# AS3724M-Q1

N and P-Channel Complementary MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---|---|---|
| 30V | 32mΩ@10V | 4A |
| | 48mΩ@4.5V | |

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---|---|---|
| -30V | 65mΩ@-10V | -3A |
| | 100mΩ@-4.5V | |

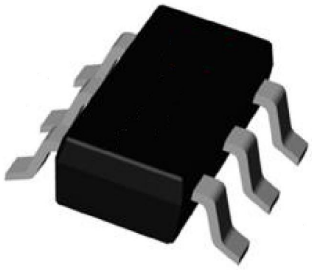
## Feature

- Trench Power LV MOSFET technology
- High density cell design for Low $R_{DS(ON)}$
- High Speed switching
- Suffix "-Q1" for AEC-Q101

## Application

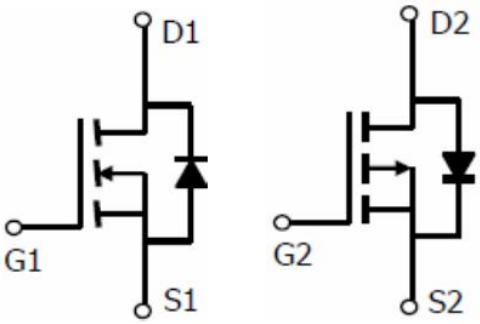
- Wireless charger
- Load switch
- Power management

## Package

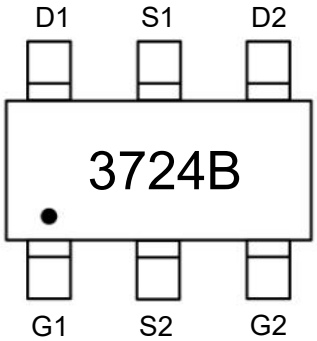


SOT-23-6L

## Circuit diagram




## Marking



## Absolute maximum ratings ($T_A$=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 | $I_D$ | 4 | -3 | A |
| Continuous Drain Current ($T_A$=100℃) | $I_D$(100℃) | 2.5 | -1.9 | A |
| Pulsed Drain Current[1)] | $I_{DM}$ | 30 | -20 | A |
| Power Dissipation[2)] | $P_D$ | 1.25 | 1.25 | W |
| Thermal Resistance from Junction to Ambient[3)] | $R_{\theta JA}$ | 100 | 100 | ℃/W |
| Junction Temperature | $T_J$ | 150 | 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55 ~ +150 | -55 ~ +150 | ℃ |

## N-CH Electrical characteristics ($T_J$=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 | 1.5 | 2.2 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =10V, $I_D$ =4A | | 24 | 32 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =2A | | 37 | 48 | |
| **Dynamic characteristics[4)]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =15V,$V_{GS}$ =0V,f =1MHz | | 235 | | pF |
| Output Capacitance | $C_{oss}$ | | | 43 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 35 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =15V,$V_{GS}$ =10V,$I_D$ =4A | | 6 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.25 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.3 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS}$=15V, $V_{GS}$ =10V, $R_{GEN}$=3Ω, $I_D$=4A | | 4 | | nS |
| Turn-on rise time | $t_r$ | | | 23 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 7 | | |
| Turn-off fall time | $t_f$ | | | 19 | | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward Current | $I_S$ | | | | 4 | A |
| Diode Forward voltage | $V_{SD}$ | $V_{GS}$ =0V, $I_S$=4A | | | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=4A, di/dt=100A/us | | 17 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 1.7 | | nC |

## P-CH Electrical characteristics ($T_J$=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 | -1.5 | -2.4 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =-10V, $I_D$ =-3A | | 48 | 65 | mΩ |
| | | $V_{GS}$ =-4.5V, $I_D$ =-2A | | 75 | 100 | |
| **Dynamic characteristics**[4] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-15V,$V_{GS}$ =0V,f =1MHz | | 260 | | pF |
| Output Capacitance | $C_{oss}$ | | | 50 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 40 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =-15V,$V_{GS}$ =-10V, $I_D$ =-3A | | 7 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 2 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-15V,$V_{GS}$=-10V, $I_D$=-3A,$R_{GEN}$=3Ω | | 5 | | nS |
| Turn-on rise time | $t_r$ | | | 23 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 21 | | |
| Turn-off fall time | $t_f$ | | | 30 | | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward Current | $I_S$ | | | | -3 | A |
| Diode Forward voltage | $V_{SD}$ | $V_{GS}$ =0V, $I_S$=-3A | | | -1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=-3A, di/dt=100A/us | | 12 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 4 | | nC |

Notes:

1) Repetitive rating; pulse width limited by max. junction temperature.

2) $P_d$ is based on max. junction temperature, using junction-case thermal resistance.

3) The value of $R_{\theta JA}$ is measured with the device mounted on 1 $in^2$ FR-4 board with 2oz. Copper, in the still air environment with $T_A$ =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

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

## N- Channel Typical Characteristics

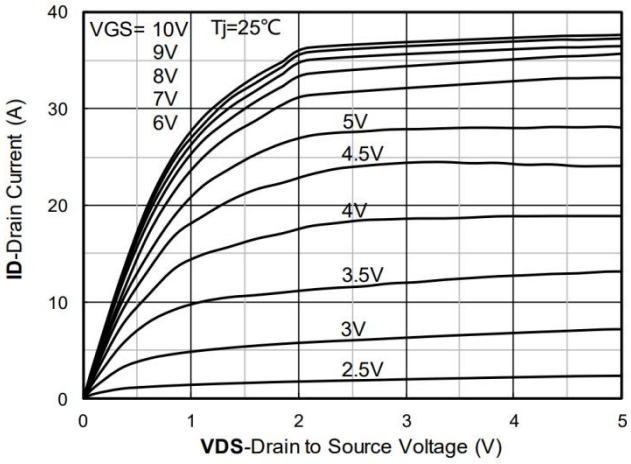



Figure 1. Output Characteristics

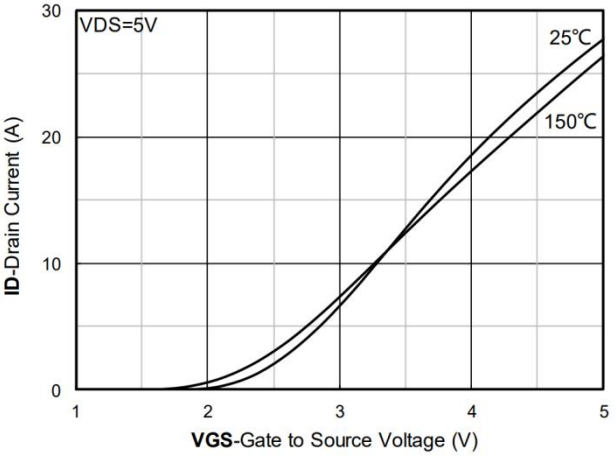



Figure 2. Transfer Characteristics

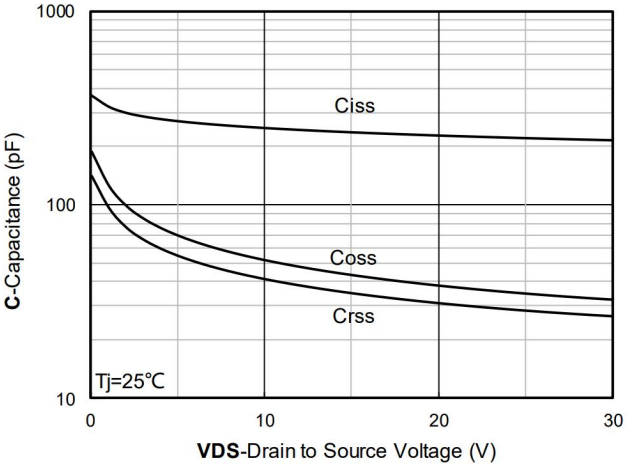



Figure 3. Capacitance Characteristics

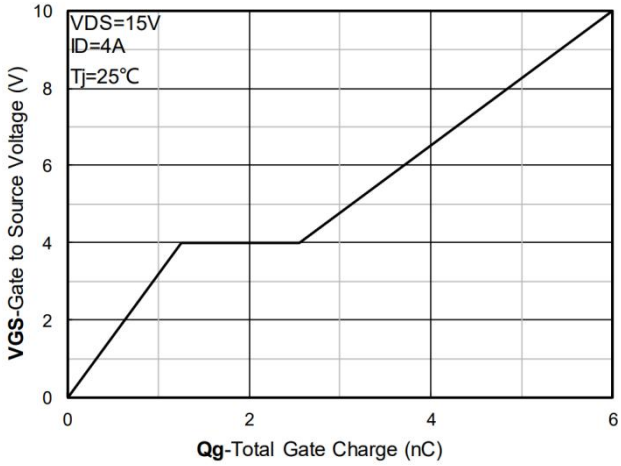



Figure 4. Gate Charge

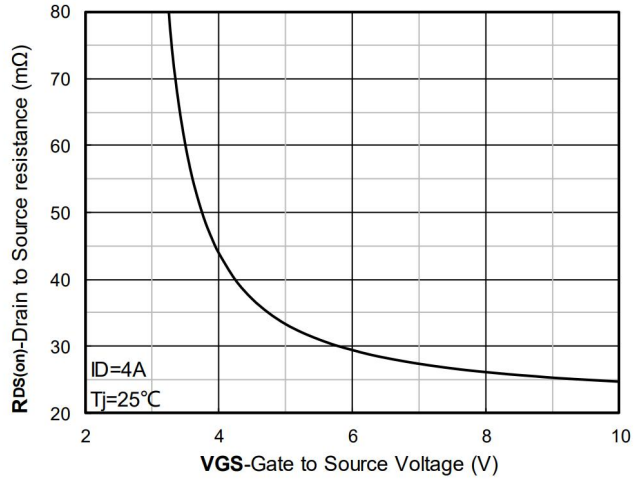



Figure 5. On-Resistance vs Gate to Source Voltage

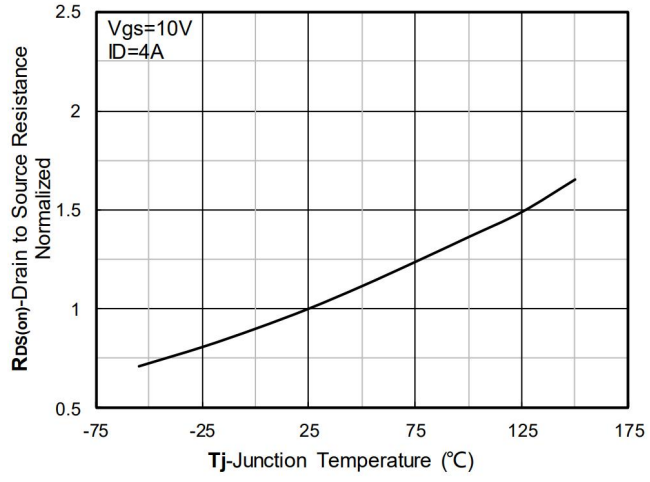



Figure 6. Normalized On-Resistance

## N- Channel Typical Characteristics

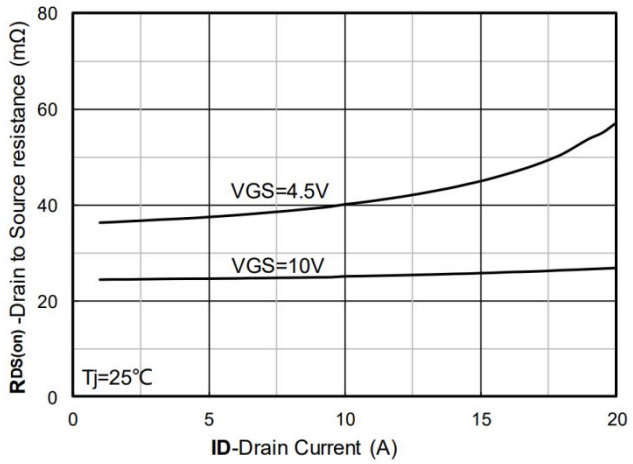



Figure 7. RDS(on) VS Drain Current

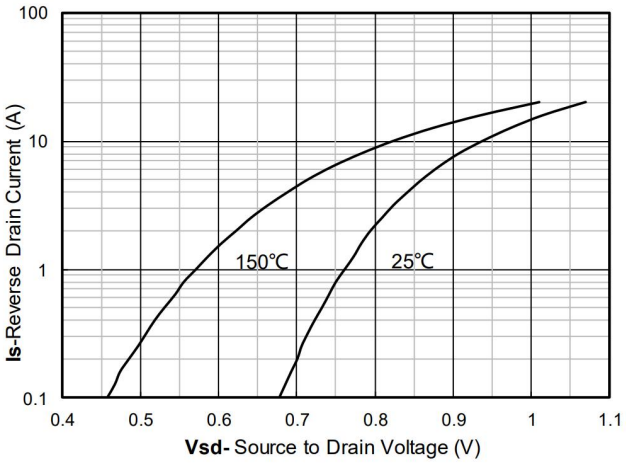



Figure 8. Forward characteristics of reverse diode

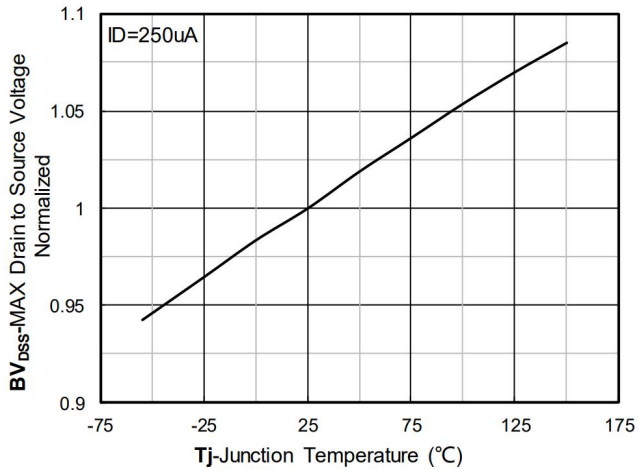



Figure 9. Normalized breakdown voltage

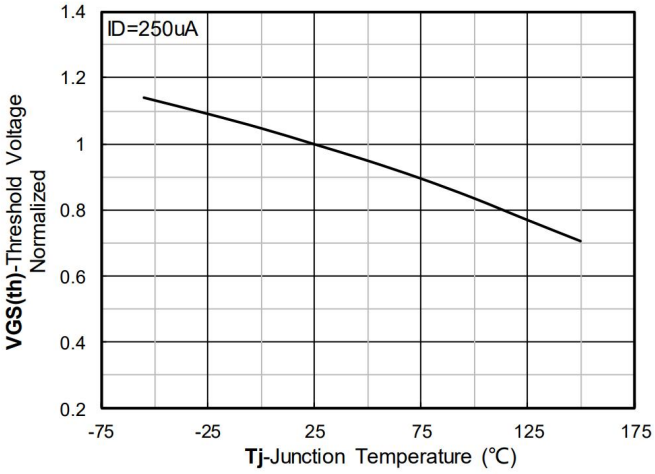



Figure 10. Normalized Threshold voltage

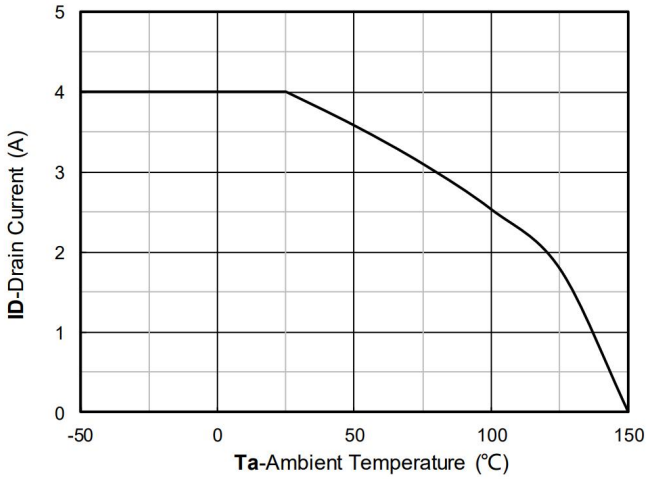



Figure 11. Current dissipation

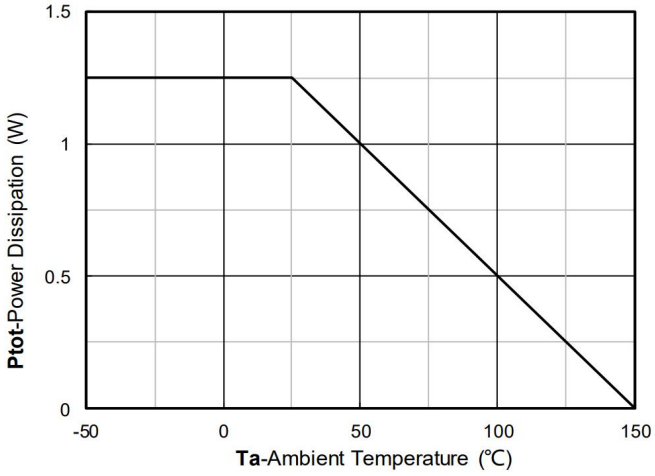



Figure 12. Power dissipation

## N-Channel Typical Characteristics

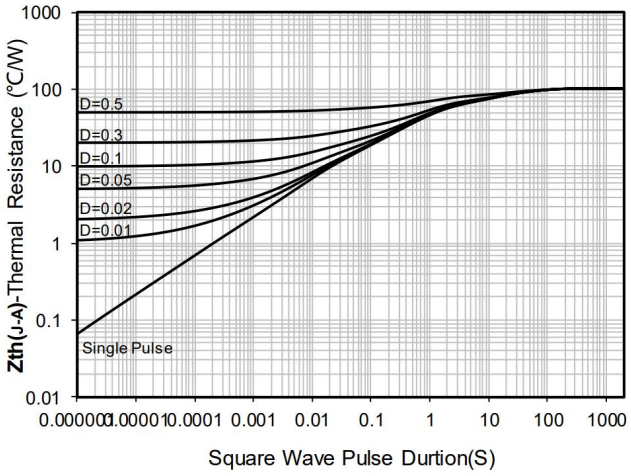



Figure 13. Maximum Transient Thermal Impedance

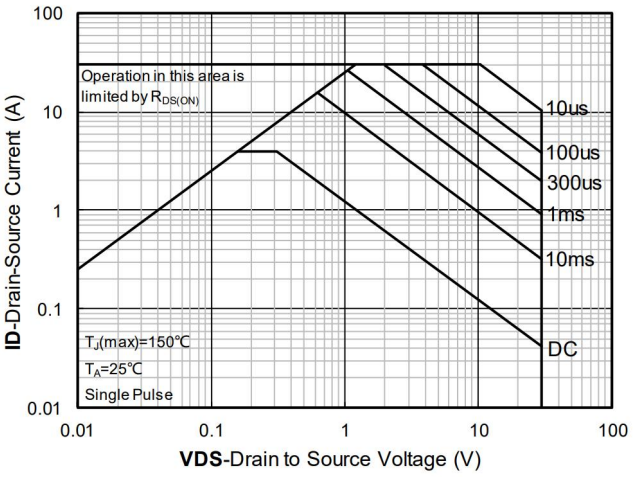



Figure 14. Safe Operation Area

## P- Channel Typical Characteristics

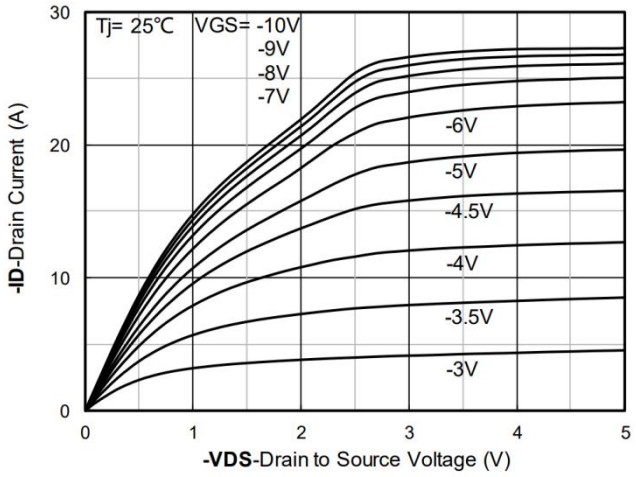



Figure 1. Output Characteristics

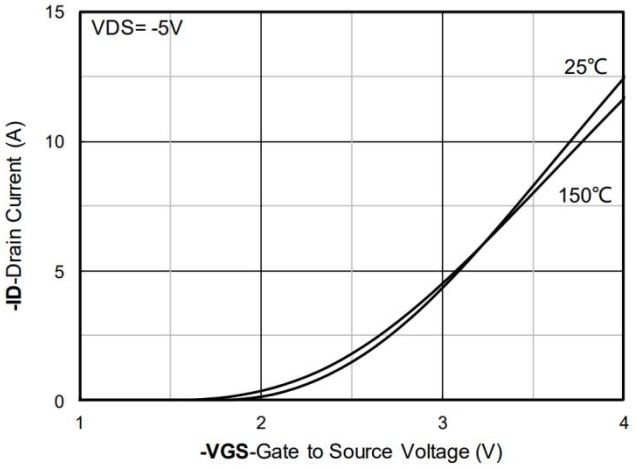



Figure 2. Transfer Characteristics

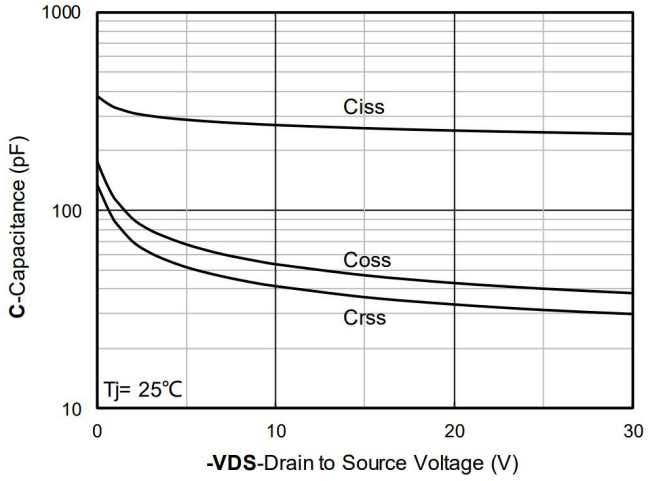



Figure 3. Capacitance Characteristics

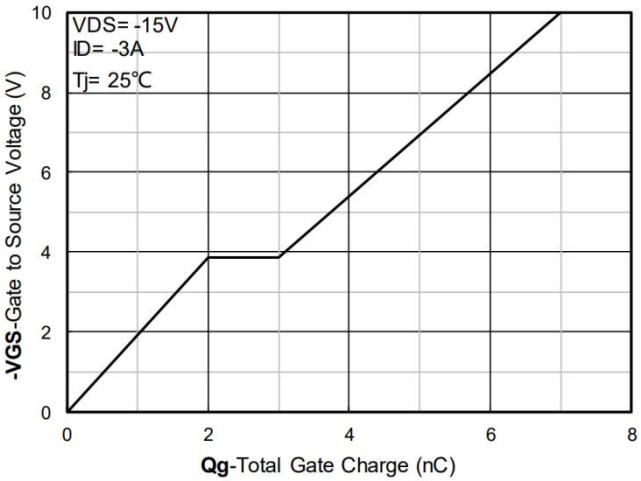



Figure 4. Gate Charge

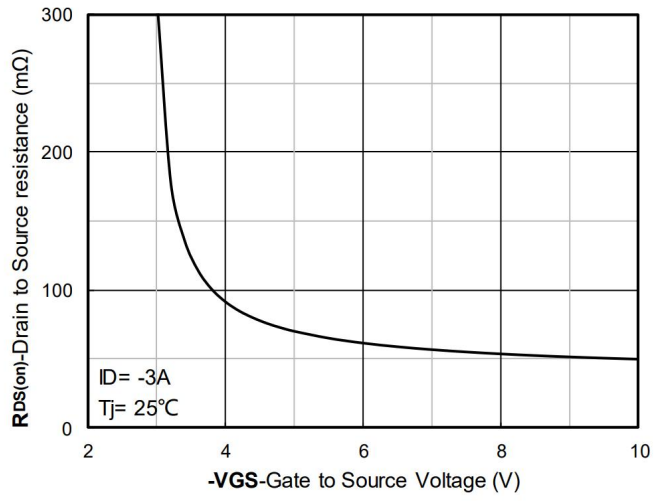



Figure 5. On-Resistance vs Gate to Source Voltage

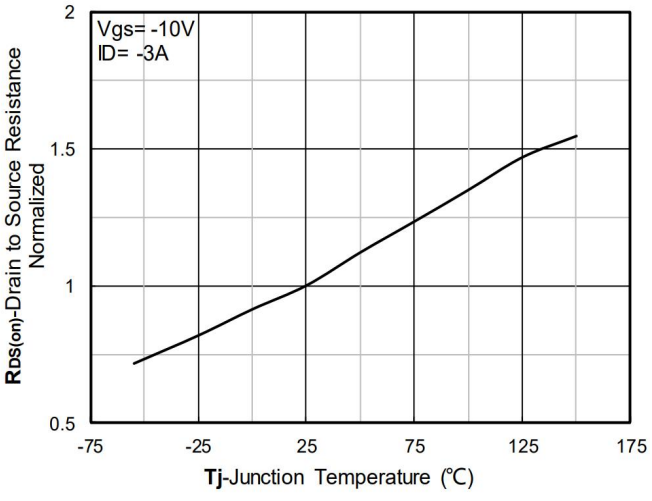



Figure 6. Normalized On-Resistance

## P- Channel Typical Characteristics

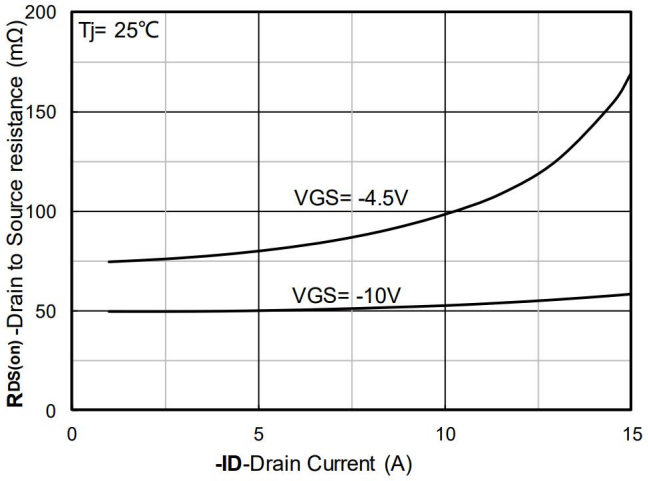



Figure 7. RDS(on) VS Drain Current

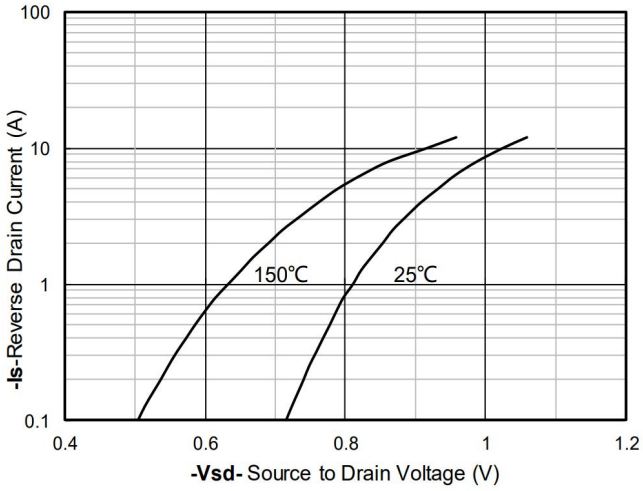



Figure 8. Forward characteristics of reverse diode

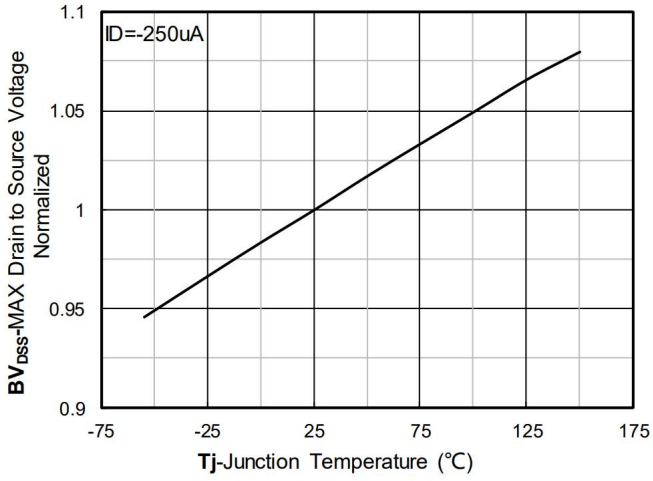



Figure 9. Normalized breakdown voltage

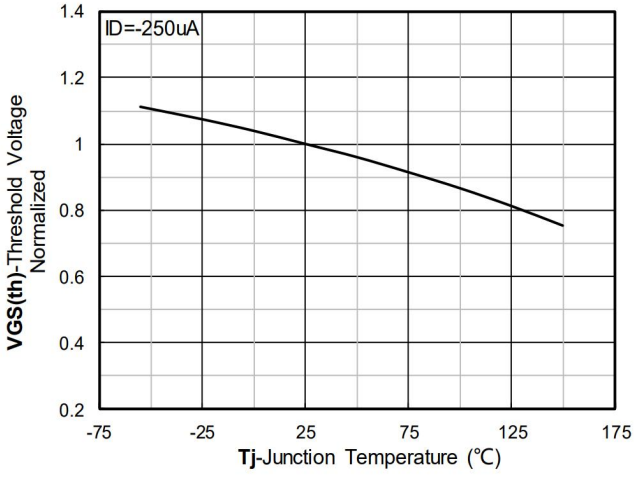



Figure 10. Normalized Threshold voltage

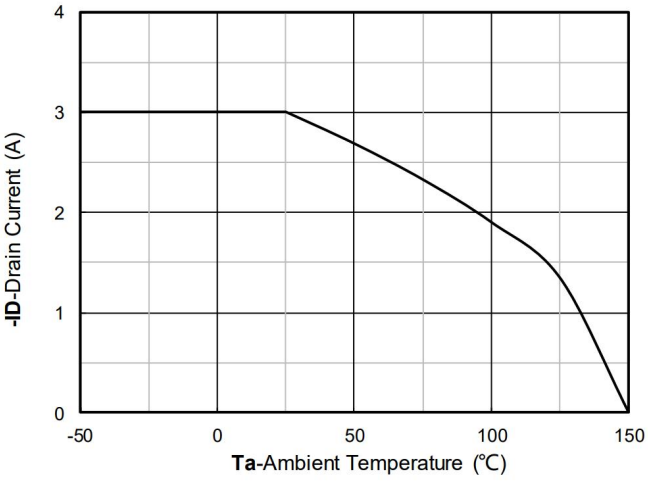



Figure 11. Current dissipation

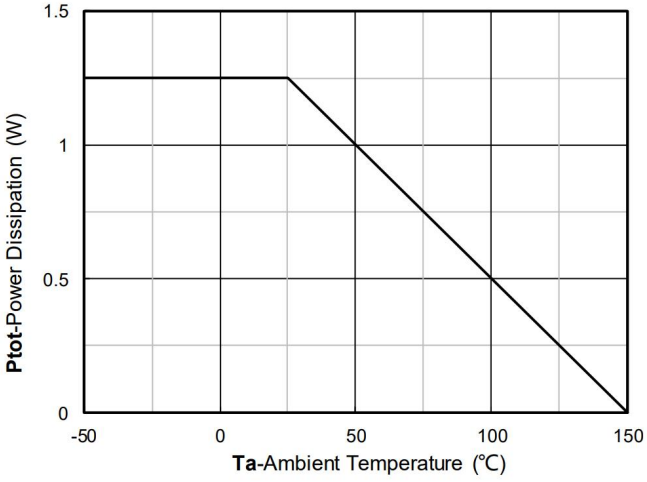



Figure 12. Power dissipation

## P- Channel Typical Characteristics

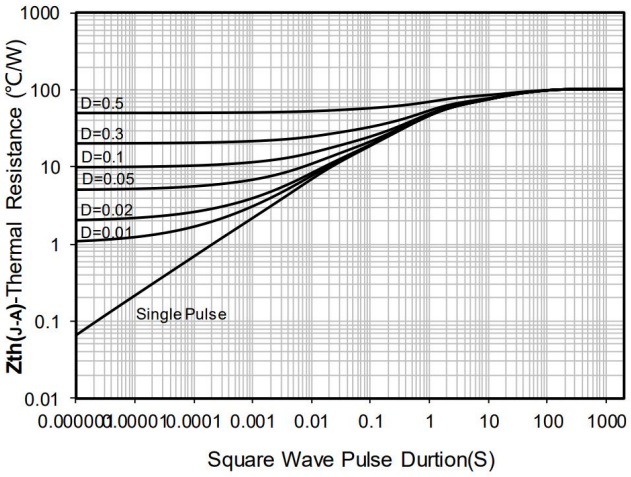



Figure 13. Maximum Transient Thermal Impedance

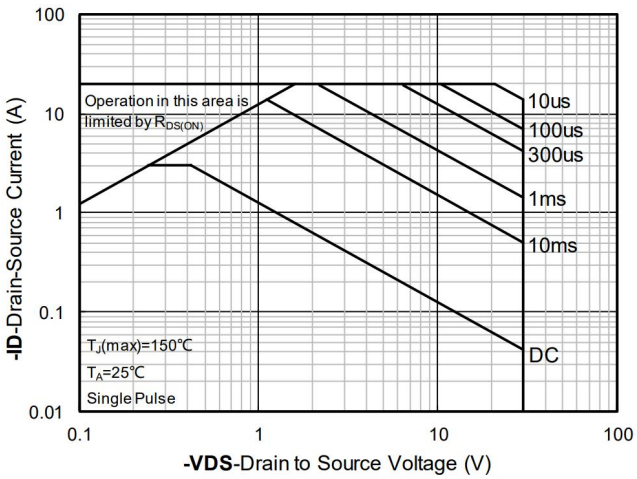
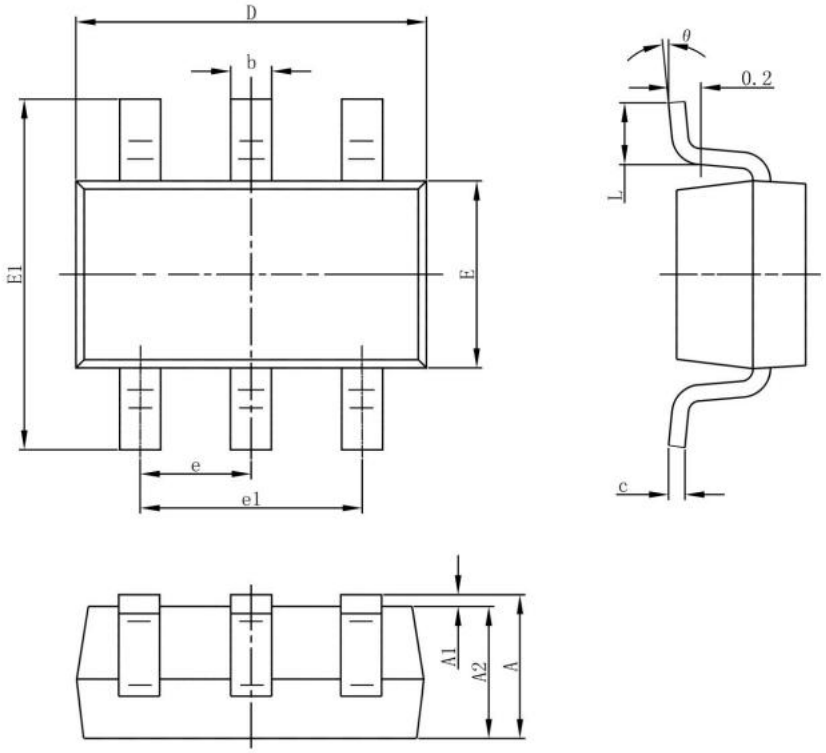



Figure 14. Safe Operation Area

## SOT-23-6L Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| e | 0.950 (BSC) | | 0.037 (BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |