# AS4503S

N and P-Channel Enhancement Mode MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---|---|---|
| 30V | 13.5mΩ@10V | 10A |
| | 20mΩ@4.5V | |

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---|---|---|
| -30V | 20mΩ@-10V | -9.1A |
| | 35mΩ@4.5V | |

## Feature

- Advanced trench process technology
- High Density Cell Design For Ultra Low On-Resistance
- Surface mount package

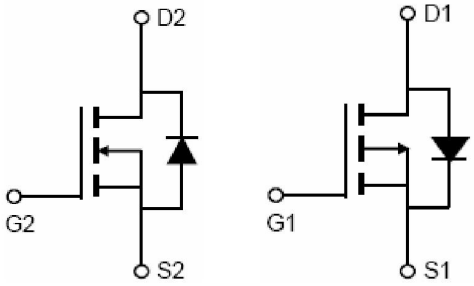
## Application

- Battery protection
- Load switch
- Power management

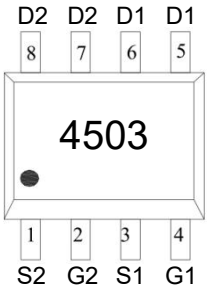
## Package

SOP-8

## Circuit diagram




## Marking



## Absolute maximum ratings (Ta=25℃ unless otherwise noted)

| Parameter | Symbol | N-Channel | p-Channel | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | -30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current | $I_D$ | 10 | -9.1 | A |
| Pulsed Drain Current | $I_{DM}$ | 30 | -30 | A |
| Power Dissipation | $P_D$ | 2.5 | 2.5 | W |
| Junction Temperature | $T_J$ | 150 | 150 | ℃ |
| Thermal Resistance,Junction-to-Ambient[1)] | $R_{\theta JA}$ | 50 | 50 | ℃/W |
| Storage Temperature | $T_{STG}$ | -55 ~ +150 | -55 ~ +150 | ℃ |

## N-CH Electrical characteristics ($T_A$=25 ºC, unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$= 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 |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 1.0 | | 3.0 | V |
| Drain-source on-resistance[2)] | $R_{DS(on)}$ | $V_{GS}$ =10V, $I_D$ =10A | | | 13.5 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =5A | | | 20 | mΩ |
| **Dynamic characteristics[3)]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =15V,$V_{GS}$ =0V,f =1MHz | | 1550 | | pF |
| Output Capacitance | $C_{oss}$ | | | 300 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 180 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =15V,$V_{GS}$ =4.5V,$I_D$ =10A | | 13 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 5.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 3.5 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=25V,$V_{GS}$=10V , $I_D$ =1A,$R_{GEN}$=6Ω | | 30 | | nS |
| Turn-on rise time | $t_r$ | | | 20 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 100 | | |
| Turn-off fall time | $t_f$ | | | 80 | | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage | $V_{DS}$ | $V_{GS}$ =0V, $I_S$=6A | | | 1.2 | V |

## P-CH Electrical characteristics ($T_A$=25 °C, unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 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 |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -1.0 | | -3.0 | V |
| Drain-source on-resistance[2)] | $R_{DS(on)}$ | $V_{GS}$ =-10V, $I_D$ =-9.1A | | | 20 | mΩ |
| | | $V_{GS}$ =-4.5V, $I_D$ =-5A | | | 35 | mΩ |
| **Dynamic characteristics[3)]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-15V,$V_{GS}$ =0V,f =1MHz | | 1600 | | pF |
| Output Capacitance | $C_{oss}$ | | | 350 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 300 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =-15V,$V_{GS}$ =-10V, $I_D$ =-9.1A | | 30 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 5.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 8 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-15V,$V_{GS}$=-10V, $I_D$ =-1A,$R_{GEN}$=6Ω | | 10 | | nS |
| Turn-on rise time | $t_r$ | | | 15 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 110 | | |
| Turn-off fall time | $t_f$ | | | 70 | | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage | $V_{DS}$ | $V_{GS}$ =0V, $I_S$=-6A | | | -1.2 | V |

Notes:

1) Surface Mounted on FR4 Board, t≤ 10 sec.

