# P-CHANNEL ENHANCEMENT MODE MOSFET

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)\ max}$ | $I_D$ $T_A = +25°C$ |
|---|---|---|
| -50V | 10Ω @ $V_{GS}$ = -5V | -130mA |

## Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

## Features and Benefits

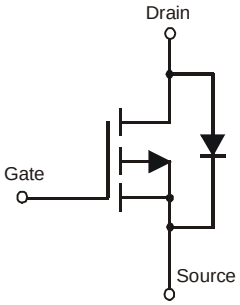
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

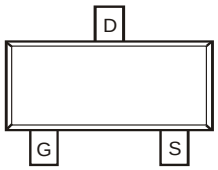
- Case: SOT23
- Case Material: UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Lead Free Plating) Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

SOT23

Top View




Equivalent Circuit



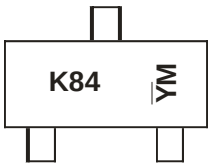

Top View

## Ordering Information (Note 4)

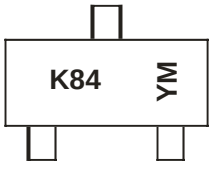
| Part Number | Qualification | Case | Packaging |
|---|---|---|---|
| BSS84-7-F | Commercial | SOT23 | 3000/Tape & Reel |
| BSS84Q-7-F | Automotive | SOT23 | 3000/Tape & Reel |
| BSS84-13-F | Commercial | SOT23 | 10000/Tape & Reel |
| BSS84Q-13-F | Automotive | SOT23 | 10000/Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html

## Marking Information




Chengdu A/T Site




Shanghai A/T Site

K84 = Product Type Marking Code
YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)
YM = Date Code Marking for CAT (Chengdu Assembly/ Test site)
Y or Y = Year (ex: A = 2013)
M = Month (ex: 9 = September)

Date Code Key

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | … | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | J | K | L | M | N | P | R | … | Y | Z | A | B | C | D | E |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | -50 | V |
| Drain-Gate Voltage $R_{GS} \leq 20K\Omega$ | | $V_{DGR}$ | -50 | V |
| Gate-Source Voltage | Continuous | $V_{GSS}$ | ±20 | V |
| Drain Current (Note 5) | Continuous | $I_D$ | -130 | mA |
| Pulsed Drain Current | | $I_{DM}$ | -1.2 | A |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Units |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 300 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 417 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 6)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -50 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | -1 | µA | $V_{DS}$ = -50V, $V_{GS}$ = 0V, $T_J$ = +25°C |
| | | — | — | -2 | µA | $V_{DS}$ = -50V, $V_{GS}$ = 0V, $T_J$ = +125°C |
| | | — | — | -100 | nA | $V_{DS}$ = -25V, $V_{GS}$ = 0V, $T_J$ = +25°C |
| Gate-Body Leakage | $I_{GSS}$ | — | — | ±10 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 6)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -0.8 | — | -2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -1mA |
| Static Drain-Source On-Resistance | $R_{DS\ (ON)}$ | — | — | 10 | Ω | $V_{GS}$ = -5V, $I_D$ = -0.100A |
| Forward Transconductance | $g_{FS}$ | 0.05 | — | — | S | $V_{DS}$ = -25V, $I_D$ = -0.1A |
| **DYNAMIC CHARACTERISTICS (Note 7)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | — | 45 | pF | $V_{DS}$ = -25V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | — | 25 | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | — | 12 | pF | |
| **SWITCHING CHARACTERISTICS (Note 7)** | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 10 | — | ns | $V_{DD}$ = -30V, $I_D$ = -0.27A, |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 18 | — | ns | $R_{GEN}$ = 50Ω, $V_{GS}$ = -10V |

Notes:
5. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to production testing


