## Description

The PAM2304 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

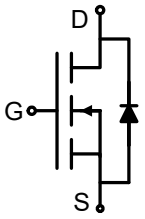
## Features

- VDS = 30V,ID = 3.6A
  RDS(ON) < 73mΩ @ VGS=4.5V
  RDS(ON) <58mΩ @ VGS=10V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

## Applications

- Battery protection
- Load switch
- Power management

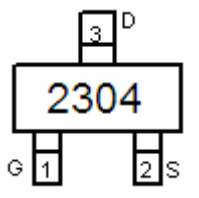
## Dimensions and Pin Configuration




Pin Schematic


SOT-23 top view

## Marking Information




2304= Device Marking Code

## Absolute Maximum Ratings ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 3.6 | A |
| Drain Current-Pulsed (Note 1) | $I_{DM}$ | 15 | A |
| Maximum Power Dissipation | $P_D$ | 1.7 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Ordering Information

| Part Number | Marking | Packaging | Reel Size |
|---|---|---|---|
| PAM2304 | 2304 | 3000/Tape & Reel | 7 inch |

## Electrical Characteristics ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 30 | | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.2 | 1.5 | 2.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=3.1A | - | 58 | 73 | mΩ |
| | | $V_{GS}$=10V, $I_D$=3.6A | - | 40 | 58 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=3.6A | - | 11 | - | S |
| **Dynamic Characteristics (Note4)** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=15V,$V_{GS}$=0V, F=1.0MHz | - | 230 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 40 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 17 | - | PF |
| **Switching Characteristics (Note 4)** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=10V,$I_D$=3.6A $V_{GS}$=4.5V,$R_{GEN}$=6Ω | - | 10 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 50 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 10 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 20 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$I_D$=3.6A, $V_{GS}$=10V | - | 4.0 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 0.75 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 0.65 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=2.7A | - | 0.8 | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 1.6 | A |

## Typical Performance Characteristics ($T_A$=25℃ unless otherwise Specified)

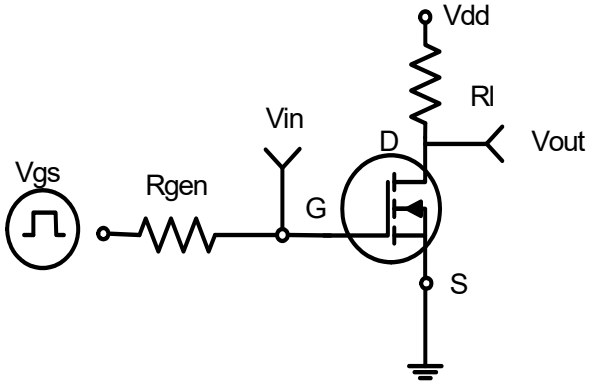



**Figure 1:Switching Test Circuit**

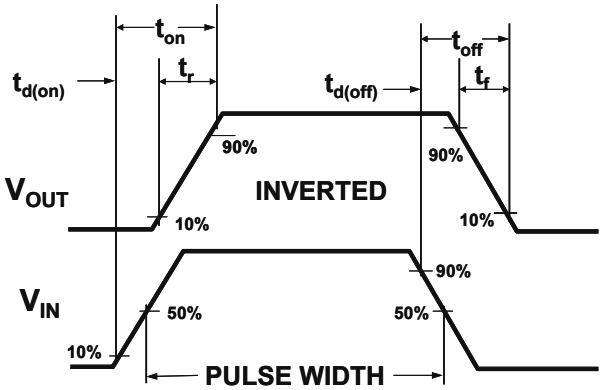



**Figure 2:Switching Waveforms**

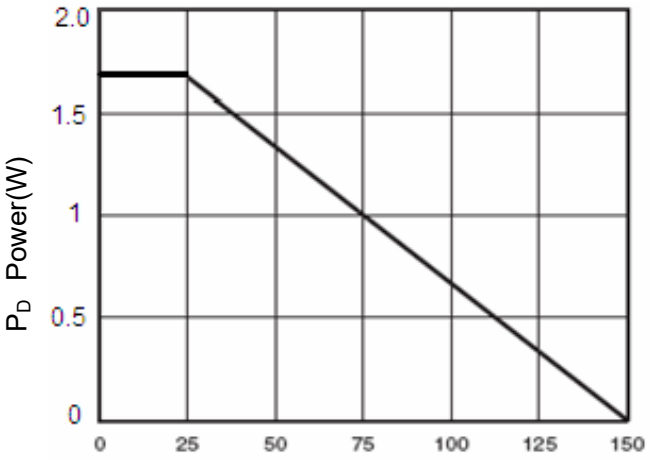



**Figure 3 Power Dissipation**

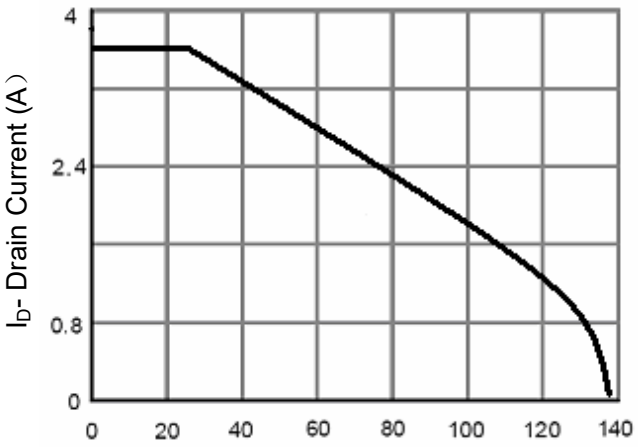



**Figure 4 Drain Current**

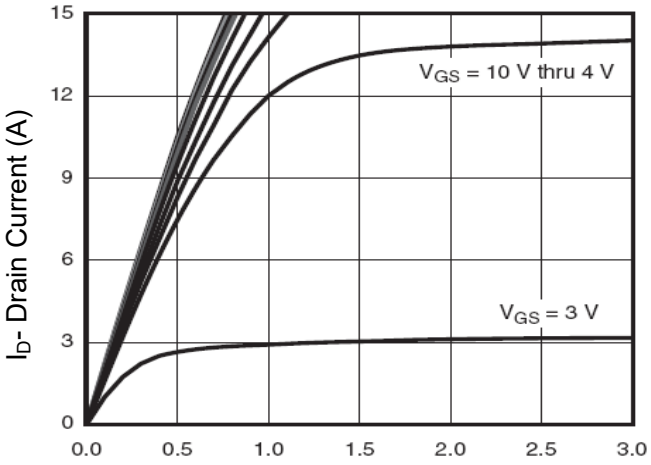



**Figure 5 Output Characteristics**

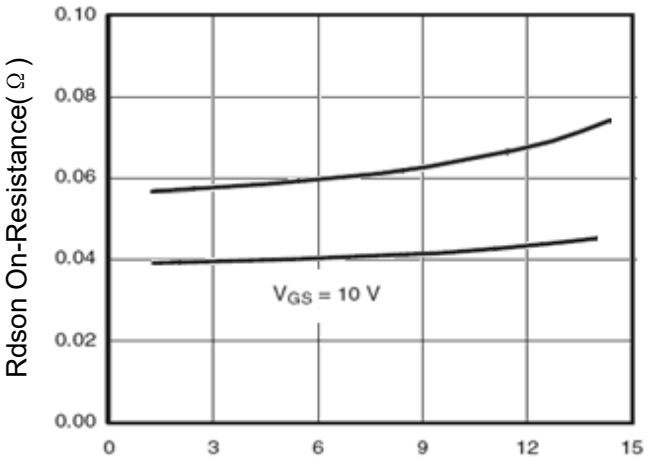



**Figure 6 Drain-Source On-Resistance**

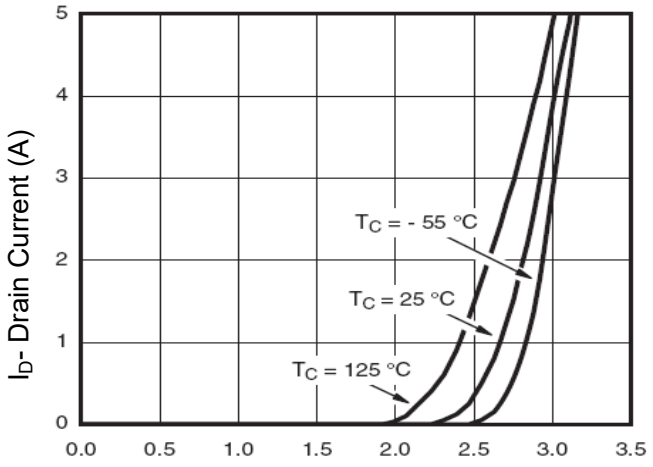



**Figure 7 Transfer Characteristics**

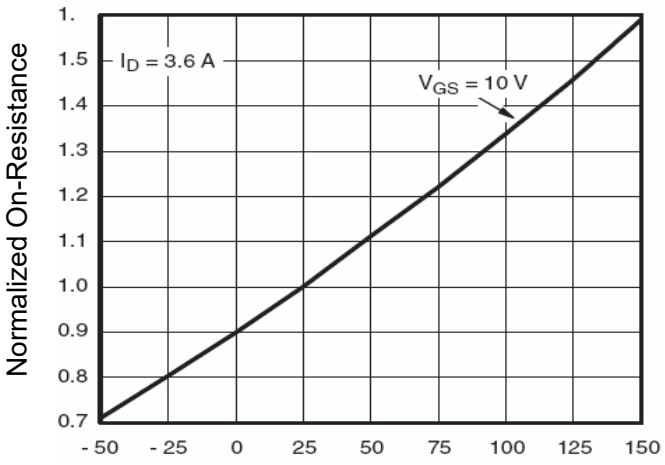



**Figure 8 Drain-Source On-Resistance**

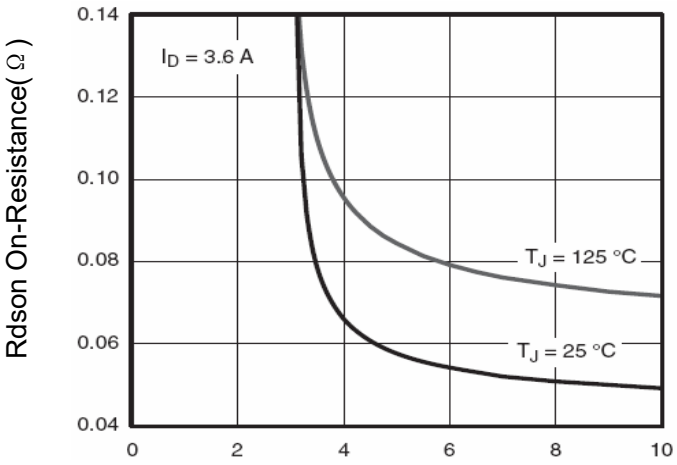



**Figure 9 Rdson vs Vgs**

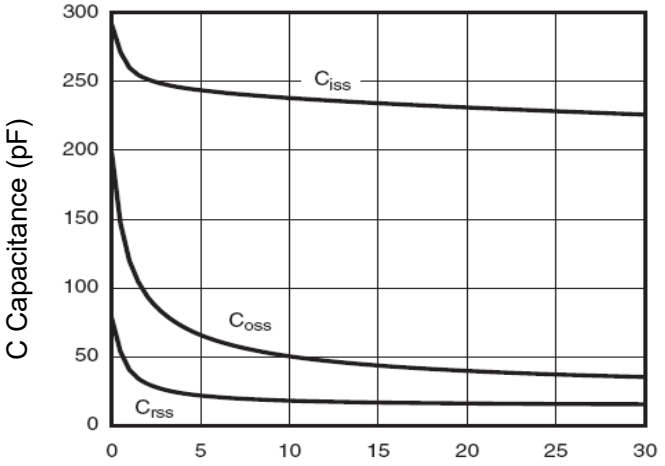



**Figure 10 Capacitance vs Vds**

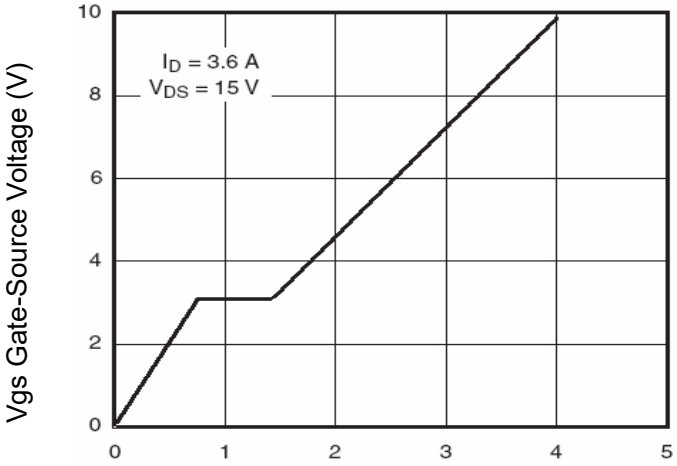



**Figure 11 Gate Charge**

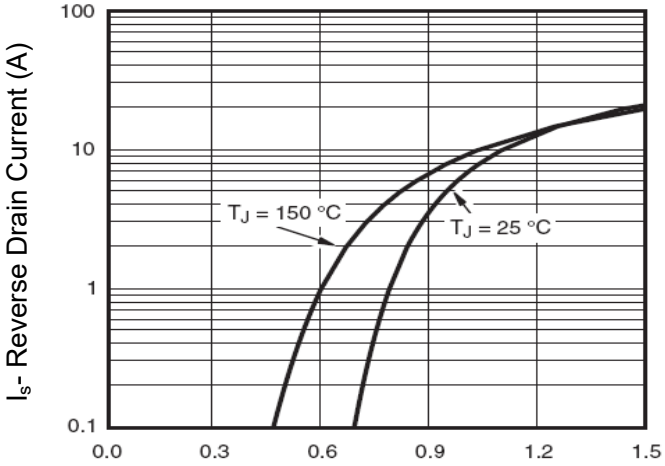



**Figure 12 Source- Drain Diode Forward**

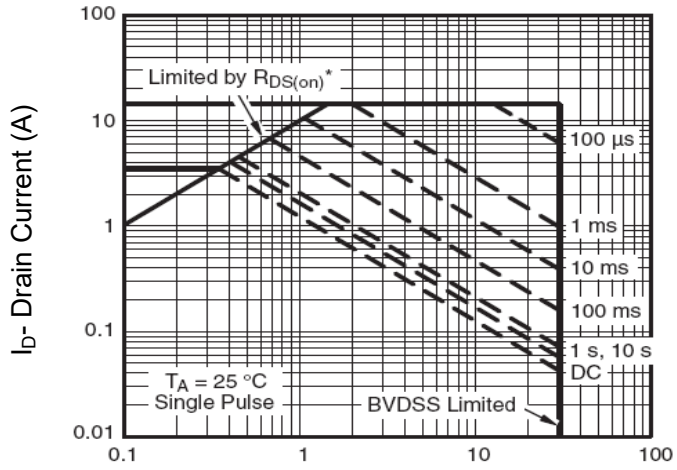



**Figure 13 Safe Operation Area**

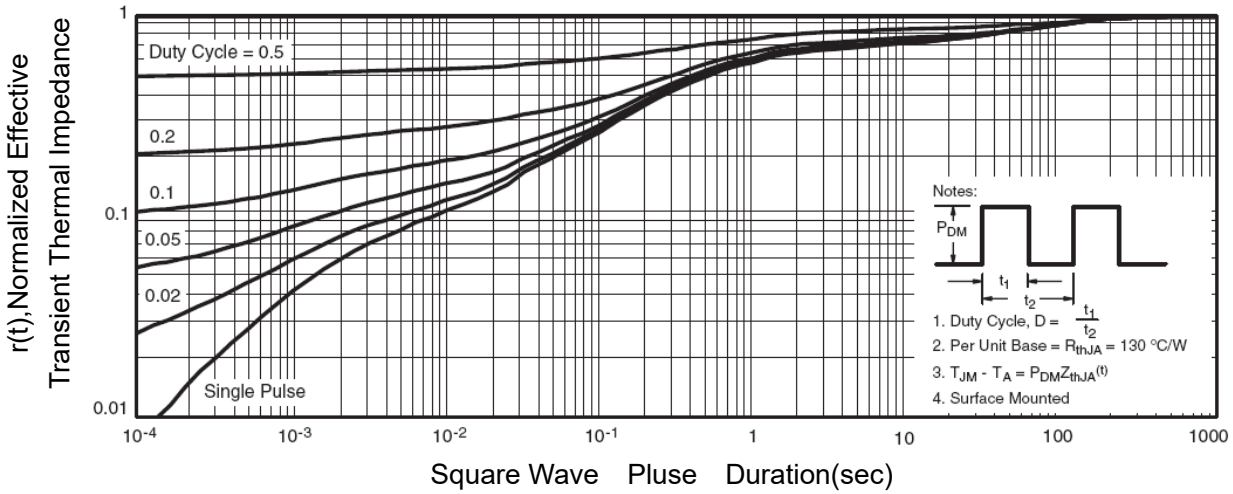
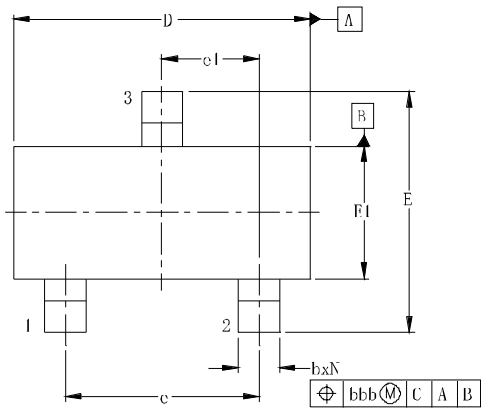
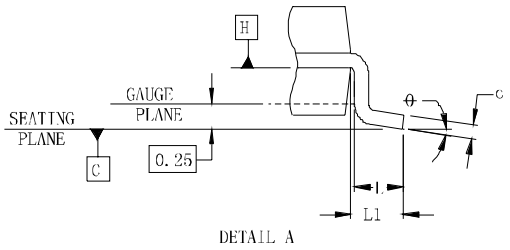
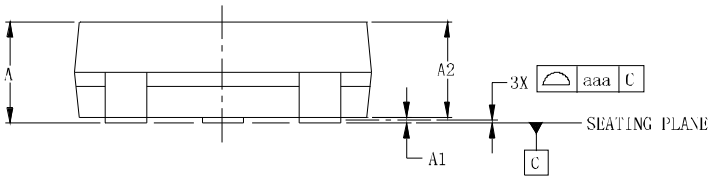



**Figure 14 Normalized Maximum Transient Thermal Impedance**

## SOT-23 Package Outline Drawing

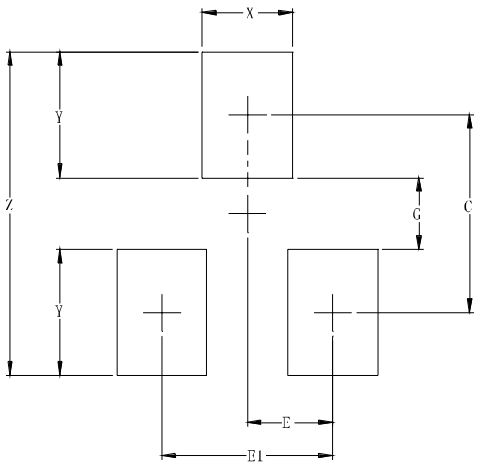



| DIMENSIONS | | | | | | |
|---|---|---|---|---|---|---|
| SYM | INCHES | | | MILLIMETERS | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.035 | - | 0.044 | 0.89 | - | 1.12 |
| A1 | 0.000 | - | 0.004 | 0.01 | - | 0.10 |
| A2 | 0.035 | 0.037 | 0.040 | 0.88 | 0.95 | 1.02 |
| b | 0.012 | - | 0.020 | 0.30 | - | 0.51 |
| c | 0.003 | - | 0.007 | 0.08 | - | 0.18 |
| D | 0.110 | 0.114 | 0.120 | 2.80 | 2.90 | 3.04 |
| E | 0.082 | 0.093 | 0.104 | 2.10 | 2.37 | 2.64 |
| E1 | 0.047 | 0.051 | 0.055 | 1.20 | 1.30 | 1.40 |
| e | 0.075 | | | 1.90BSC | | |
| e1 | 0.037 | | | 0.95BSC | | |
| L | 0.015 | 0.020 | 0.024 | 0.40 | 0.50 | 0.60 |
| L1 | 0.022 | | | 0.55 | | |
| N | 3 | | | 3 | | |
| θ | 0° | - | 8° | 0° | - | 8° |
| aaa | 0.004 | | | 0.10 | | |
| bbb | 0.008 | | | 0.20 | | |

## Suggested Land Pattern




| DIMENSIONS | | |
|---|---|---|
| SYM | INCHES | MILLIMETERS |
| C | 0.087 | 2.20 |
| E | 0.037 | 0.95 |
| E1 | 0.075 | 1.90 |
| G | 0.031 | 0.80 |
| X | 0.039 | 1.00 |
| Y | 0.055 | 1.40 |
| Z | 0.141 | 3.60 |

## Contact Information

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