2) Pulse Test: Pulse Width < 300μs, Duty Cycle ≤2%.

3) Guaranteed by design, not subject to production testing.

## N- Channel Typical Characteristics

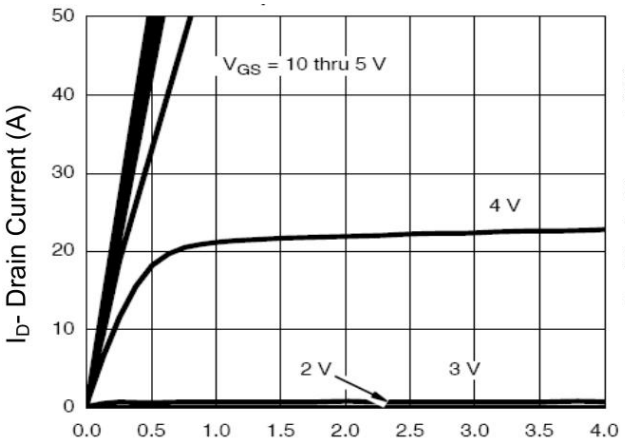



**Figure 1 Output Characteristics**

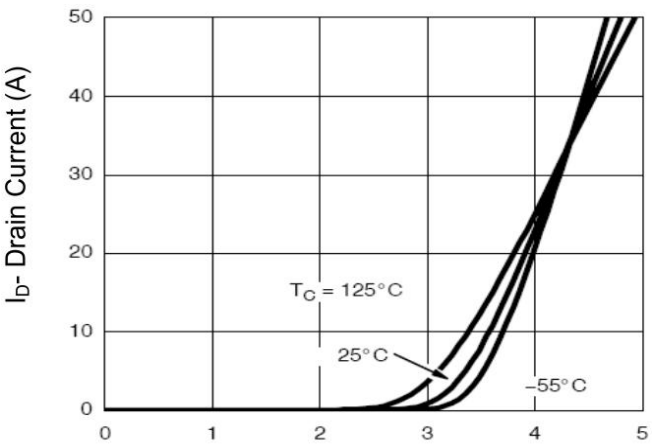



**Figure 2 Transfer Characteristics**

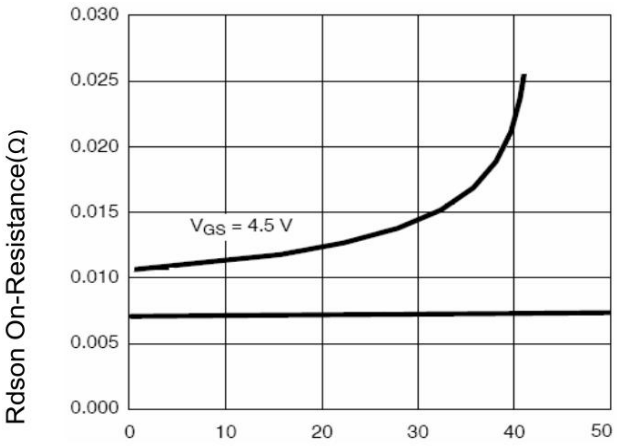



