To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 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 1st, 2010
Renesas Electronics Corporation

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

Send any inquiries to http://www.renesas.com/inquiry.

RENESAS

RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA677TB

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

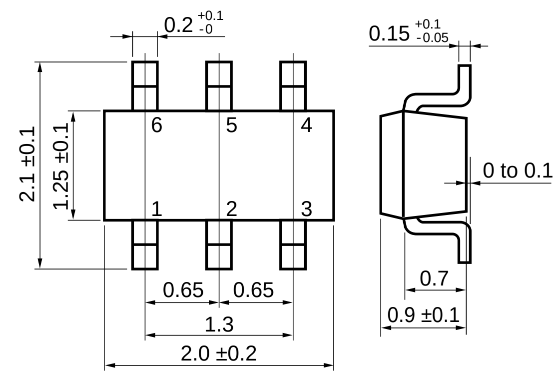
The μPA677TB is a switching device which can be driven directly by a 2.5 V power source.

The μPA677TB 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
  $R_{DS(on)1}$ = 0.57 Ω MAX. (V_{GS} = 4.5 V, I_D = 0.30 A)
  $R_{DS(on)2}$ = 0.60 Ω MAX. (V_{GS} = 4.0 V, I_D = 0.30 A)
  $R_{DS(on)3}$ = 0.88 Ω MAX. (V_{GS} = 2.5 V, I_D = 0.15 A)
- Two MOS FET circuits in same size package as SC-70

PACKAGE DRAWING (Unit: mm)



ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA677TB	SC-88 (SSP)

Marking: WA

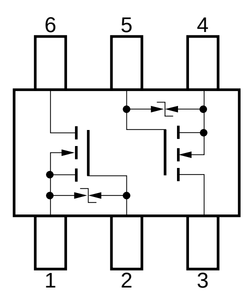
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	20	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±12	V
Drain Current (DC)	$I_{D(DC)}$	±0.35	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±1.40	A
Total Power Dissipation(2units) Note2	P_T	0.2	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 Board of 2500 mm^2 x 1.1 mm 2units total.

PIN CONNECTUON (Top View)



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

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

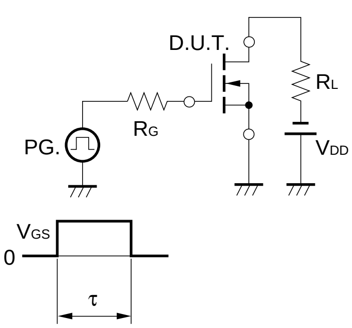
Document No. G16598EJ1V0DS00 (1st edition)
Date Published March 2003 NS CP(K)
Printed in Japan

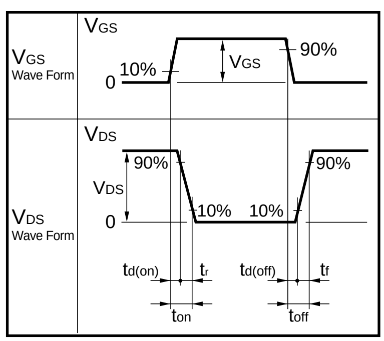
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20.0 V, V_{GS} = 0 V			1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12.0 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10.0 V, I_D = 1.0 mA	0.5	1.0	1.5	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	$R_{DS(on)1}$	V_{GS} = 4.5 V, I_D = 0.30 A		0.38	0.57	Ω
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 0.30 A		0.41	0.60	Ω
	$R_{DS(on)3}$	V_{GS} = 2.5 V, I_D = 0.15 A		0.60	0.88	Ω
Input Capacitance	C_{iss}	V_{DS} = 10.0 V		28		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		11		pF
Reverse Transfer Capacitance	C_{rss}	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	t_r	V_{GS} = 4.0 V		51		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		94		ns
Fall Time	t_f			87		ns
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = 0.35 A, V_{GS} = 0 V		0.84		V

