)}	±0.35 / ∓0.25	Α
ID(pulse)	±1.40 / ∓1.00	Α
Рт	0.2	W
Tch	150	°C
Tstg	-55 to +150	°C
	VGSS ID(DC) ID(pulse) PT Tch	VGSS $\pm 12 / \mp 12$ ID(DC) $\pm 0.35 / \mp 0.25$ ID(pulse) $\pm 1.40 / \mp 1.00$ PT 0.2 Tch 150

Notes 1. PW \leq 10 μ s, Duty Cycle \leq 1%

2. Mounted on FR-4 board of 2500 mm² x 1.1 mm

PIN CONNECTION (Top View)



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 shoud be handled with caution for electrostatic discharge.

V_{ESD} = ± 100 V TYP. (C = 200 pF, R = 0 Ω , Single pulse)

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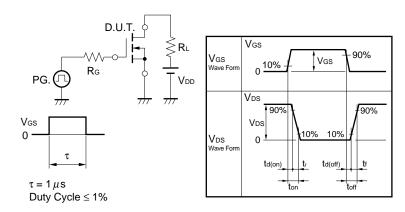
ELECTRICAL CHARACTERISTICS

(1) N-ch PART (T_A = 25°C)

()						
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	loss	V _{DS} = 20.0 V, V _{GS} = 0 V			1.0	μΑ
Gate Leakage Current	Igss	V _{GS} = ±12.0 V, V _{DS} = 0 V			±10	μΑ
Gate Cut-off Voltage Note	V _{GS(off)}	V _{DS} = 10.0 V, I _D = 1.0 mA	0.50	1.00	1.50	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10.0 V, I _D = 0.30 A	0.25	0.75		S
Drain to Source On-state Resistance Note	RDS(on)1	V _{GS} = 4.5 V, I _D = 0.30 A		0.38	0.57	Ω
	RDS(on)2	V _{GS} = 4.0 V, I _D = 0.30 A		0.41	0.60	Ω
	RDS(on)3	V _{GS} = 2.5 V, I _D = 0.15 A		0.60	0.88	Ω
Input Capacitance	Ciss	V _{DS} = 10.0 V		28		pF
Output Capacitance	Coss	V _{GS} = 0 V		11		pF
Reverse Transfer Capacitance	Crss	f = 1.0 MHz		7		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10.0 V, I _D = 0.30 A		20		ns
Rise Time	tr	V _{GS} = 4.0 V		51		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		94		ns
Fall Time	tf			87		ns
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 0.35 A, V _{GS} = 0 V		0.84		V

Note Pulsed: PW \leq 350 μ s, Duty cycle \leq 2%

TEST CIRCUIT SWITCHING TIME

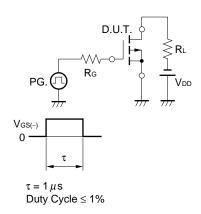


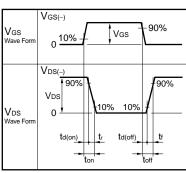
(2) P-ch PART (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	loss	V _{DS} = -20.0 V, V _{GS} = 0 V			-1.0	μΑ
Gate Leakage Current	Igss	V _{GS} = ∓12.0 V, V _{DS} = 0 V			∓10	μΑ
Gate Cut-off Voltage Note	V _{GS(off)}	V _{DS} = -10.0 V, I _D = -1.0 mA	-0.80	-1.30	-1.80	V
Forward Transfer Admittance Note	yfs	V _{DS} = -10.0 V, I _D = -0.20 A	0.2	0.6		S
Drain to Source On-state Resistance Note	RDS(on)1	V _{GS} = -4.5 V, I _D = -0.20 A		1.17	1.45	Ω
	RDS(on)2	V _{GS} = -4.0 V, I _D = -0.20 A		1.25	1.55	Ω
	RDS(on)3	V _{GS} = -2.5 V, I _D = -0.15 A		2.25	2.98	Ω
Input Capacitance	Ciss	V _{DS} = -10.0 V		29		pF
Output Capacitance	Coss	V _{GS} = 0 V		15		pF
Reverse Transfer Capacitance	Crss	f = 1.0 MHz		3		pF
Turn-on Delay Time	t _{d(on)}	$V_{DD} = -10.0 \text{ V}, I_D = -0.20 \text{ A}$		23		ns
Rise Time	tr	V _{GS} = -4.0 V		39		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		50		ns
Fall Time	tf			33		ns
Body Diode Forward Voltage	VF(S-D)	I _F = 0.25 A, V _{GS} = 0 V		0.88		V

Note Pulsed: PW \leq 350 μ s, Duty cycle \leq 2%

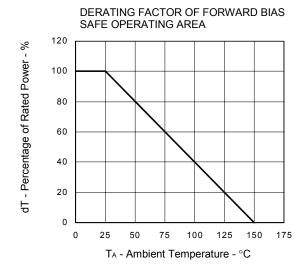
TEST CIRCUIT SWITCHING TIME

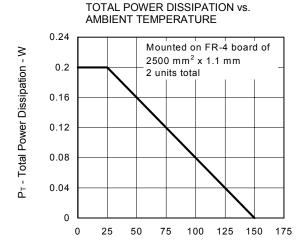




TYPICAL CHARACTERISTICS

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

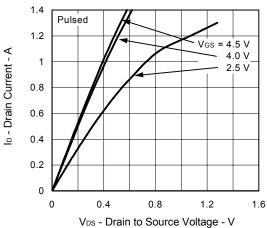




1.4 Pulsed 1.2 Vgs = 4.5 V 4.0 V 1 2.5 V 8.0

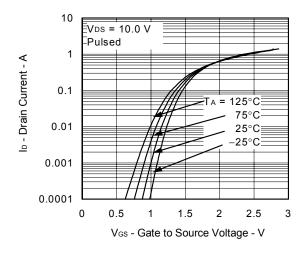
DRAIN CURRENT vs.

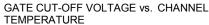
DRAIN TO SOURCE VOLTAGE

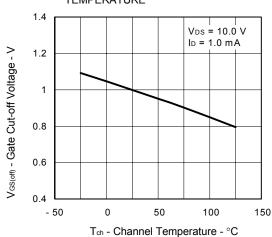




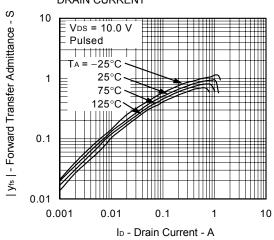
TA - Ambient Temperature - °C







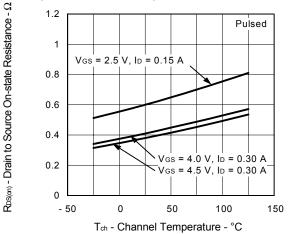
FORWARD TRANSFER ADMITTANCE vs. **DRAIN CURRENT**



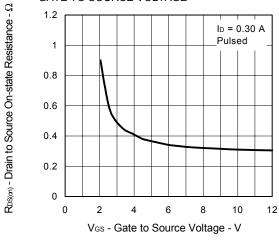
 $\mathsf{R}_{\mathsf{DS}(\varpi)}$ - Drain to Source On-state Resistance - Ω

 $\mathsf{R}_{\mathsf{DS}(m)}$ - Drain to Source On-state Resistance - Ω

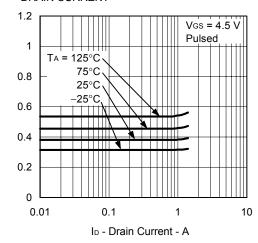
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



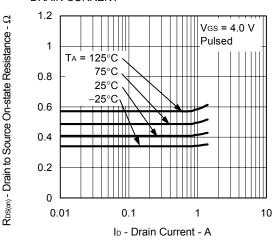
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



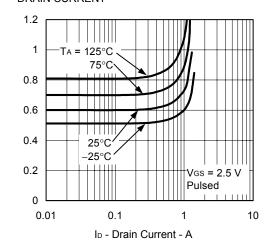
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



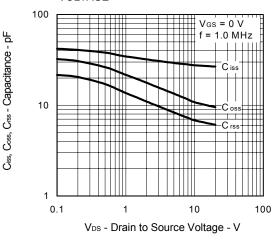
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



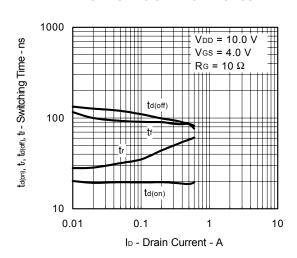
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE

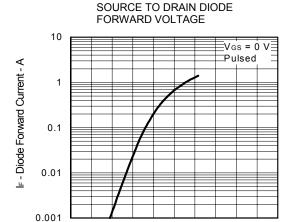


1.2

1.4

SWITCHING CHARACTERISTICS





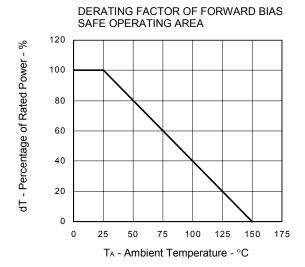
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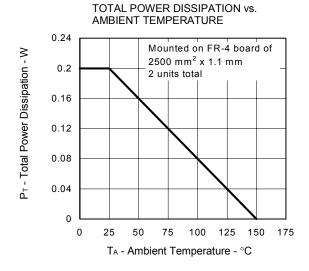
 $V_{F(S\text{-}D)}$ - Source to Drain Voltage - V

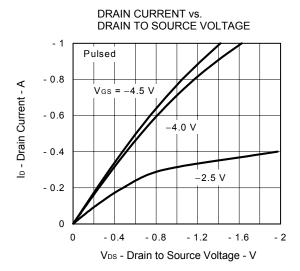
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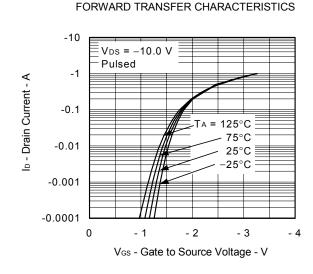
0.6

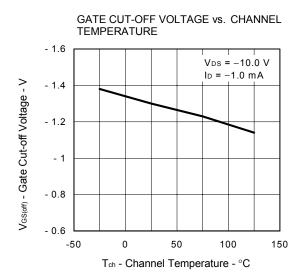
(2) P-ch PART ($T_A = 25$ °C)

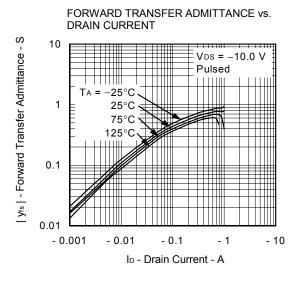






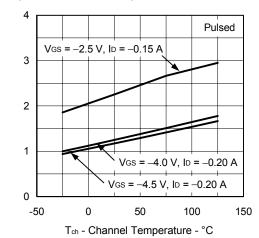




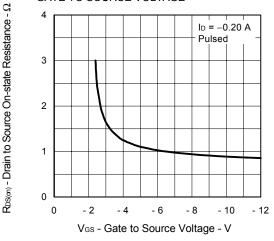


 $\mathsf{R}_{\mathsf{DS}(\varpi)}$ - Drain to Source On-state Resistance - Ω

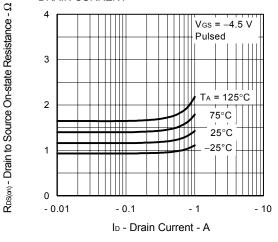
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



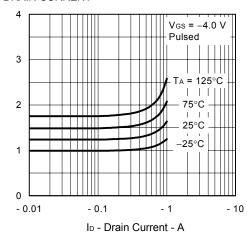
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



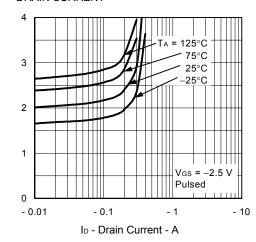
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



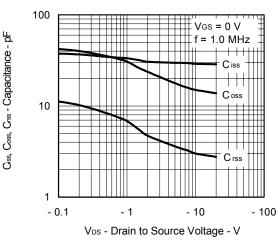
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



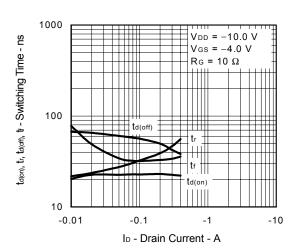
 $\mathsf{R}_{\mathsf{DS}(\varpi)}$ - Drain to Source On-state Resistance - Ω

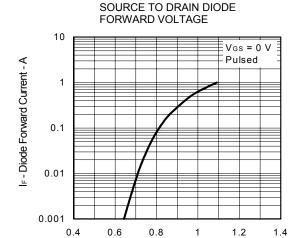
 $\mathsf{R}_{\mathsf{DS}(m)}$ - Drain to Source On-state Resistance - Ω

1.2

1.4

SWITCHING CHARACTERISTICS





 $V_{\text{F(S-D)}}$ - Source to Drain Voltage - V

0.4

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