**Figure 3 Rdson- Drain Current**

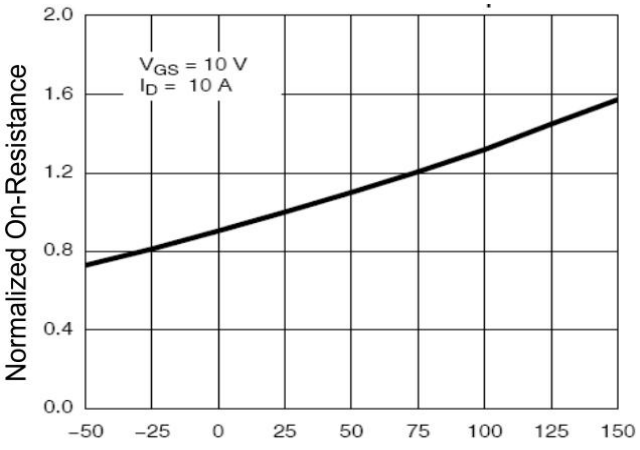



**Figure 4 Rdson- Junction Temperature**

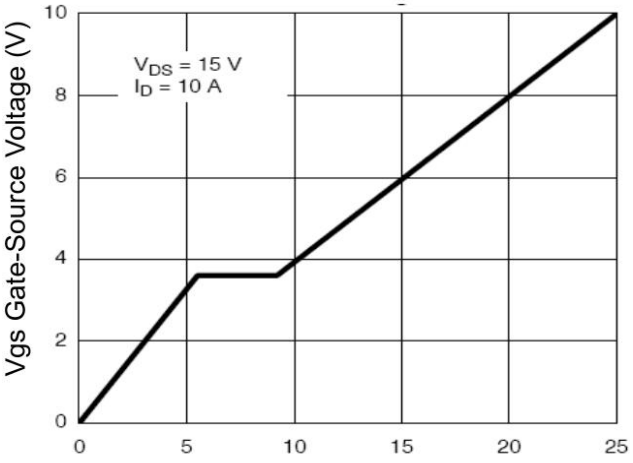



**Figure 5 Gate Charge**

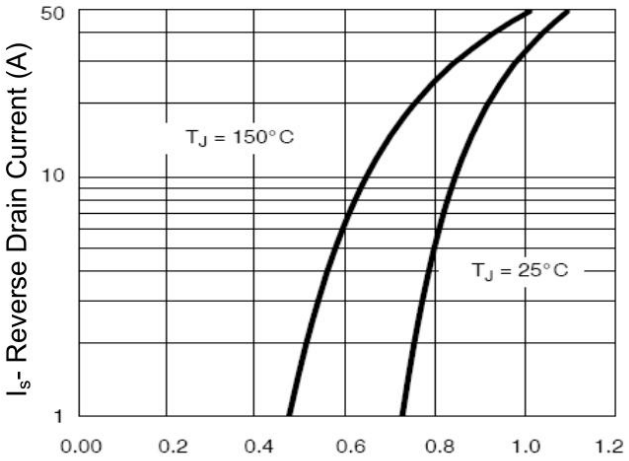



**Figure 6 Source- Drain Diode Forward**



| Document ID | Issued Date | Revised Date | Revision | Page. |
|---|---|---|---|---|
| AS-3150306 | 2013/03/08 | 2021/08/23 | B | 8 |

## N- Channel Typical Characteristics

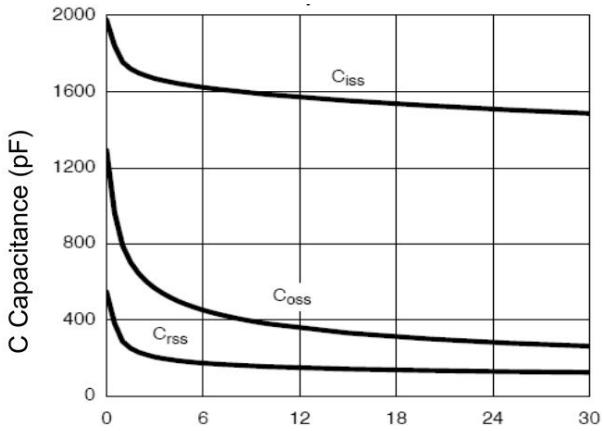



**Figure 7 Capacitance vs Vds**

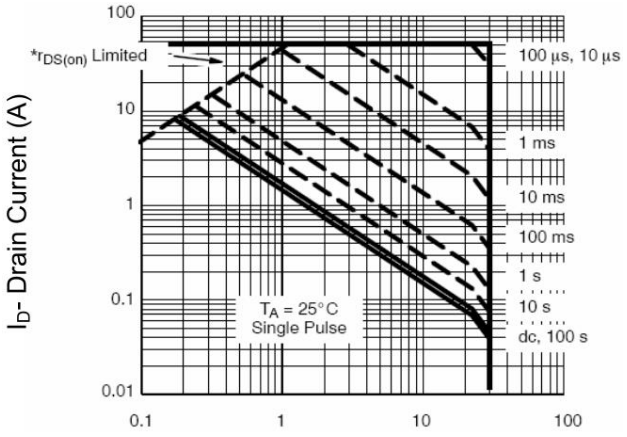



**Figure 8 Safe Operation Area**

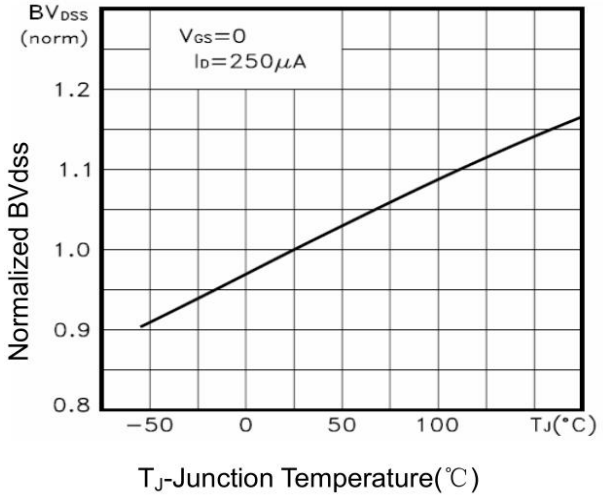



**Figure 9 $BV_{DSS}$ vs Junction Temperature**

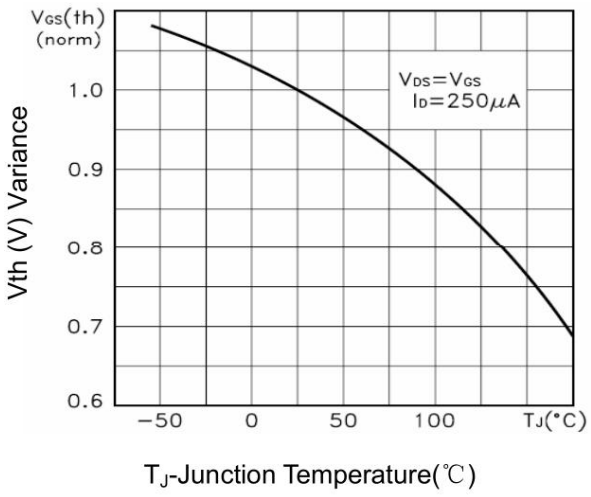



**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

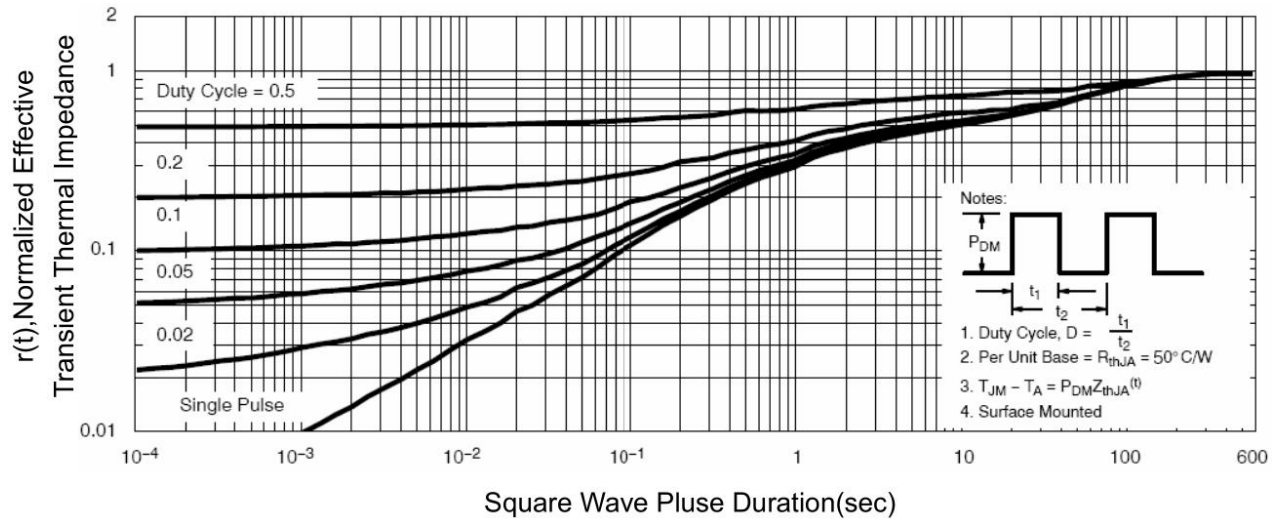



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## P- Channel Typical Characteristics

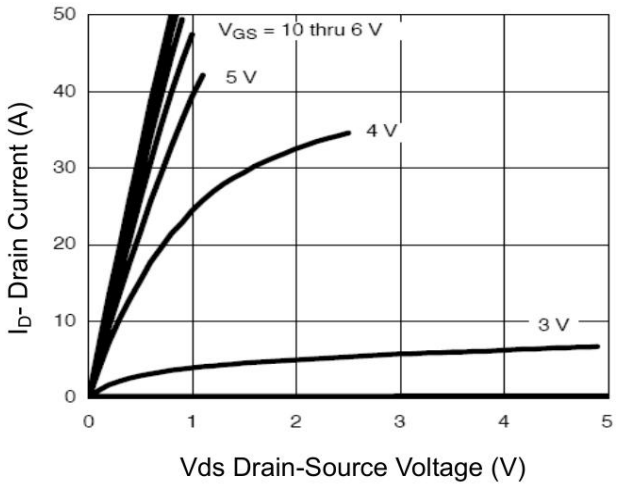



**Figure 1 Output Characteristics**

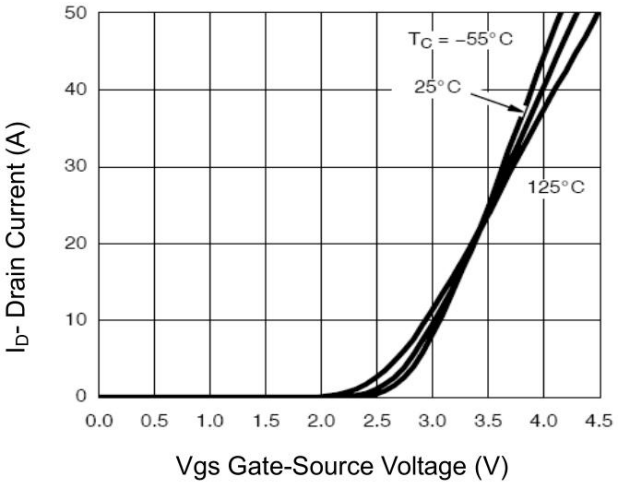



**Figure 2 Transfer Characteristics**

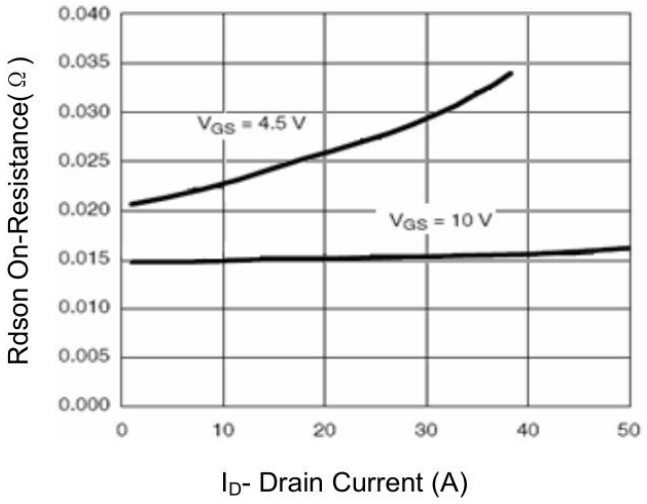



**Figure 3 Drain-Source On-Resistance**

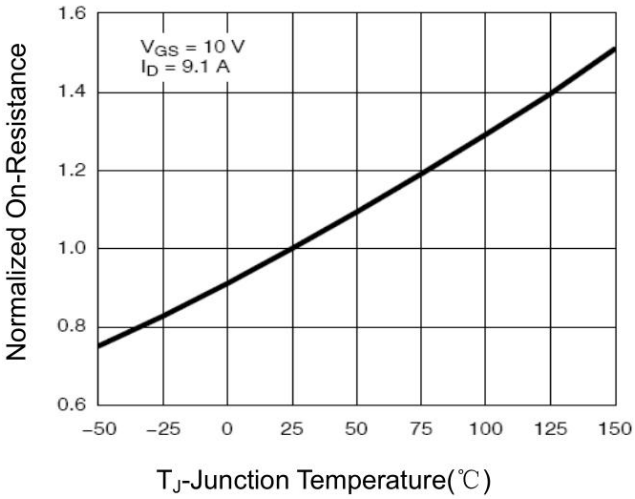



