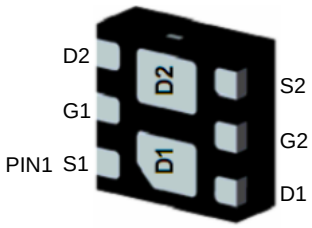
# WPMD2084

**Dual P-Channel, -20V, -3.3A, Power MOSFET**

**Http://www.sh-willsemi.com**

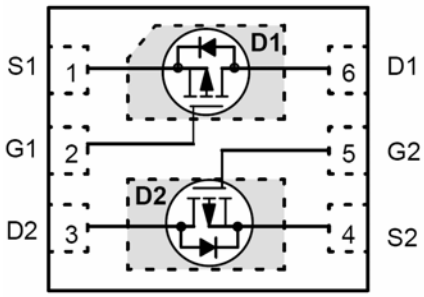
| $V_{DS}$ (V) | Typical $R_{DS(on)}$ (mΩ) |
|---|---|
| -20 | 80 @ $V_{GS}$=-4.5V |
| | 105 @ $V_{GS}$=-2.5V |




**DFN2X2-6L**

## Descriptions

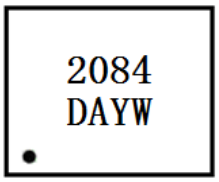
The WPMD2084 is Dual P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPMD2084 is Pb-free.




**Pin configuration (Top view)**

## Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package DFN2X2-6L




2084 = Device Code
DA = Special Code
Y = Year
W = Week(A~z)

**Marking**

## Applications

- DC/DC converters
- Power supply converters circuit
- Load/Power Switching for portable device

## Order information

| Device | Package | Shipping |
|---|---|---|
| WPMD2084-6/TR | DFN2X2-6L | 3000/Tape&Reel |

## Absolute Maximum ratings

| Parameter | | Symbol | 10 s | Steady State | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±10 | | V |
| Continuous Drain Current [a d] | $T_A$=25°C | $I_D$ | -3.3 | -2.9 | A |
| | $T_A$=70°C | | -2.6 | -2.3 | |
| Maximum Power Dissipation [a d] | $T_A$=25°C | $P_D$ | 2.0 | 1.5 | W |
| | $T_A$=70°C | | 1.3 | 1.0 | |
| Continuous Drain Current [b d] | $T_A$=25°C | $I_D$ | -2.2 | -2.0 | A |
| | $T_A$=70°C | | -1.7 | -1.6 | |
| Maximum Power Dissipation [b d] | $T_A$=25°C | $P_D$ | 0.8 | 0.7 | W |
| | $T_A$=70°C | | 0.5 | 0.4 | |
| Pulsed Drain Current [c] | | $I_{DM}$ | -18 | | A |
| Operating Junction Temperature | | $T_J$ | -55 to 150 | | °C |
| Lead Temperature | | $T_L$ | 260 | | °C |
| Storage Temperature Range | | $T_{stg}$ | -55 to 150 | | °C |

## Thermal resistance ratings

| Single Operation | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Junction-to-Ambient Thermal Resistance [a] | t ≤ 10 s | $R_{\theta JA}$ | 50 | 62 | °C/W |
| | Steady State | | 65 | 82 | |
| Junction-to-Ambient Thermal Resistance [b] | t ≤ 10 s | $R_{\theta JA}$ | 125 | 150 | |
| | Steady State | | 145 | 175 | |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 30 | 38 | |

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR4 board using minimum pad size, 1oz copper

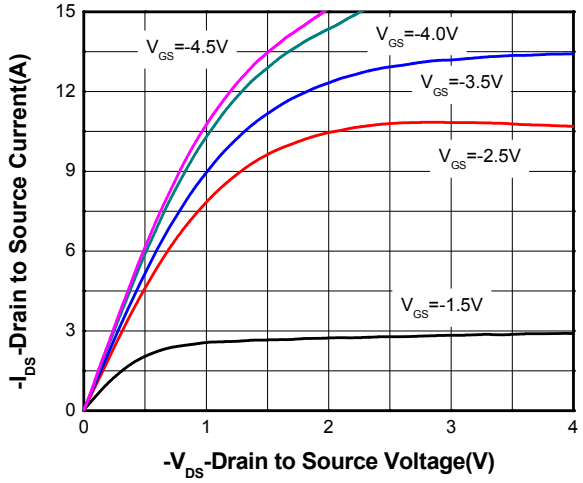
c Repetitive rating, pulse width limited by junction temperature, $t_p$=10μs, Duty Cycle=1%

d Repetitive rating, pulse width limited by junction temperature $T_J$=150°C.

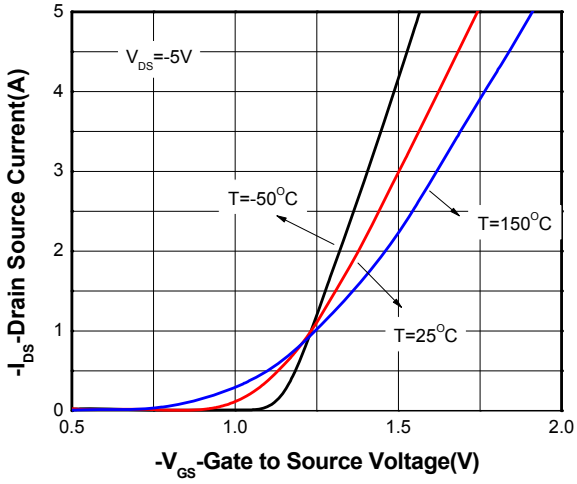
## Electronics Characteristics (Ta=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-to-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = -250uA | -20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =-16V, $V_{GS}$ = 0V | | | -1 | uA |
| Gate-to-source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±10V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = -250uA | -0.4 | -0.65 | -1 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}$ =-4.5V, $I_D$ = -2.4A | | 80 | 120 | mΩ |
| | | $V_{GS}$ =-2.5V, $I_D$ = -2.0A | | 100 | 150 | |
| **CHARGES, CAPACITANCES AND GATE RESISTANCE** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1.0MHz, $V_{DS}$ = -10 V | | 444 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 52 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 41 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = -4.5 V, $V_{DS}$ = -10 V, $I_D$ =-2.4 A | | 5.8 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.5 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | 0.7 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 1.6 | | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | td(ON) | $V_{GS}$ = -4.5 V, $V_{DS}$ =-6 V, $I_D$=-1A, $R_G$=6Ω | | 9.8 | | ns |
| Rise Time | tr | | | 4.4 | | |
| Turn-Off Delay Time | td(OFF) | | | 35 | | |
| Fall Time | tf | | | 7.4 | | |
| **BODY DIODE CHARACTERISTICS** | | | | | | |
| Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = -2.4A | | -0.8 | -1.5 | V |

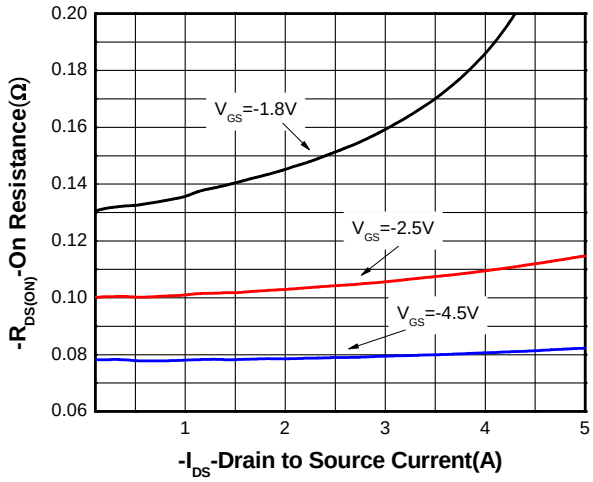
## Typical Characteristics (Ta=25°C, unless otherwise noted)



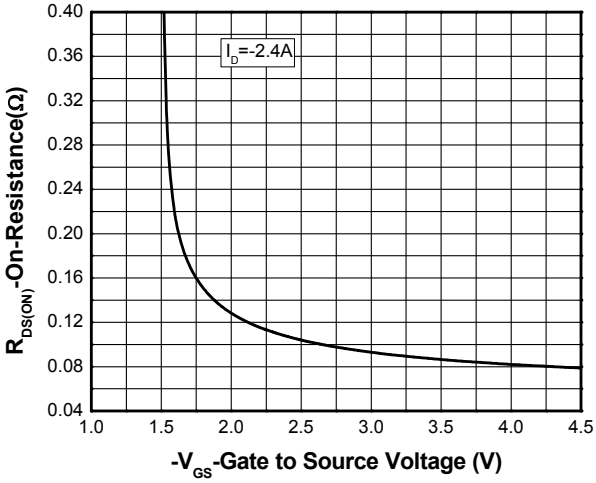

Output characteristics



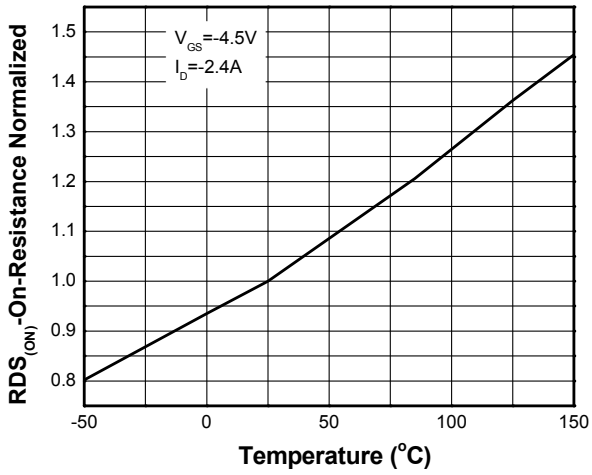

Transfer characteristics



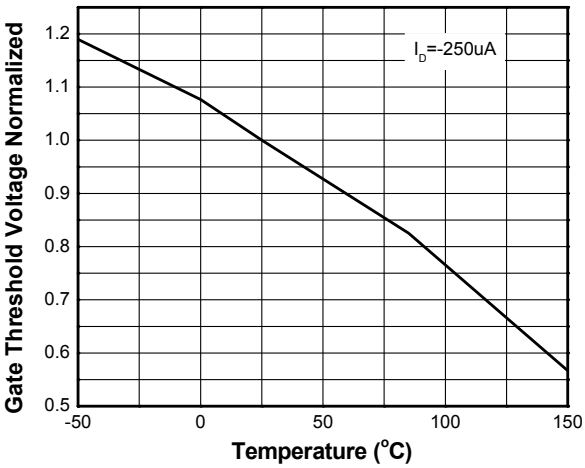

On-Resistance vs. Drain current



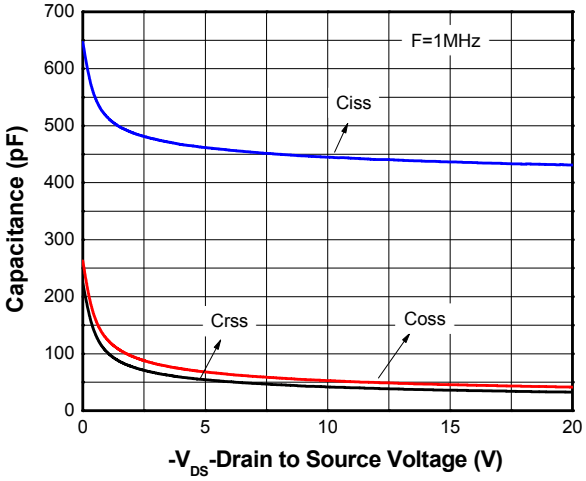

On-Resistance vs. Gate-to-source voltage



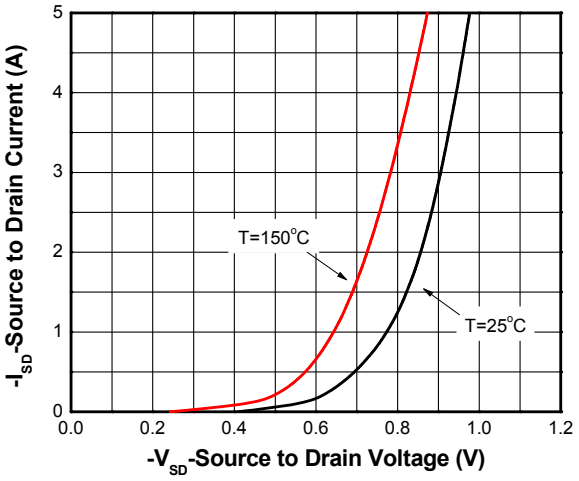

On-Resistance vs. Junction temperature



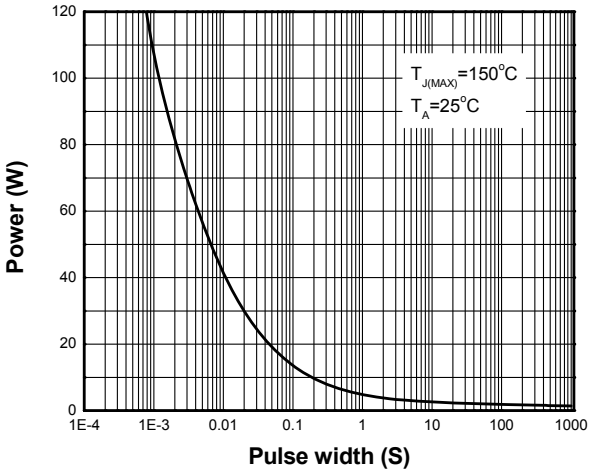

