

To our customers,

Old Company Name in Catalogs and Other Documents

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

April 1st, 2010
Renesas Electronics Corporation

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

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MOS FIELD EFFECT TRANSISTOR

μPA2521

N-CHANNEL MOS FET FOR SWITCHING

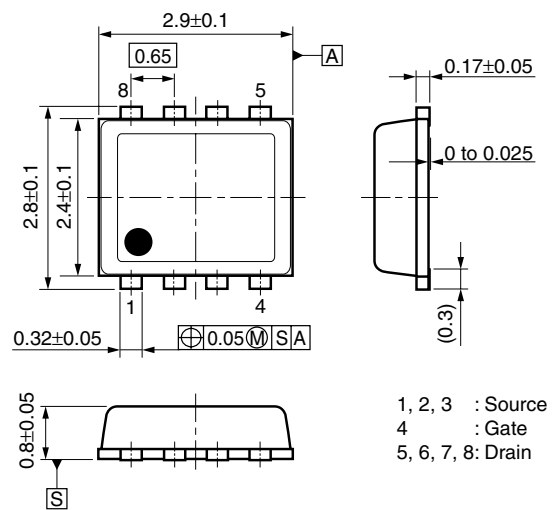
DESCRIPTION

The μPA2521 is N-channel MOS Field Effect Transistor designed for DC/DC converter and power management applications of portable equipments.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 16.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 8.0 \text{ A)}$
 $R_{DS(on)2} = 25 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 4.0 \text{ A)}$
- Built-in gate protection diode
- Small and surface mount package (8-pin VSOFF (2429))
- Pb-free (This product does not contain Pb in external electrode and other parts.)

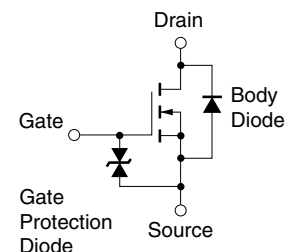
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, All terminals are connected.)

| | | | |
|---|-----------------------|-------------|----|
| Drain to Source Voltage (V _{GS} = 0 V) | V _{DSS} | 30 | V |
| Gate to Source Voltage (V _{DS} = 0 V) | V _{GSS} | ±20 | V |
| Drain Current (DC) | I _{D(DC)} | ±8 | A |
| Drain Current (pulse) ^{Note1} | I _{D(pulse)} | ±32 | A |
| Total Power Dissipation ^{Note2} | P _{T1} | 1.0 | W |
| Total Power Dissipation (PW = 5 sec) ^{Note2} | P _{T2} | 2.2 | W |
| Channel Temperature | T _{ch} | 150 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |
| Single Avalanche Current ^{Note3} | I _{AS} | 8 | A |
| Single Avalanche Energy ^{Note3} | E _{AS} | 6.4 | mJ |

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board of 25.4 mm x 25.4 mm x 0.8 mm

3. Starting T_{ch} = 25°C, V_{DD} = 15 V, R_G = 25 Ω, V_{GS} = 20 → 0 V, L = 100 μH

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.

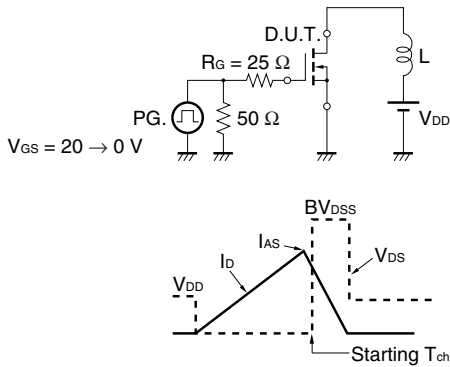
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ELECTRICAL CHARACTERISTICS (TA = 25°C, All terminals are connected.)

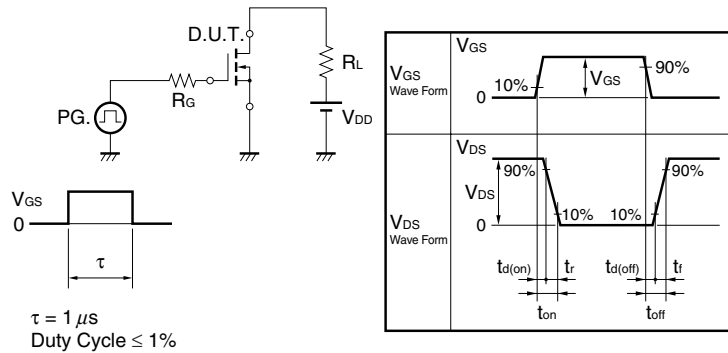
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|----------------------|---|------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 30 V, V _{GS} = 0 V | | | 10 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±20 V, V _{DS} = 0 V | | | ±10 | μA |
| Gate to Source Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1 mA | 1.5 | | 2.5 | V |
| Forward Transfer Admittance ^{Note} | y _{fs} | V _{DS} = 10 V, I _D = 4.0 A | 3.2 | | | S |
| Drain to Source On-state Resistance ^{Note} | R _{DS(on)1} | V _{GS} = 10 V, I _D = 8.0 A | | 12 | 16.5 | mΩ |
| | R _{DS(on)2} | V _{GS} = 4.5 V, I _D = 4.0 A | | 17 | 25 | mΩ |
| Input Capacitance | C _{iss} | V _{DS} = 15 V, | | 780 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V, | | 170 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 61 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 15 V, I _D = 4.0 A, | | 9.2 | | ns |
| Rise Time | t _r | V _{GS} = 10 V, | | 3.8 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 10 Ω | | 31 | | ns |
| Fall Time | t _f | | | 4.8 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 15 V, | | 7.6 | | nC |
| Gate to Source Charge | Q _{GS} | V _{GS} = 5 V, | | 2.6 | | nC |
| Gate to Drain Charge | Q _{GD} | I _D = 8 A | | 2.4 | | nC |
| Body Diode Forward Voltage ^{Note} | V _{F(S-D)} | I _F = 8 A, V _{GS} = 0 V | | 0.82 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 8 A, V _{GS} = 0 V, | | 24 | | ns |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100 A/μs | | 17 | | nC |
| Gate Resistance | R _G | f = 1 MHz | | 1.6 | | Ω |

Note Pulsed

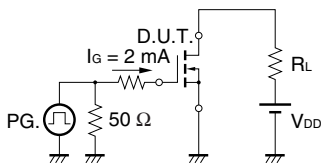
TEST CIRCUIT 1 AVALANCHE CAPABILITY



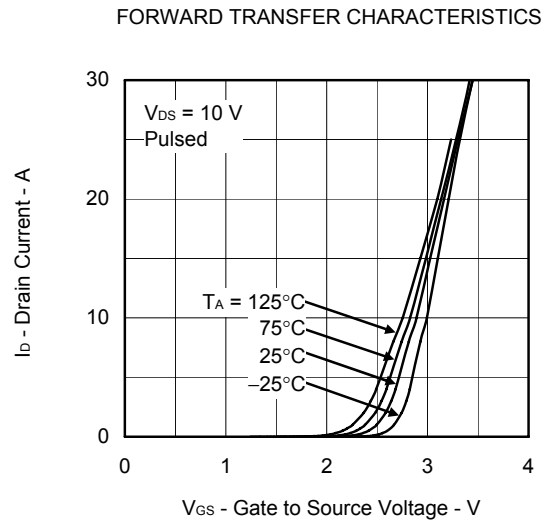
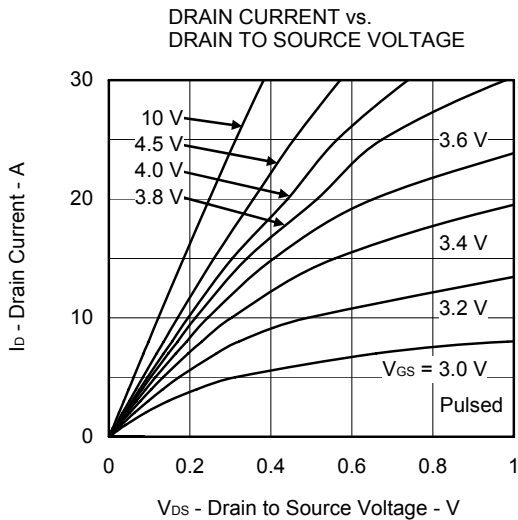
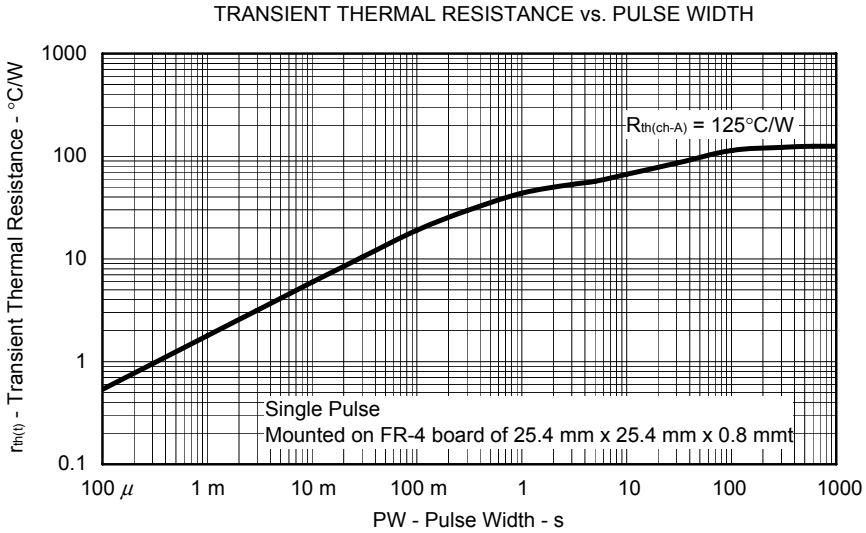
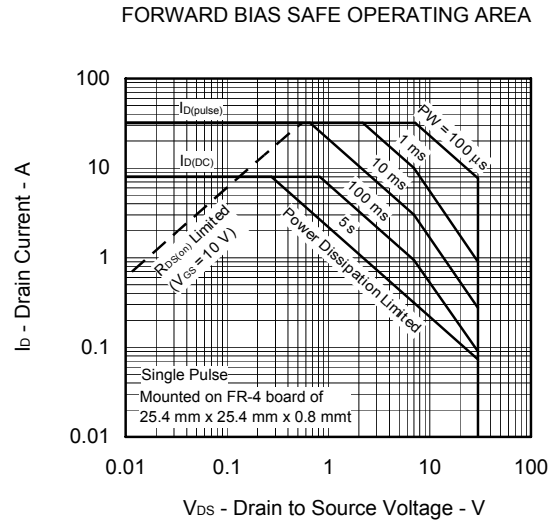
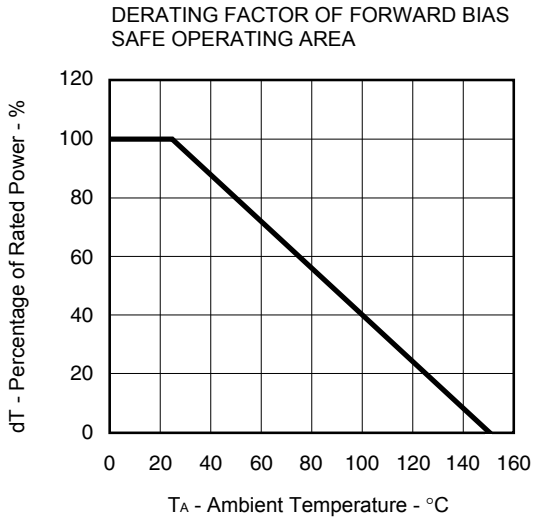
TEST CIRCUIT 2 SWITCHING TIME



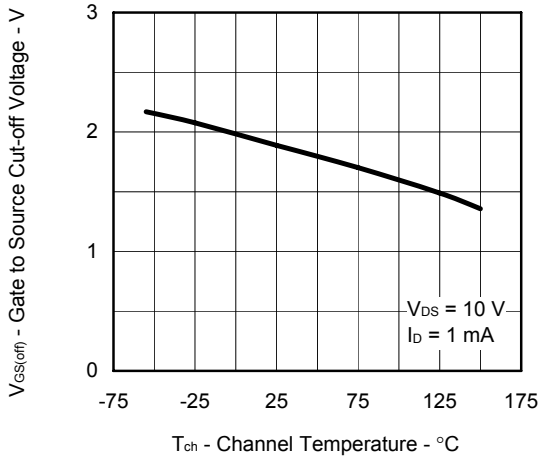
TEST CIRCUIT 3 GATE CHARGE



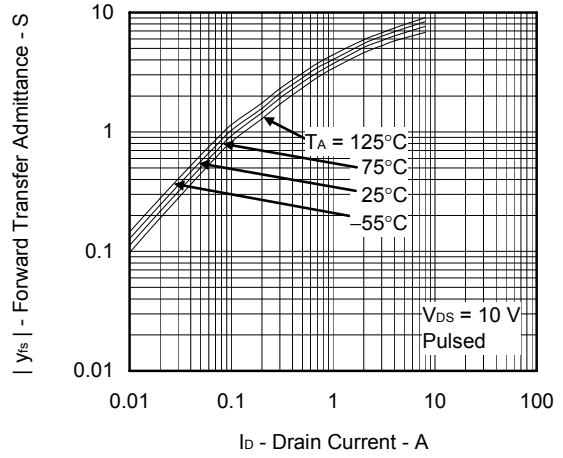
TYPICAL CHARACTERISTICS (T_A = 25°C)



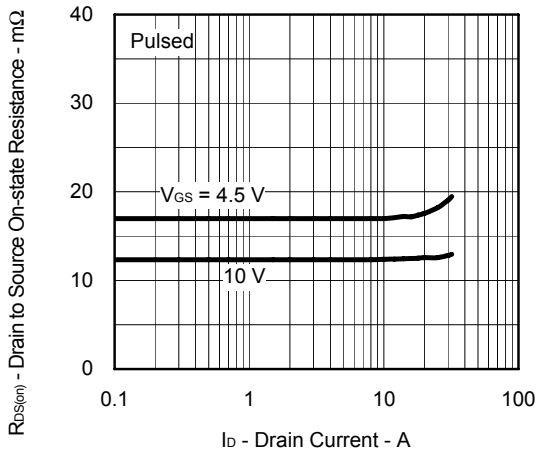
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



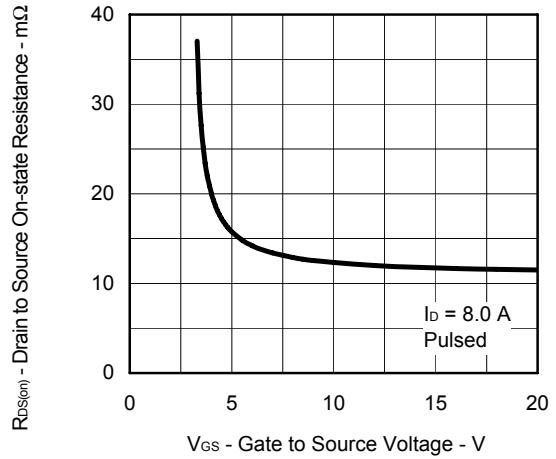
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



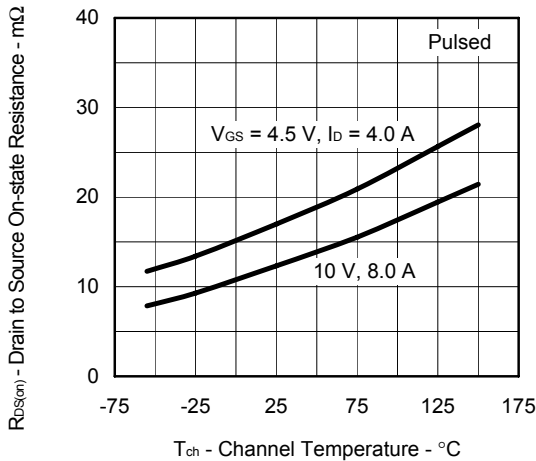
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



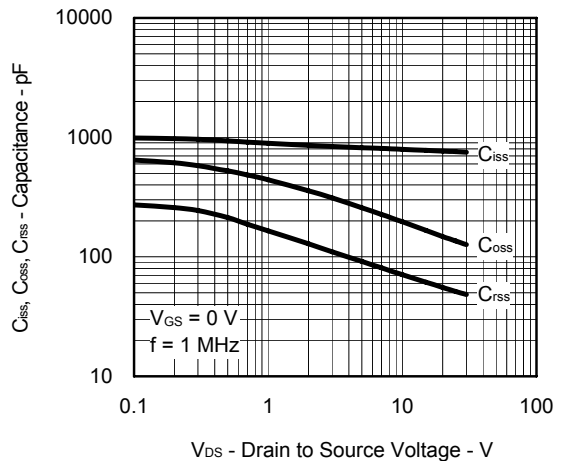
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



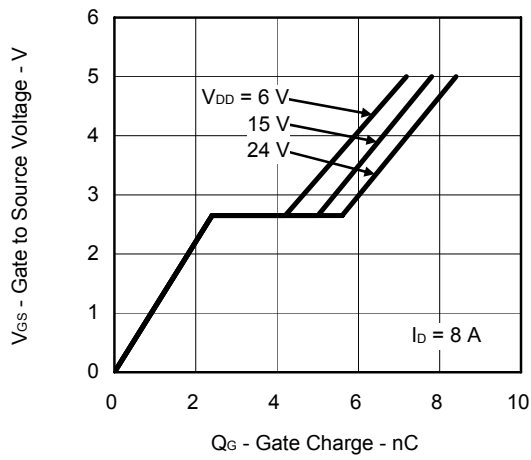
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



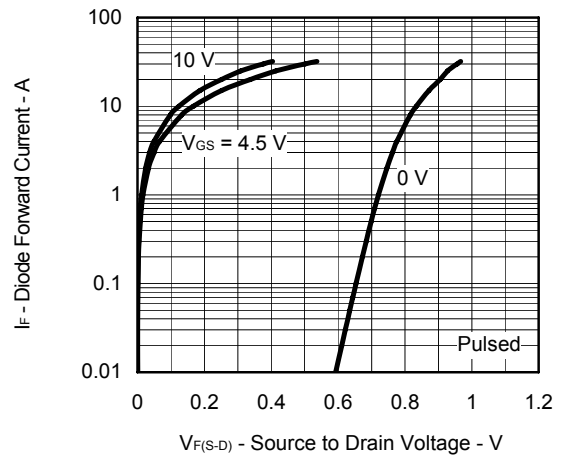
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



ORDERING INFORMATION

| PART NUMBER | LEAD PLATING | PACKING | PACKAGE |
|---------------------------------------|--------------|----------------------|--------------------|
| μ PA2521T1H-T1-AT ^{Note} | Pure Sn | 8 mm embossed taping | 8-pin VSOFF (2429) |
| μ PA2521T1H-T2-AT ^{Note} | | 3000 p/reel | |

Note Pb-free (This product does not contain Pb in external electrode and other parts.)

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