**Figure 4 Drain-Source On-Resistance**

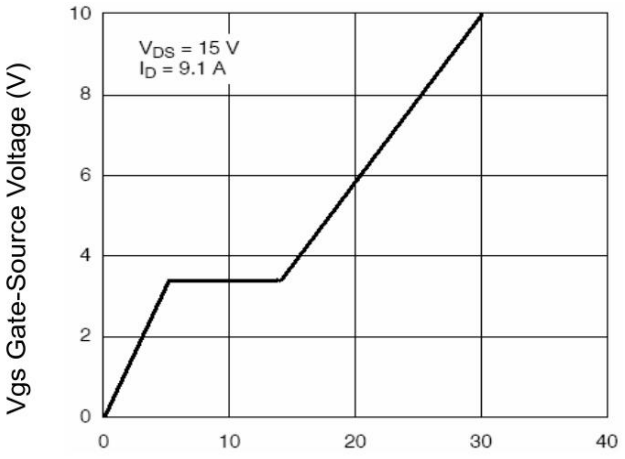



**Figure 5 Gate Charge**

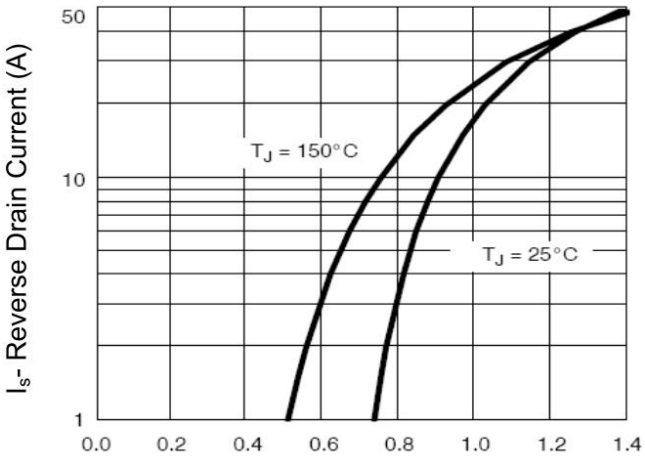



**Figure 6 Source- Drain Diode Forward**

## P- Channel Typical Characteristics

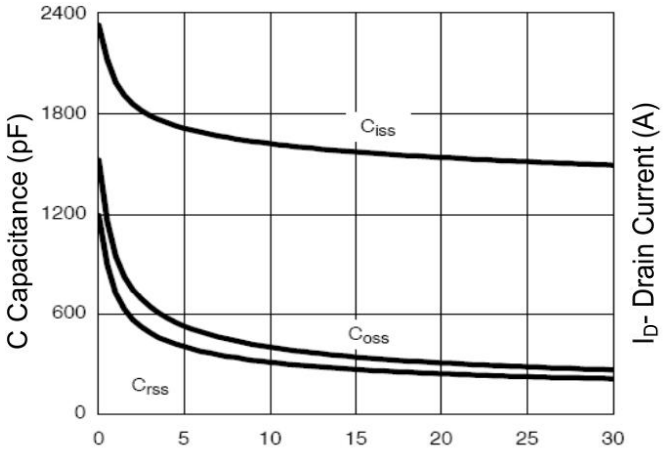



**Figure 7 Capacitance vs Vds**

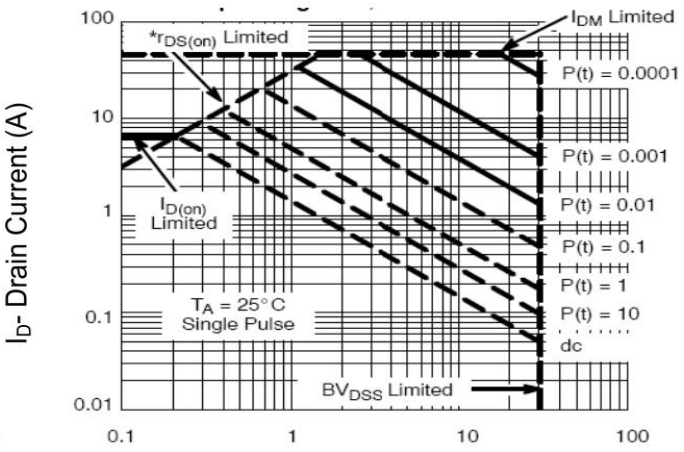



**Figure 8 Safe Operation Area**

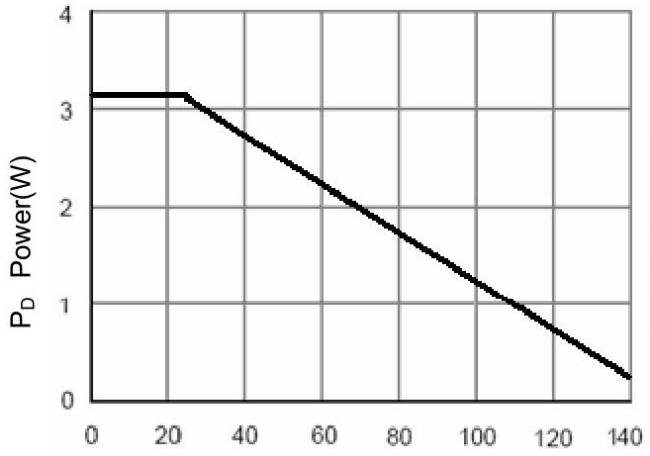



**Figure 9 Power Dissipation**

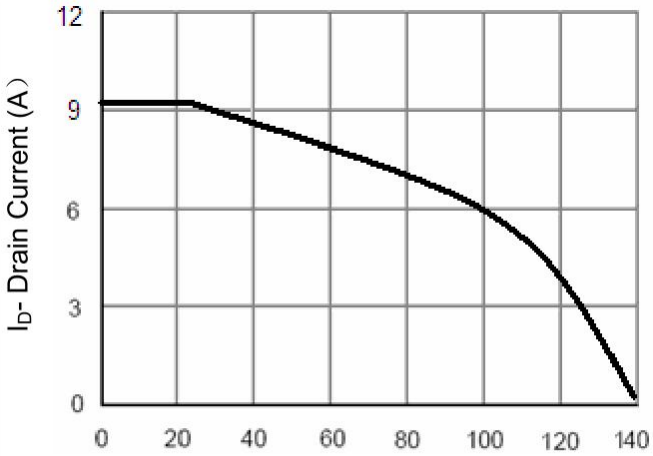



**Figure 10 Drain Current**

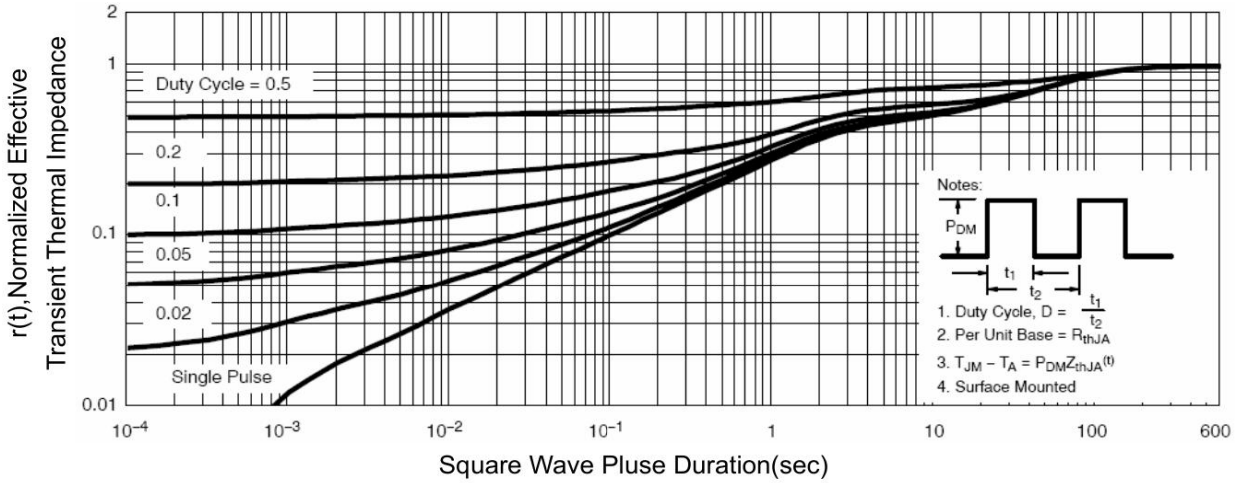
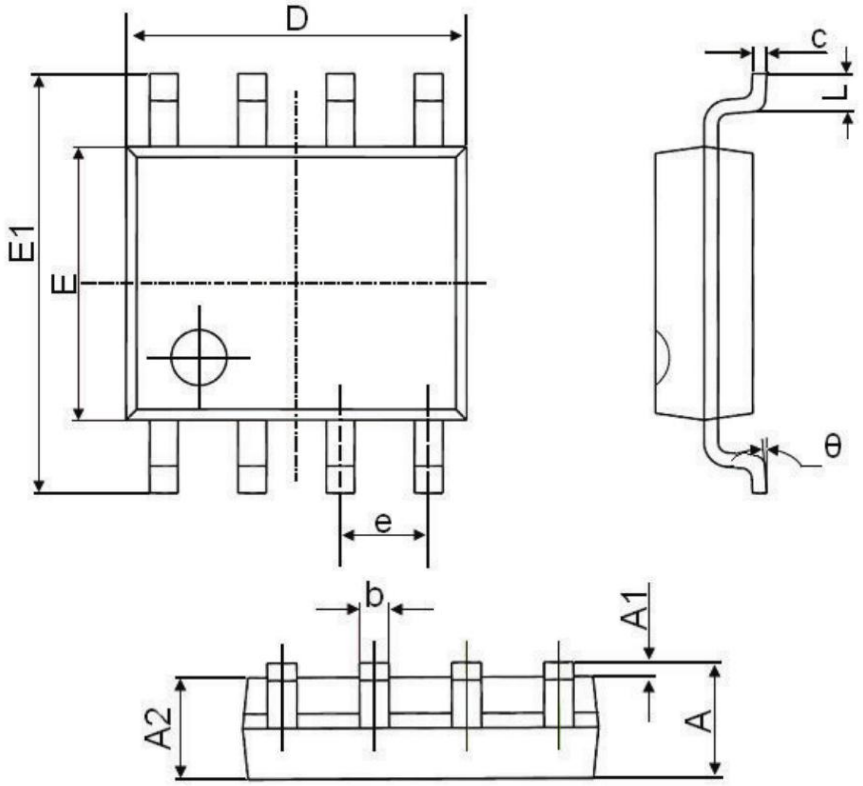



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## SOP-8 Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |