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April 1st, 2010
Renesas Electronics Corporation

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

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SWITCHING N-CHANNEL POWER MOSFET

DESCRIPTION

The μPA2805UT1L is N-channel MOS FET designed for DC/DC converter and power management applications of portable equipments.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 10 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 25 \text{ A)}$
 $R_{DS(on)2} = 15 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 13 \text{ A)}$
- Low Q_G
- Thin type surface mount package with heat spreader (8-pin HVSON (3333))
- RoHS Compliant
- Halogen Free

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, All terminals are connected.)

| | | | |
|--|----------------|------------------------|------------------|
| Drain to Source Voltage ($V_{GS} = 0 \text{ V}$) | V_{DSS} | 30 | V |
| Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) | V_{GSS} | ± 20 | V |
| Drain Current (DC) ($T_C = 25^\circ\text{C}$) | $I_{D(DC)}$ | ± 25 | A |
| Drain Current (pulse) ^{Note1} | $I_{D(pulse)}$ | ± 100 | A |
| Total Power Dissipation ^{Note2} | P_{T1} | 1.5 | W |
| Total Power Dissipation ($PW = 10 \text{ s}$) ^{Note2} | P_{T2} | 3.8 | W |
| Total Power Dissipation ($T_C = 25^\circ\text{C}$) | P_{T3} | 52 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | $-55 \text{ to } +150$ | $^\circ\text{C}$ |
| Single Avalanche Current ^{Note3} | I_{AS} | 14 | A |
| Single Avalanche Energy ^{Note3} | E_{AS} | 19.6 | mJ |

THERMAL RESISTANCE

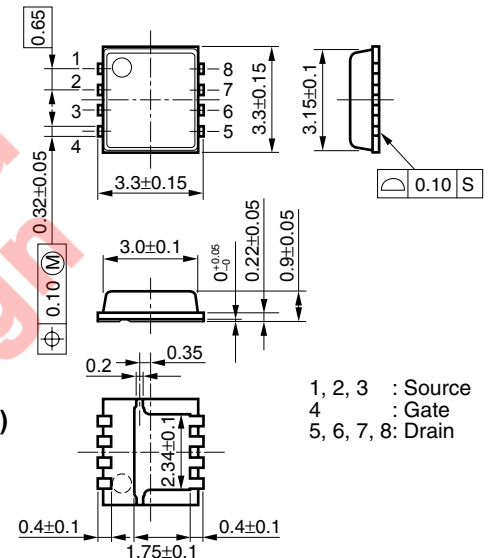
| | | | |
|--|----------------|------|--------------------|
| Channel to Ambient Thermal Resistance ^{Note2} | $R_{th(ch-A)}$ | 83.3 | $^\circ\text{C/W}$ |
| Channel to Case (Drain) Thermal Resistance | $R_{th(ch-C)}$ | 2.4 | $^\circ\text{C/W}$ |

- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. Mounted on a glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mm
 3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 15 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$, $L = 100 \mu\text{H}$

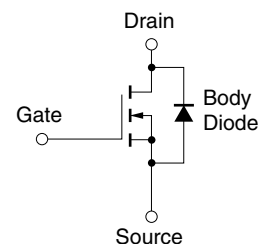
Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT

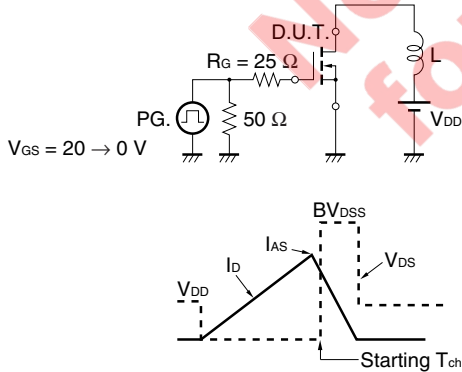


ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

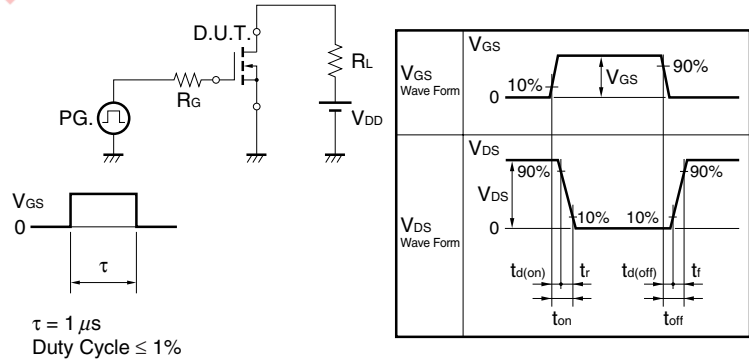
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|----------------------|---|------------------------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 30 V, V _{GS} = 0 V | | | 10 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±16 V, V _{DS} = 0 V | | | ±100 | nA |
| 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 = 13 A | 6.7 | | | S |
| Drain to Source On-state Resistance ^{Note} | R _{DS(on)1} | V _{GS} = 10 V, I _D = 25 A | | 7.5 | 10 | mΩ |
| | R _{DS(on)2} | V _{GS} = 4.5 V, I _D = 13 A | | 11.5 | 15 | mΩ |
| Input Capacitance | C _{iss} | V _{DS} = 15 V, V _{GS} = 0 V, | | 940 | 1230 | pF |
| Output Capacitance | C _{oss} | f = 1 MHz | | 160 | 210 | pF |
| Reverse Transfer Capacitance | C _{rss} | | | 72 | 110 | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 15 V, I _D = 13 A, | | 11 | | ns |
| Rise Time | t _r | V _{GS} = 10 V, | | 4.3 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 10 Ω | | 35 | | ns |
| Fall Time | t _f | | | 4.7 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 15 V, I _D = 25 A | V _{GS} = 10 V | 16.7 | 25.5 | nC |
| | | | V _{GS} = 5 V | 8.0 | 12 | nC |
| Gate to Source Charge | Q _{GS} | | | 3.5 | | nC |
| Gate to Drain Charge | Q _{GD} | | | 2.7 | | nC |
| Body Diode Forward Voltage ^{Note} | V _{F(S-D)} | I _F = 25 A, V _{GS} = 0 V | | 0.87 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 25 A, V _{GS} = 0 V, | | 25 | | ns |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100 A/μs | | 19 | | nC |
| Gate Resistance | R _G | f = 1 MHz | | 2.5 | 3.9 | Ω |

Note Pulsed

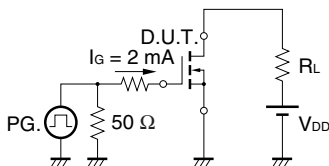
TEST CIRCUIT 1 AVALANCHE CAPABILITY



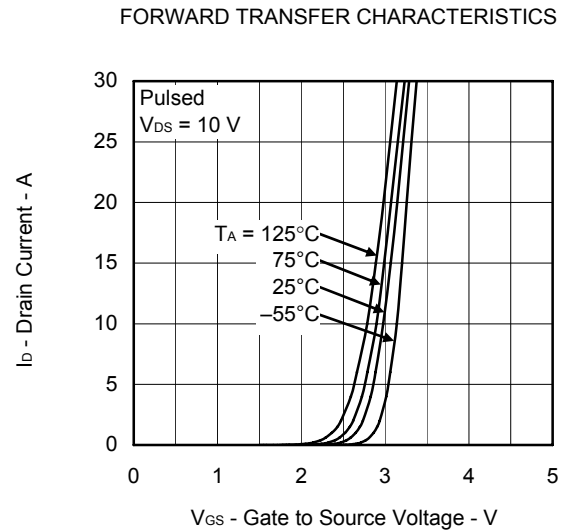
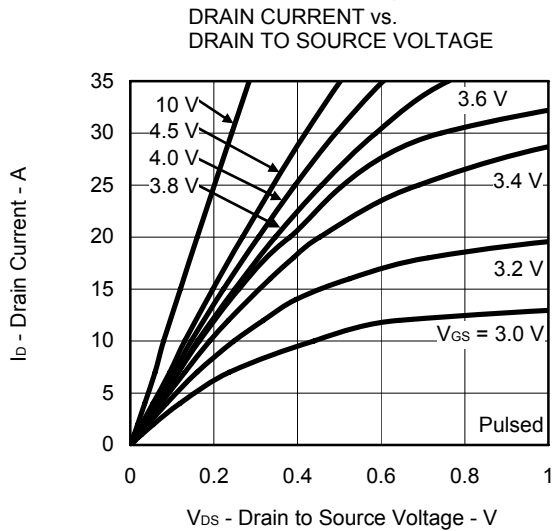
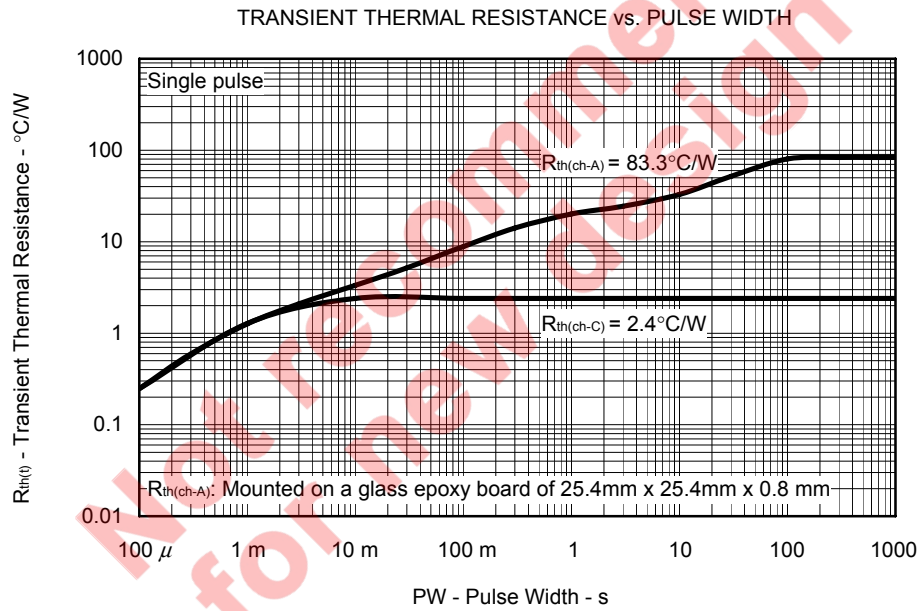
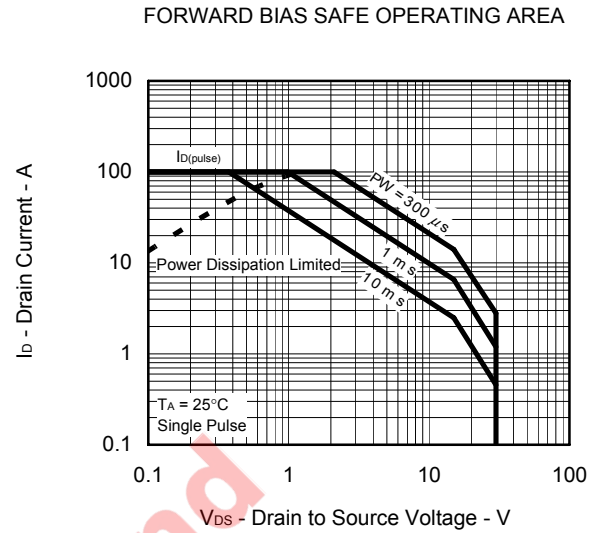
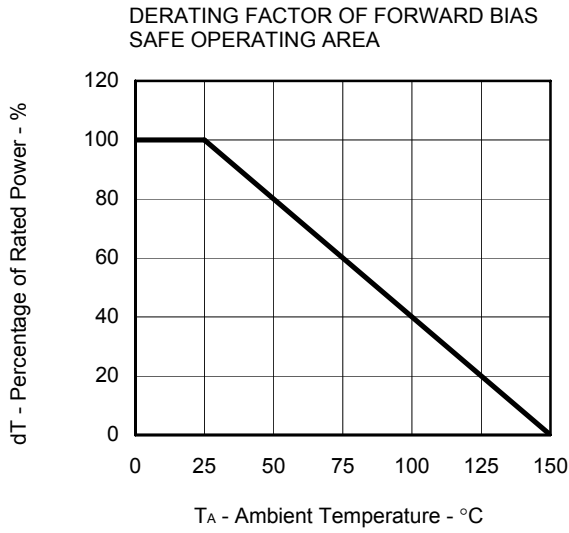
TEST CIRCUIT 2 SWITCHING TIME