Threshold voltage vs. Temperature



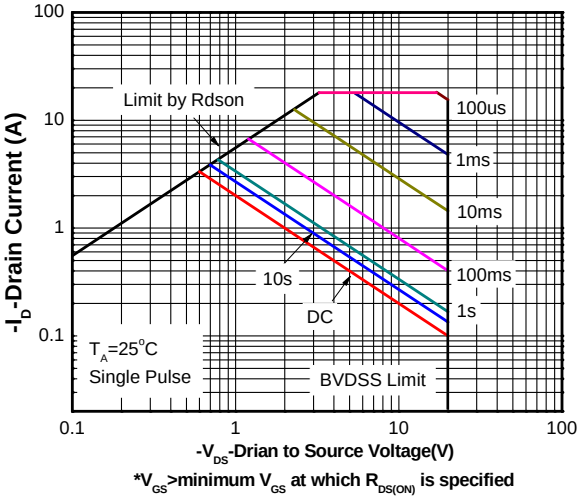

Capacitance



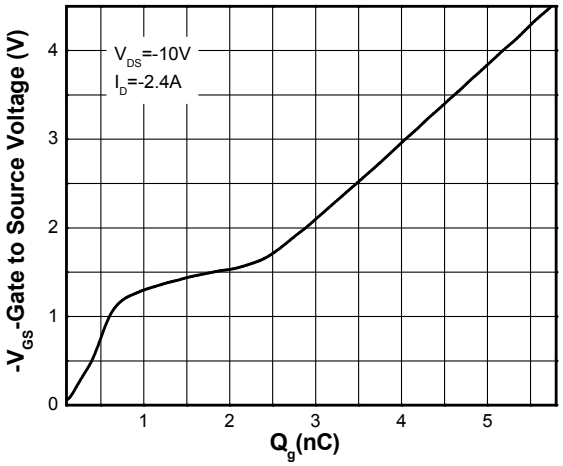

Body diode forward voltage




Single pulse power

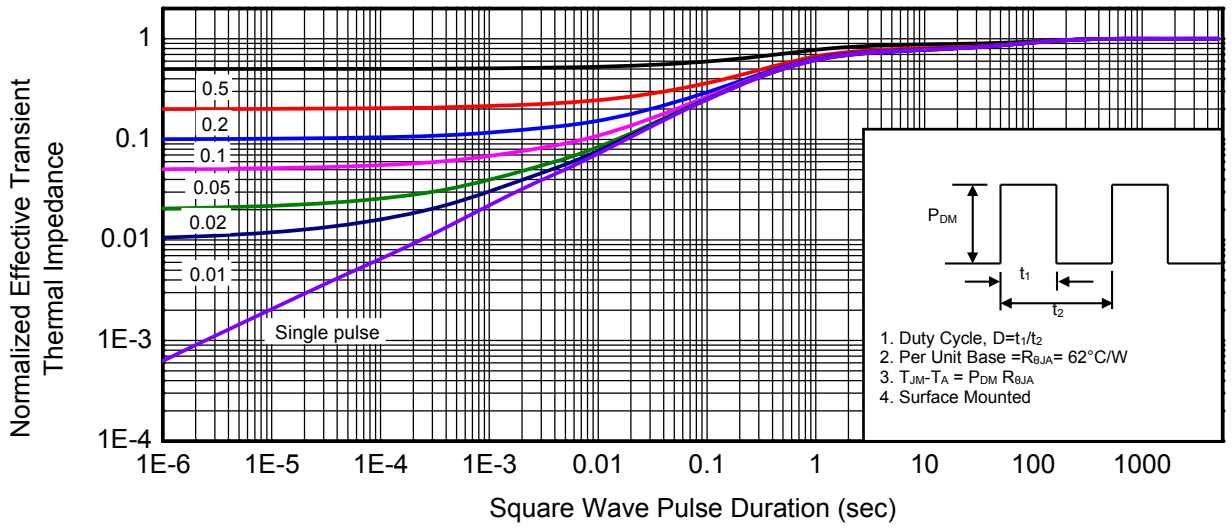



Safe operating power



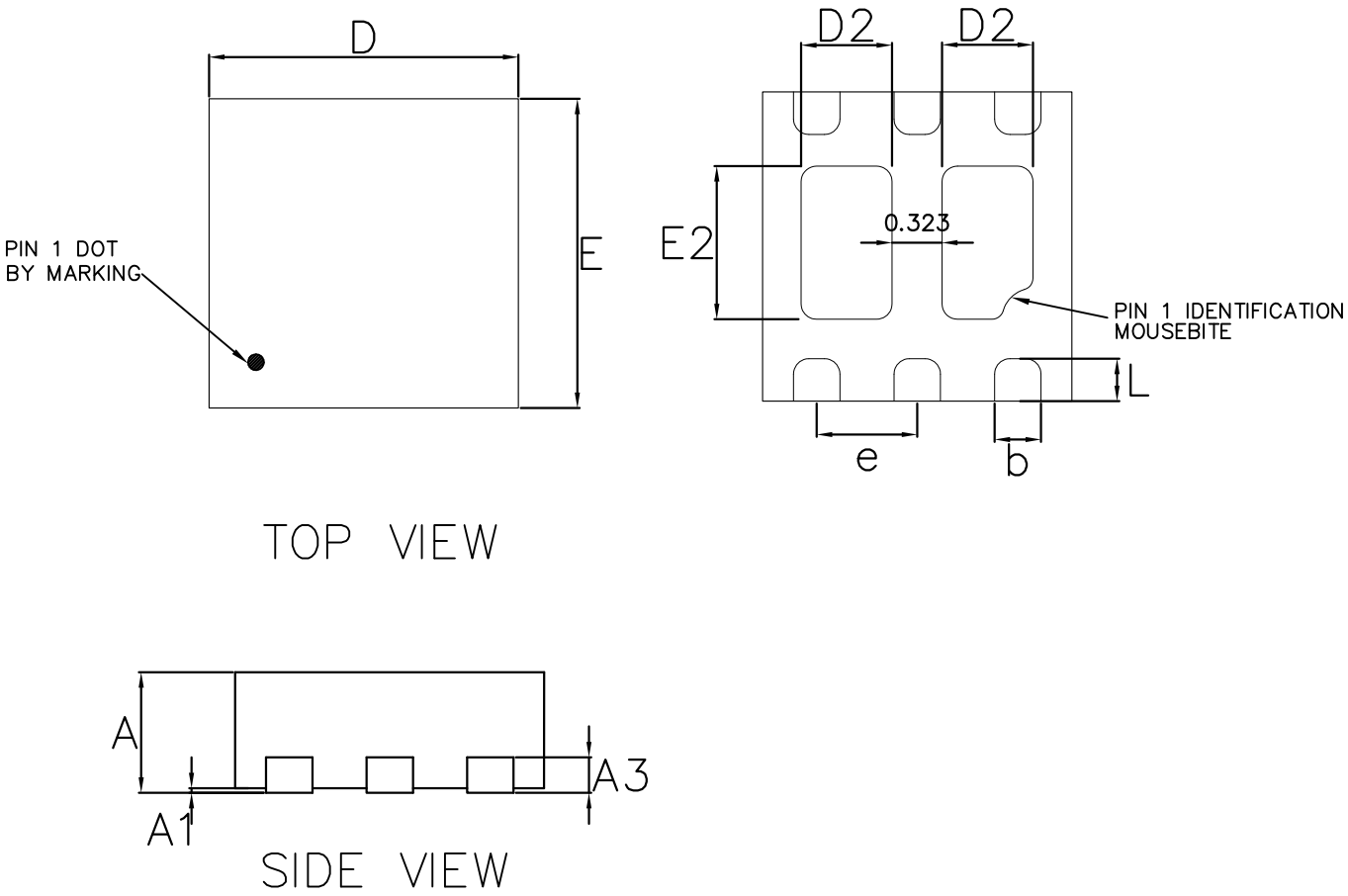

Gate Charge Characteristics

**Transient thermal response (Junction-to-Ambient)**



## Package outline dimensions

**DFN2X2-6L**




| COMMON DIMENSIONS(MM) | | | |
|---|---|---|---|
| PKG. | W: VERY VERY THIN | | |
| REF. | MIN. | NOM. | MAX |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | – | 0.05 |
| A3 | 0.20 REF. | | |
| D | 1.95 | 2.00 | 2.05 |
| E | 1.95 | 2.00 | 2.05 |
| D2 | 0.44 | 0.59 | 0.69 |
| E2 | 0.84 | 0.99 | 1.09 |
| b | 0.25 | 0.30 | 0.35 |
| L | 0.175 | 0.275 | 0.375 |
| e | 0.65 BSC | | |