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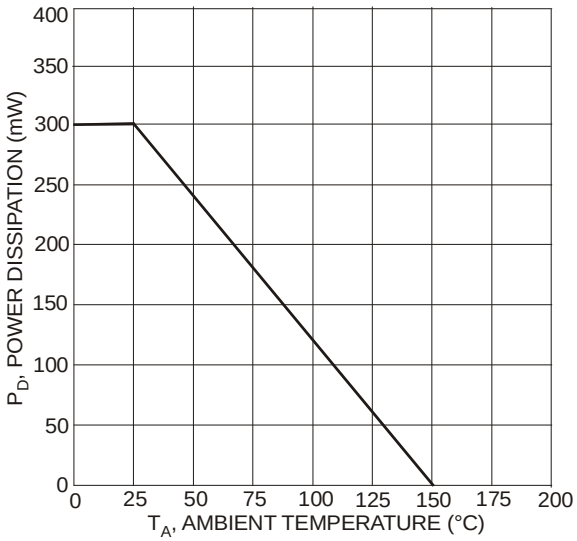


Fig. 1 Max Power Dissipation vs. Ambient Temperature

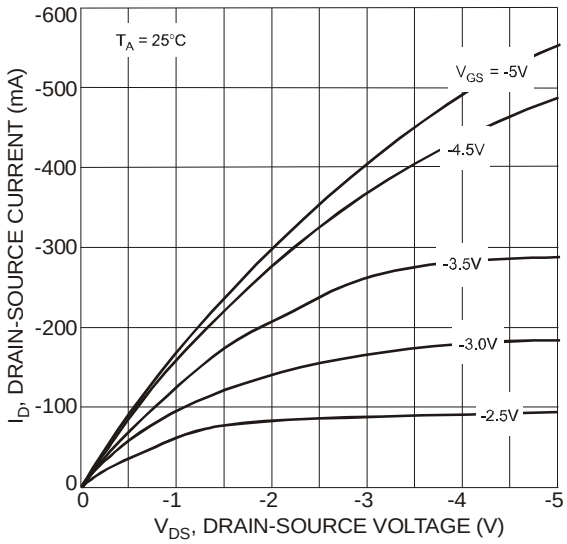


Fig. 2 Drain-Source Current vs. Drain-Source Voltage

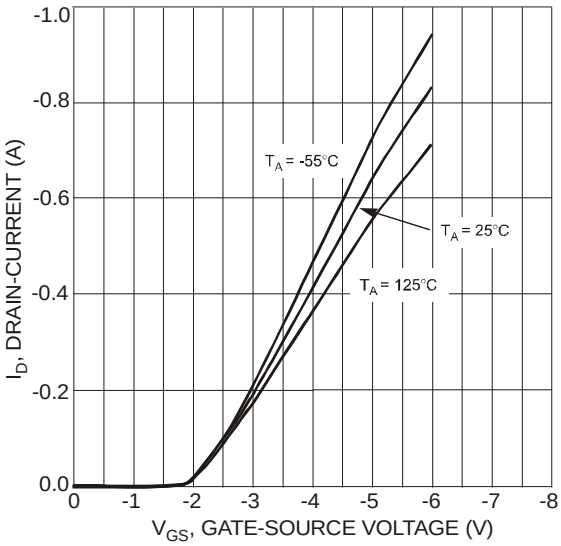


Fig. 3 Drain-Current vs. Gate-Source Voltage

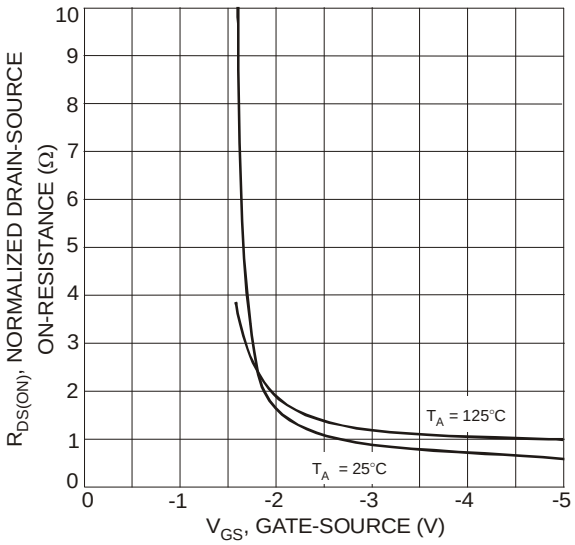


Fig. 4 On-Resistance vs. Gate-Source Voltage

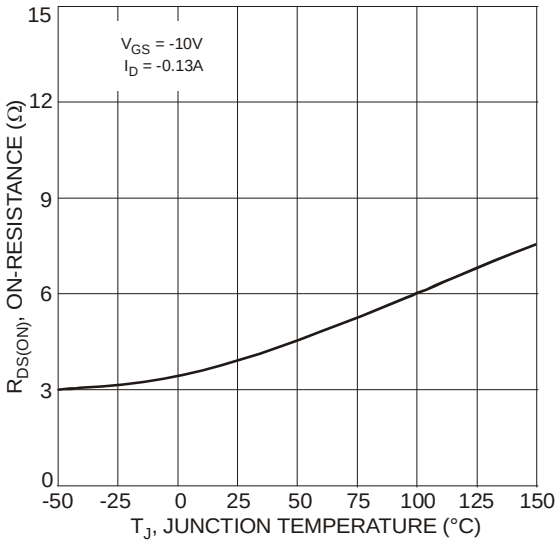


Fig. 5 On-Resistance vs. Junction Temperature

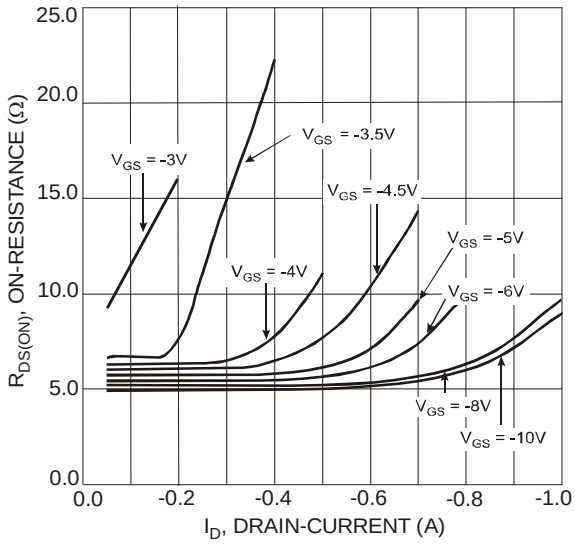


Fig. 6 On-Resistance vs. Drain-Current


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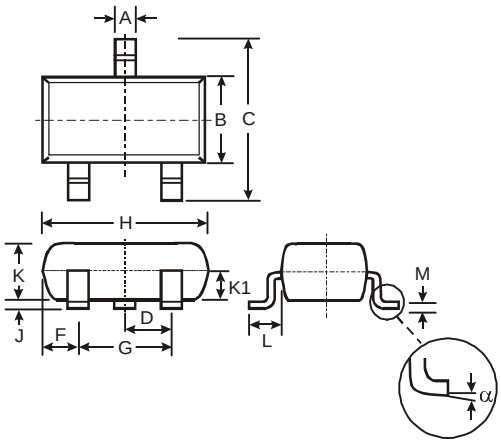
## Package Outline Dimensions

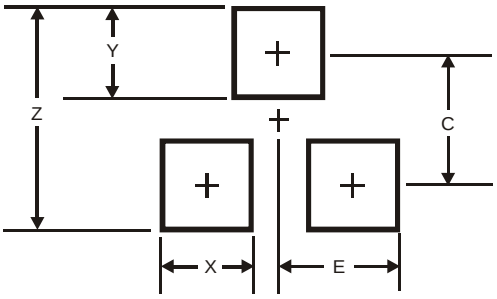
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.903 | 1.10 | 1.00 |
| **K1** | - | - | 0.400 |
| **L** | 0.45 | 0.61 | 0.55 |
| **M** | 0.085 | 0.18 | 0.11 |
| **α** | 0° | 8° | - |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 2.9 |
| **X** | 0.8 |
| **Y** | 0.9 |
| **C** | 2.0 |
| **E** | 1.35 |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