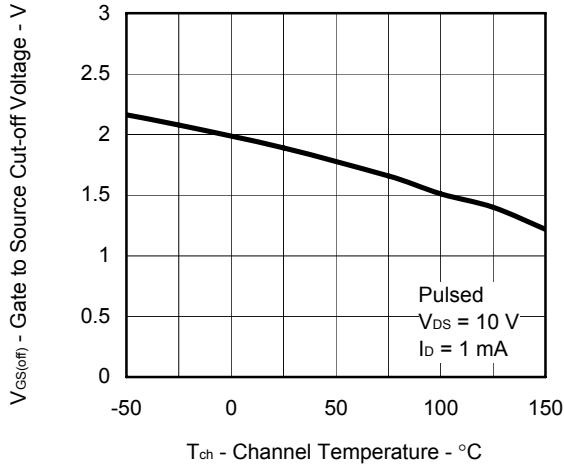
TEST CIRCUIT 3 GATE CHARGE



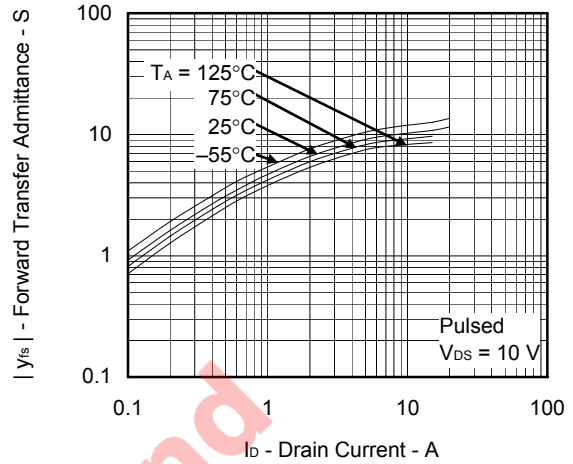
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



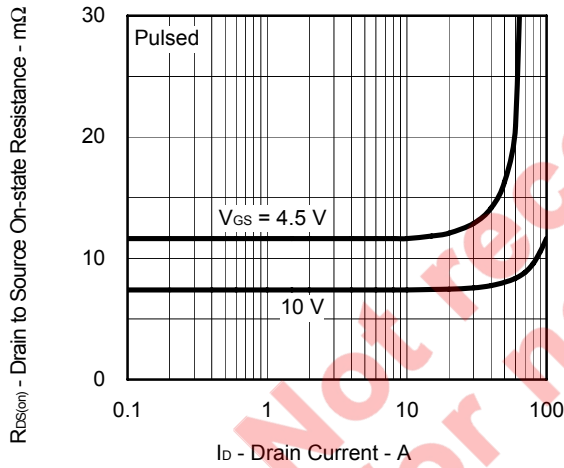
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



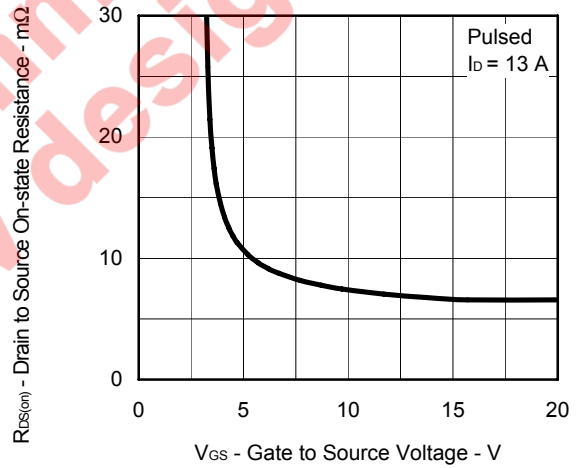
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



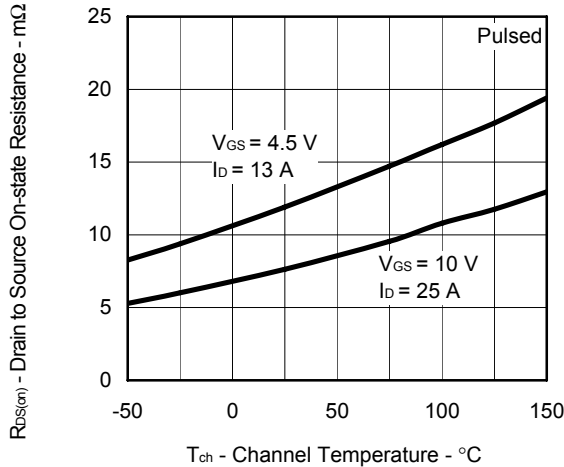
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



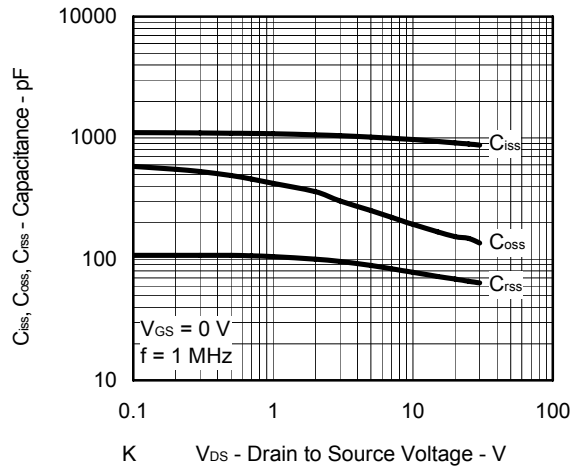
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



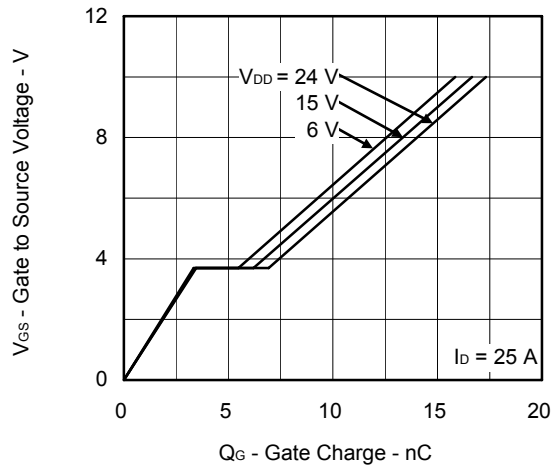
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



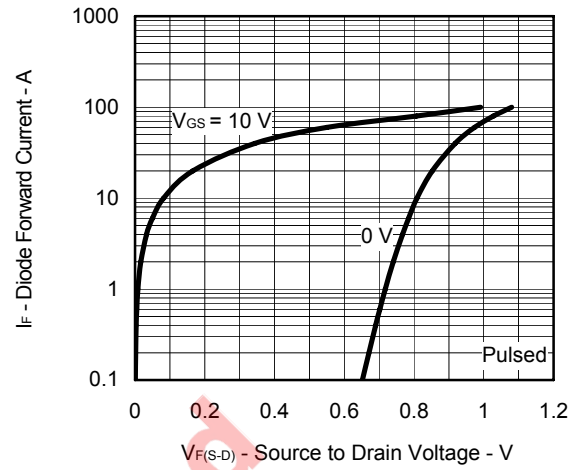
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



ORDERING INFORMATION

| PART NUMBER | LEAD PLATING | PACKING | PACKAGE |
|-----------------------------------|--------------|------------------|------------------------------------|
| μPA2805UT1L-E1-AY ^{Note} | Pure Sn | Tape 3000 p/reel | 8-pin HVSON (3333) 0.028 g TYP. |
| μPA2805UT1L-E2-AY ^{Note} | | | |

Note Pb-free (This product does not contain Pb in the external electrode.)

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