Note Pulsed PW≤350 μs, Duty Cycle≤2%

TEST CIRCUIT SWITCHING TIME

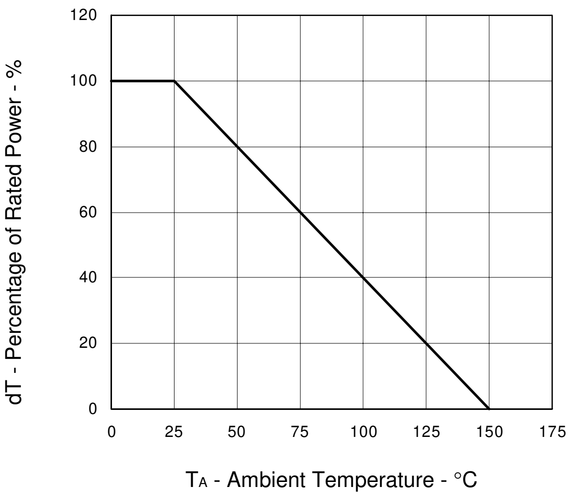




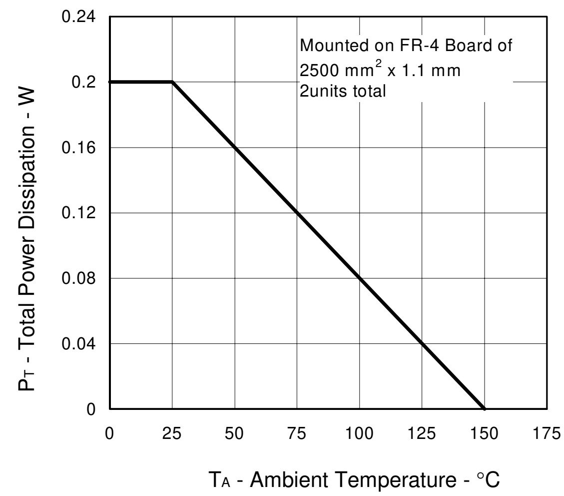
τ = 1 μs
Duty Cycle ≤ 1%

TYPICAL CHARACTERISTICS (T_A = 25°C)

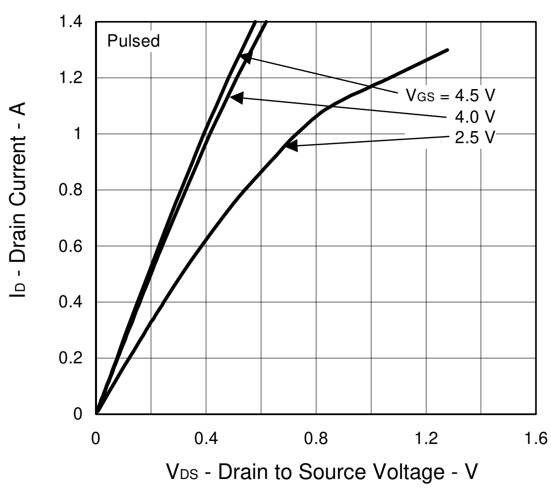
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



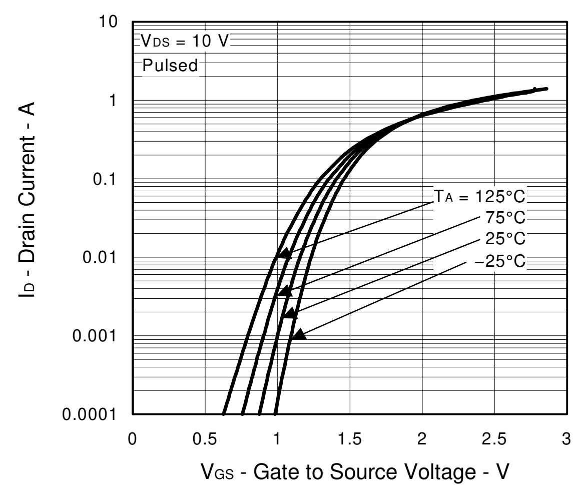
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



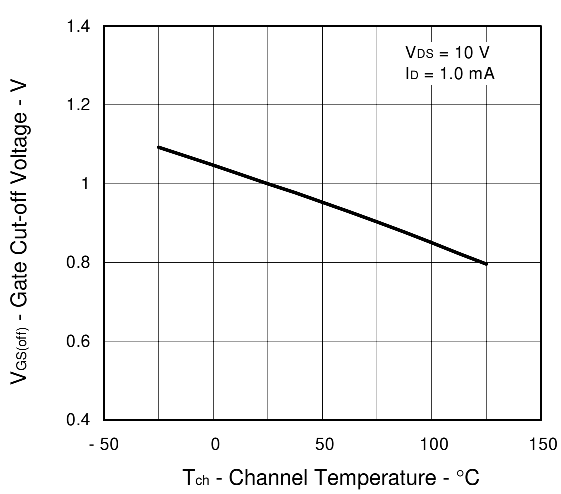
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



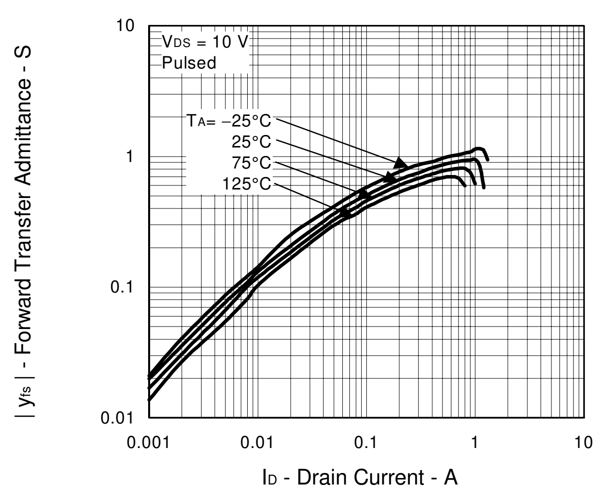
FORWARD TRANSFER CHARACTERISTICS



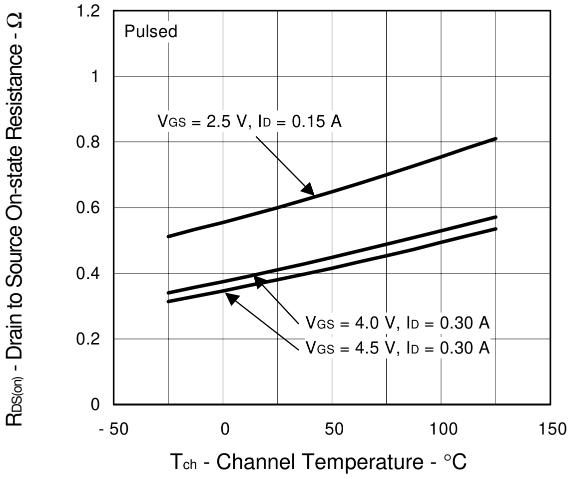
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



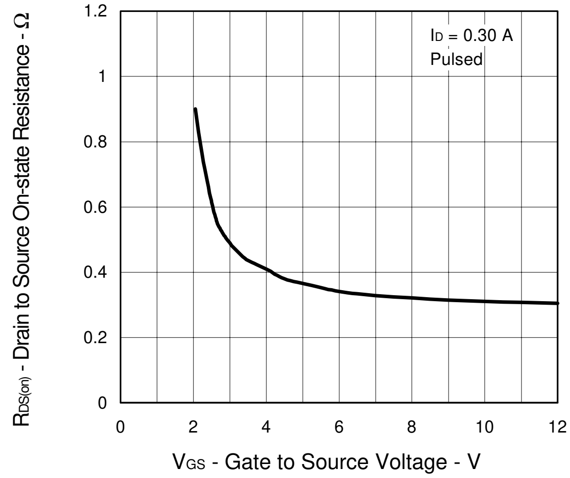
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



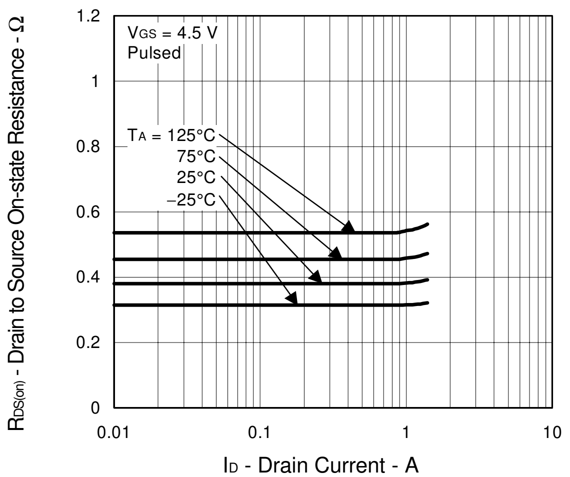
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



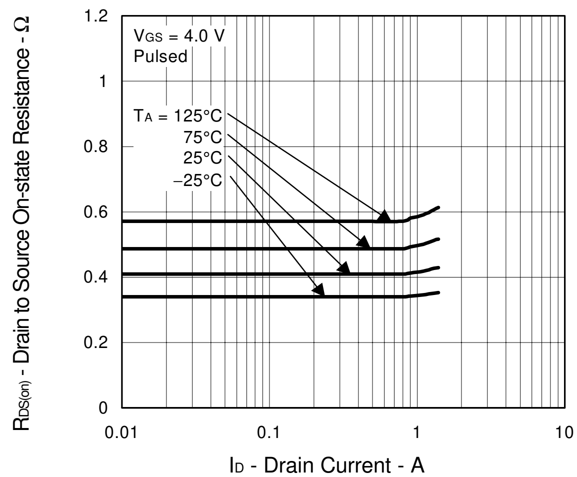
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



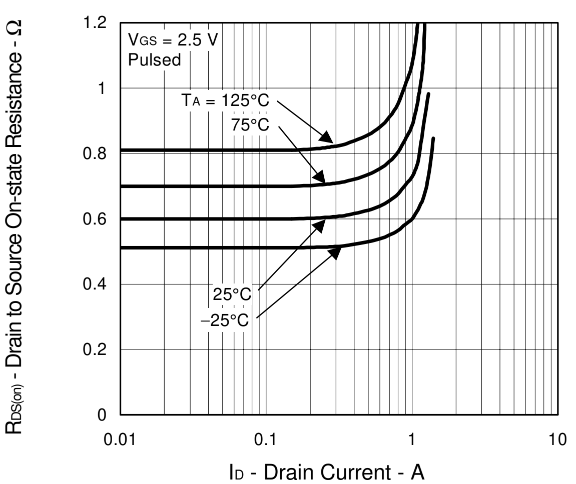
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



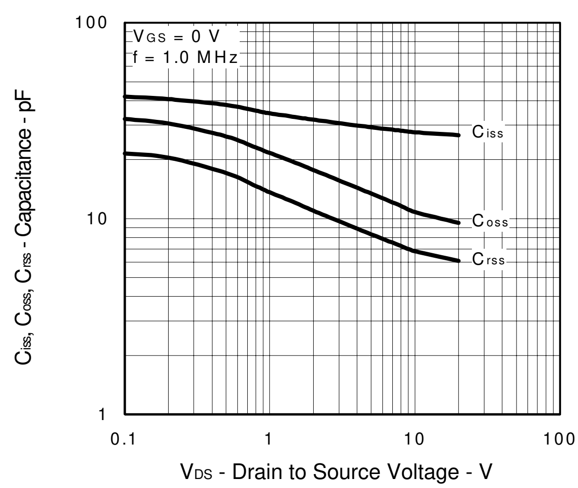
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



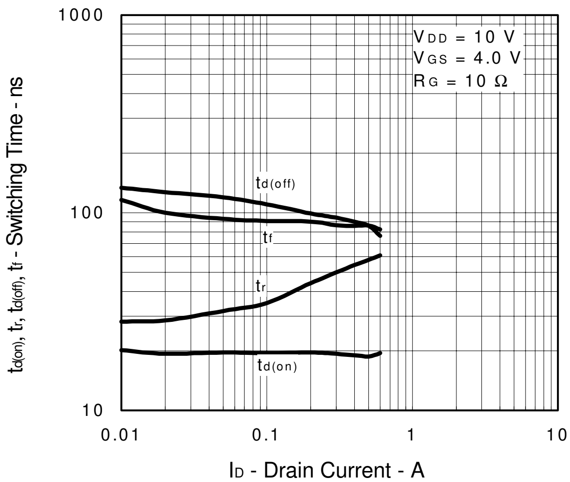
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE