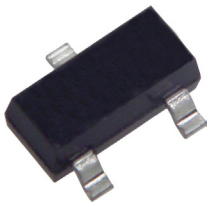
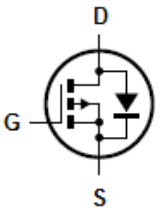
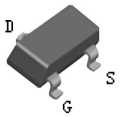
# P-Channel MOSFET Transistor



## Features

- Voltage Controlled P-Channel Small signal switch
- High Density Cell Design for Low $R_{DS(ON)}$
- High Saturation Current
- Lead Free




**SOT-23**

## Applications

- Line current interrupter in telephone sets
- Relay, high speed and line transformer drivers

## Maximum Ratings

**Ratings at 25°C unless otherwise specified.**

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | -50 | V |
| Gate-source voltage | $V_{GSO}$ | ±20 | V |
| Drain current continuous (Note 1)<br>Pulse | $I_D$ | -130<br>-520 | mA |
| Power dissipation (Note 1) | $P_D$ | 0.36 | W |
| Derate above 25°C | | 2.9 | mW/°C |
| Thermal resistance, Junction-to-ambient | $R_{\theta JA}$ | 350 | °C/W |
| Operating junction and storage temperature | $T_J$, $T_{stg}$ | -55 to +150 | °C |
| Maximum Lead Temperature For Soldering Purposes, 1/16" from case for 10 seconds | $T_L$ | 300 | °C |

**Note 1** $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

## Electrical Characteristics

**Ratings at 25°C unless otherwise specified**

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=-250µA | -50 | - | - | V |
| Breakdown voltage temperature coefficient | $\Delta V_{(BR)DSS} / \Delta T_J$ | $I_D$ = –250 µA,Referenced to 25°C | - | -48 | - | mV/°C |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-1mA | -0.8 | -1.7 | -2 | V |
| Gate threshold voltage temperature coefficient | $\Delta V_{GS(th)} / \Delta T_J$ | $I_D$ = –1mA, Referenced to 25°C | - | 3 | - | mV/°C |
| Gate-body leakage | $I_{GSS}$ | $V_{DS}$= 0V, $V_{GS}$= ±20V | - | - | ±100 | nA |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=-50V, $V_{GS}$=0V | - | - | -15 | µA |
| | | $V_{DS}$=-50V, $V_{GS}$=0V $T_J$= 125°C | - | - | -60 | µA |
| Drain-source on-resistance | $R_{DS(ON)}$ | $V_{GS}$ = -5V, $I_D$ = -0.1A | - | 1.2 | 10 | Ω |
| | | $V_{GS}$ = -5V, $I_D$ = -0.1A, $T_J$=125°C | - | 1.9 | 17 | |

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| On-state drain current | $I_{D(on)}$ | $V_{GS}$=-5V, $V_{DS}$=-10V | -0.6 | - | - | A |
| Forwards transfer admittance | $\|y_{fs}\|$ | $V_{DS}$=-25V, $I_D$=-0.1A | 0.05 | 0.6 | - | S |
| Input capacitance | $C_{ISS}$ | $V_{DS}$=-25V, $V_{GS}$=0V, f=1MHz | - | 73 | - | pF |
| Output capacitance | $C_{OSS}$ | | - | 10 | - | |
| Reverse transfer capacitance | $C_{RSS}$ | | - | 5 | - | |
| Gate resistance | $R_G$ | $V_{GS}$=-15mV, f=1MHz | - | 9 | - | Ω |
| Turn-on delay time | $t_{D(ON)}$ | $V_{DD}$=-30V, $I_D$=-0.27A, $V_{GS}$=-10V, $R_{GEN}$=6Ω | - | 2.5 | 5 | ns |
| Turn-on rise time | $t_r$ | | - | 6.3 | 13 | |
| Turn-off delay time | $t_{D(OFF)}$ | | - | 10 | 20 | |
| Turn-off fall time | $t_f$ | | - | 4.8 | 9.6 | |
| Total gate charge | $Q_g$ | $V_{DS}$=-25V, $I_D$=-0.1A, $V_{GS}$=-5 V | - | 0.9 | 1.3 | nC |
| Gate-source charge | $Q_{gs}$ | | - | 0.2 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 0.3 | - | |
| Maximum continuous drain-source diode forward current | $I_S$ | - | - | - | -0.13 | A |
| Drain-source diode forward voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=-0.26A (Note 2) | - | -0.8 | -1.4 | V |
| Diode reverse recovery time | $t_{rr}$ | $I_F$=-0.1A $di_F/dt$ =100A/µs (Note 2) | - | 10 | - | nS |
| Diode reverse recovery charge | $Q_{rr}$ | | - | 3 | - | nC |

**Note 2** Pulse Test: Pulse Width δ300us, Duty Cycle ≤2%.

## Typical Characteristics:

**$T_A$ = 25°C unless otherwise specified**

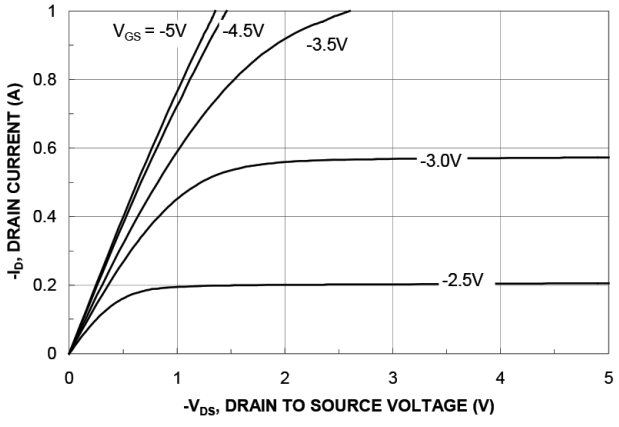



**Figure 1. On-Region Characteristics.**

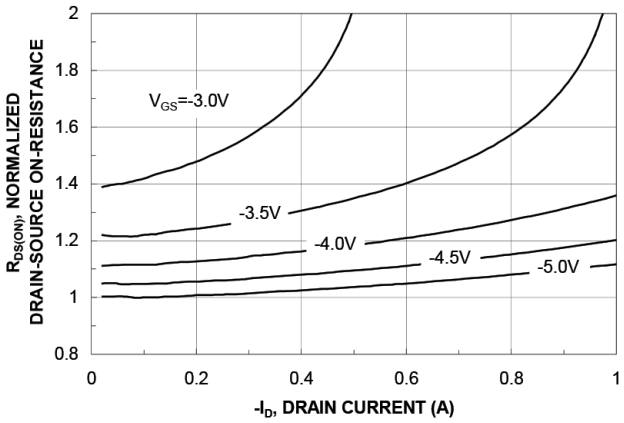



**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**

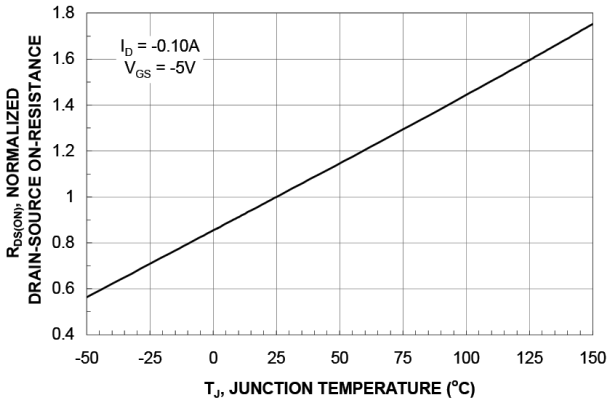



**Figure 3. On-Resistance Variation with Temperature.**

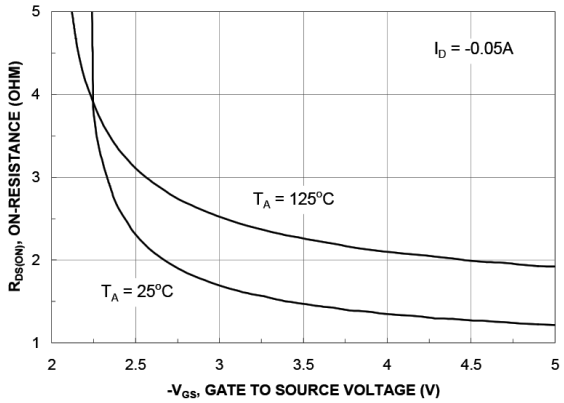



**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**

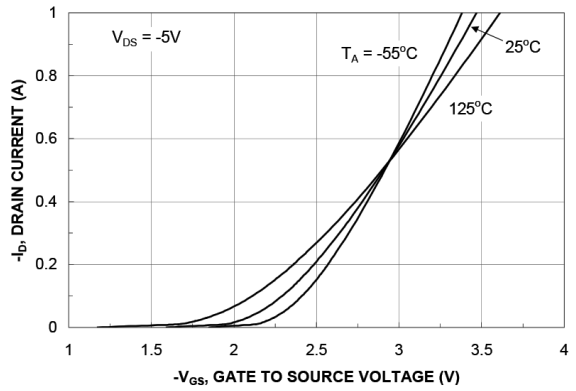



**Figure 5. Transfer Characteristics.**

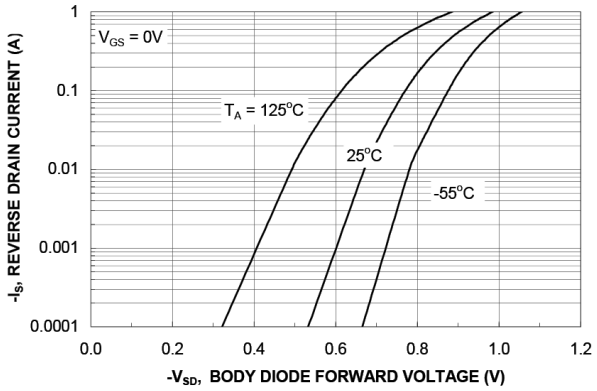



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.**

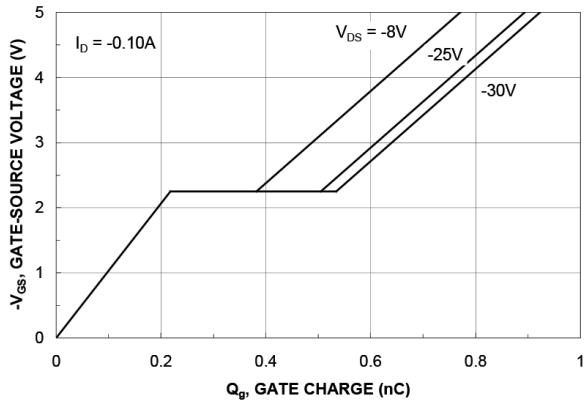



**Figure 7. Gate Charge Characteristics.**

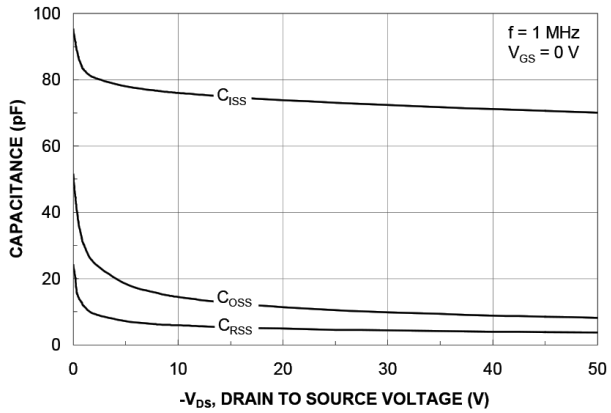



**Figure 8. Capacitance Characteristics.**

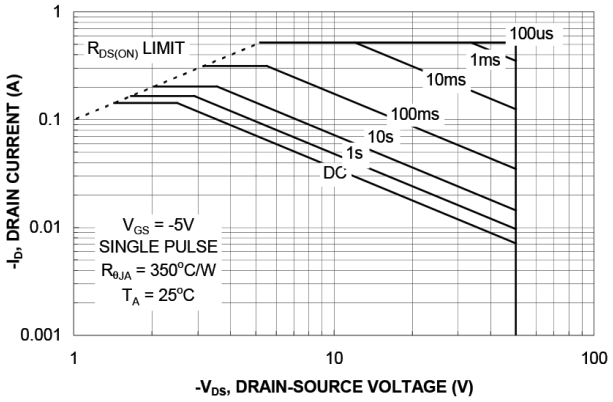



**Figure 9. Maximum Safe Operating Area.**

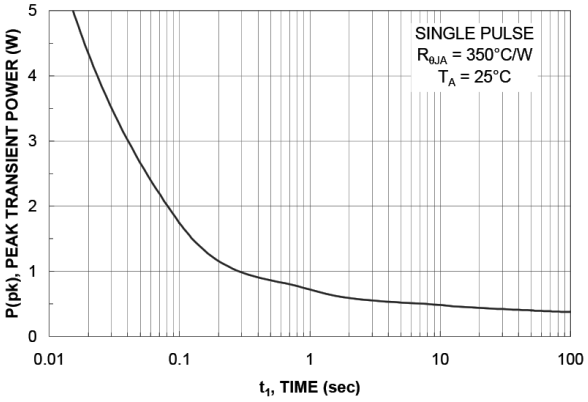



**Figure 10. Single Pulse Maximum Power Dissipation.**

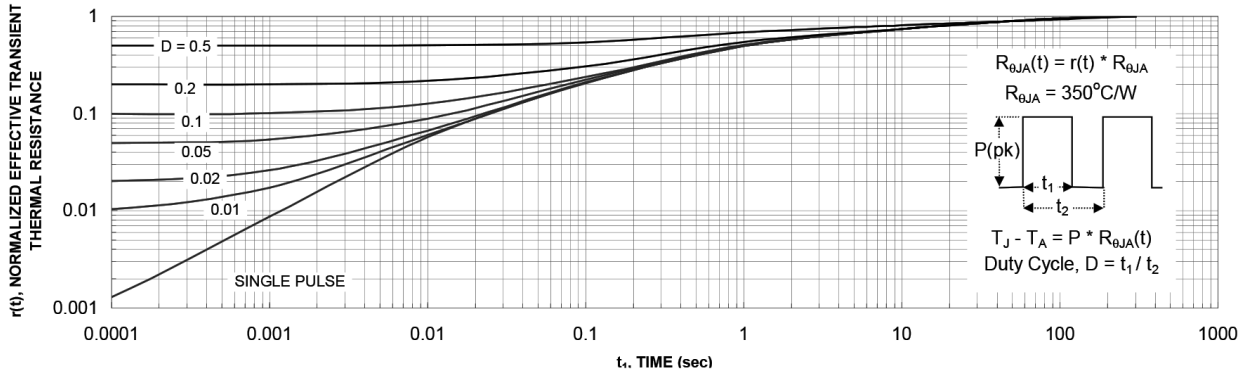
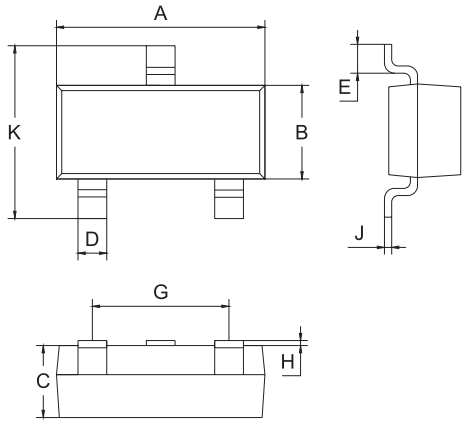



**Figure 11. Transient Thermal Response Curve.**

**Thermal characterization performed using the conditions described in Note 1a.**
**Transient thermal response will change depending on the circuit board design.**

## Package Outline:

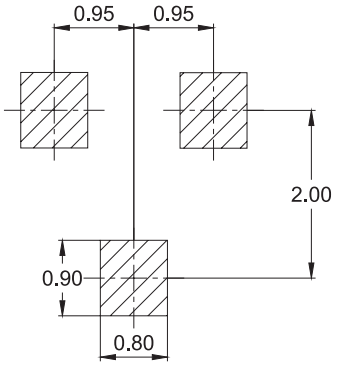
**Plastic surface mounted package**




| SOT-23 | | |
|---|---|---|
| **Dim.** | **Min.** | **Max.** |
| A | 2.7 | 3.1 |
| B | 1.1 | 1.5 |
| C | 1 Typ. | |
| D | 0.4 Typ. | |
| E | 0.35 | 0.48 |
| G | 1.8 | 2 |
| H | 0.02 | 0.1 |
| J | 0.1 Typ. | |
| K | 2.2 | 2.6 |

Dimensions : Millimetres

## Soldering Footprint:




Dimensions : Millimetres

## Package Information:

| Device | Package | Shipping | Marking Code |
|---|---|---|---|
| BSS84-7-F | SOT-23 | 3,000 / Tape & Reel | SP |

## Part Number Table

| Description | Part Number |
|---|---|
| MOSFET Transistor, P-Channel, -130mA, -50V, 1.2Ω, -5V, -1.7V | BSS84-7-F |