

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)} \text{ max}$    | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|------------|-----------------------------|------------------------------------|
| -50V       | 10Ω @ $V_{GS} = -5\text{V}$ | -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
- PPAP Capable (Note 4)

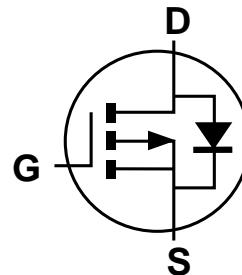
## Mechanical Data

- 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: 0.009 grams (Approximate)

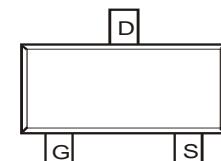
SOT23



Top View



Equivalent Circuit



Top View

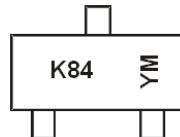
## Ordering Information (Note 5)

| 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:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- See [http://www.diodes.com/quality/lead\\_free.html](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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
- For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



K84 = Product Type Marking Code  
 YM or YM = Date Code Marking  
 Y or Y = Year (ex: E = 2017)  
 M = Month (ex: 9 = September)

Date Code Key

| Year  | 1998 | ~   | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |     |     |
|-------|------|-----|------|------|------|------|------|------|------|------|-----|-----|
| Code  | J    | ~   | D    | E    | F    | G    | H    | I    | J    | K    |     |     |
| Month | Jan  | Feb | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov | Dec |
| Code  | 1    | 2   | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | N   | D   |

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                    | Symbol     | Value    | Unit |
|---|------------|----------|------|
| Drain-Source Voltage                              | $V_{DSS}$  | -50      | V    |
| Drain-Gate Voltage $R_{GS} \leq 20\text{k}\Omega$ | $V_{DGR}$  | -50      | V    |
| Gate-Source Voltage                               | Continuous | $\pm 20$ | V    |
| Drain Current (Note 6)                            | Continuous | $I_D$    | mA   |
| Pulsed Drain Current                              |            | $I_{DM}$ | A    |

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                          | Symbol          | Value       | Unit |
|---|-----------------|-------------|------|
| Total Power Dissipation (Note 6)        | $P_D$           | 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** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                | Symbol              | Min  | Typ  | Max      | Unit          | Test Condition   |
|---|---------------------|------|------|----------|---------------|--|
| <b>OFF CHARACTERISTICS (Note 7)</b>           |                     |      |      |          |               |  |
| Drain-Source Breakdown Voltage                | $BV_{DSS}$          | -50  | —    | —        | V             | $V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$  |
| Zero Gate Voltage Drain Current               | $I_{DSS}$           | —    | —    | -1       | $\mu\text{A}$ | $V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = +25^\circ\text{C}$                          |
|   |                     | —    | —    | -2       | $\mu\text{A}$ | $V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = +125^\circ\text{C}$                         |
|   |                     | —    | —    | -100     | nA            | $V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, T_J = +25^\circ\text{C}$                          |
| Gate-Body Leakage                             | $I_{GSS}$           | —    | —    | $\pm 10$ | nA            | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$  |
| <b>ON CHARACTERISTICS (Note 7)</b>            |                     |      |      |          |               |  |
| Gate Threshold Voltage                        | $V_{GS(\text{TH})}$ | -0.8 | —    | -2.0     | V             | $V_{DS} = V_{GS}, I_D = -1\text{mA}$   |
| Static Drain-Source On-Resistance             | $R_{DS(\text{ON})}$ | —    | —    | 10       | $\Omega$      | $V_{GS} = -5\text{V}, I_D = -0.100\text{A}$  |
| Forward Transconductance                      | $g_{FS}$            | 0.05 | —    | —        | S             | $V_{DS} = -25\text{V}, I_D = -0.1\text{A}$   |
| <b>DYNAMIC CHARACTERISTICS (Note 8)</b>       |                     |      |      |          |               |  |
| Input Capacitance                             | $C_{iss}$           | —    | 24.6 | 45       | pF            | $V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$                                |
| Output Capacitance                            | $C_{oss}$           | —    | 4.7  | 25       | pF            |  |
| Reverse Transfer Capacitance                  | $C_{rss}$           | —    | 2.8  | 12       | pF            | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$                                    |
| Gate Resistance                               | $R_g$               | —    | 916  | —        | $\Omega$      |  |
| Total Gate Charge ( $V_{GS} = -4.5\text{V}$ ) | $Q_g$               | —    | 0.28 | —        | nC            | $V_{DS} = -10\text{V}, I_D = -0.1\text{A}$   |
| Total Gate Charge ( $V_{GS} = -10\text{V}$ )  | $Q_g$               | —    | 0.59 | —        | nC            |  |
| Gate-Source Charge                            | $Q_{gs}$            | —    | 0.09 | —        | nC            |  |
| Gate-Drain Charge                             | $Q_{gd}$            | —    | 0.08 | —        | nC            |  |
| Turn-On Delay Time                            | $t_{D(\text{ON})}$  | —    | 10   | —        | ns            | $V_{DD} = -30\text{V}, I_D = -0.27\text{A}, R_{\text{GEN}} = 50\Omega, V_{GS} = -10\text{V}$ |
| Turn-Off Delay Time                           | $t_{D(\text{OFF})}$ | —    | 18   | —        | ns            |  |

Notes: 6. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at <http://www.diodes.com/package-outlines.html>.

7. Short duration pulse test used to minimize self-heating effect.

8. Guaranteed by design. Not subject to production testing.

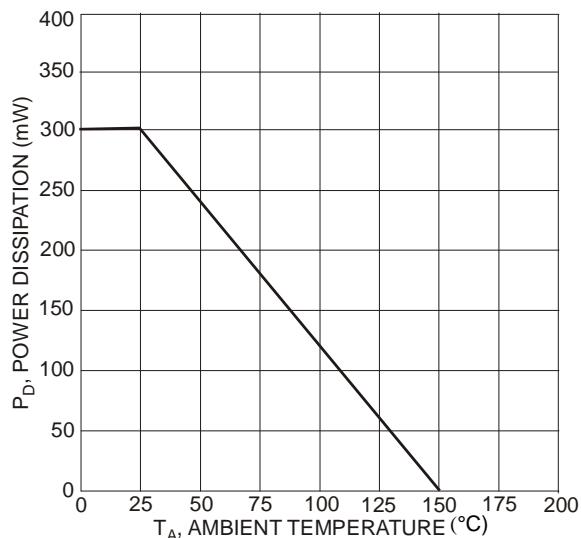


Fig. 1 Max Power Dissipation vs. Ambient Temperature

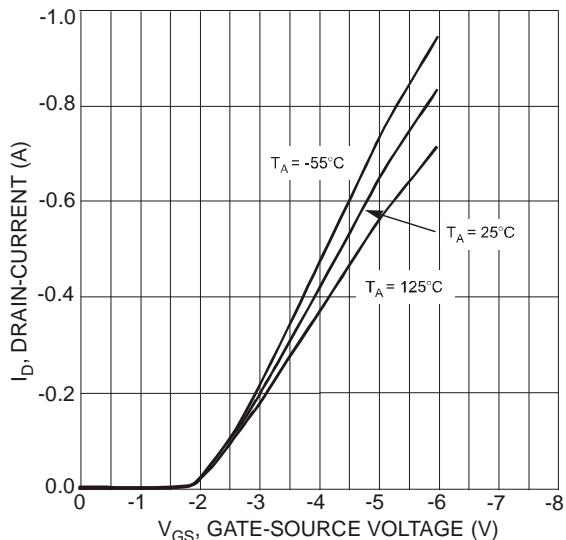


Fig. 3 Drain-Current vs. Gate-Source Voltage

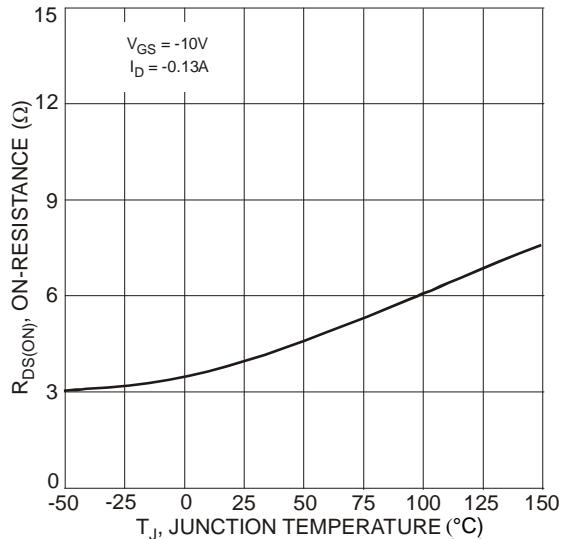


Fig. 5 On-Resistance vs. Junction Temperature

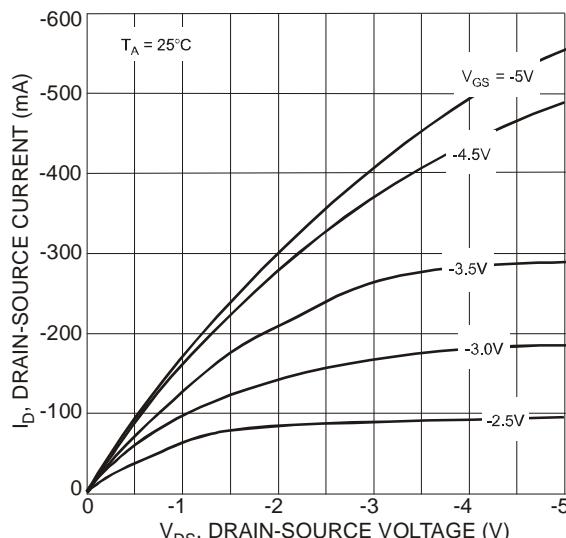


Fig. 2 Drain-Source Current vs. Drain-Source Voltage

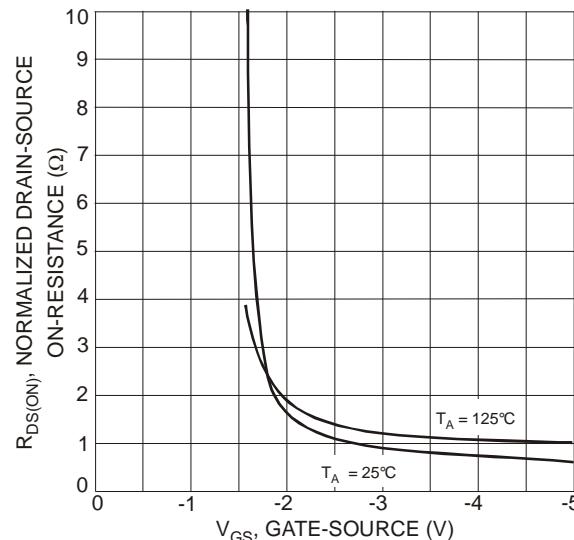


Fig. 4 On-Resistance vs. Gate-Source Voltage

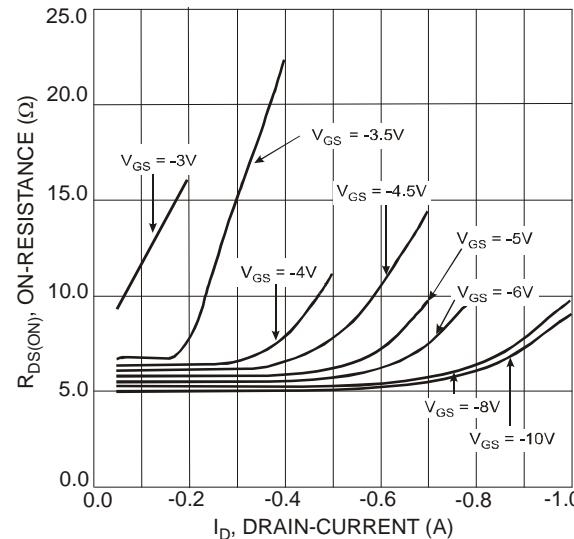
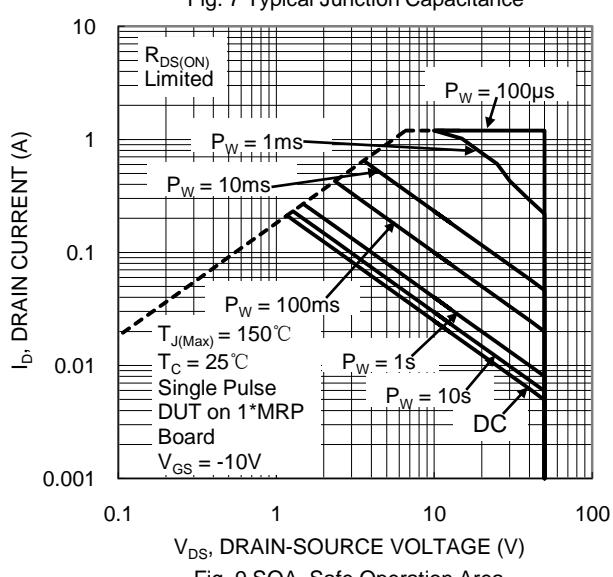
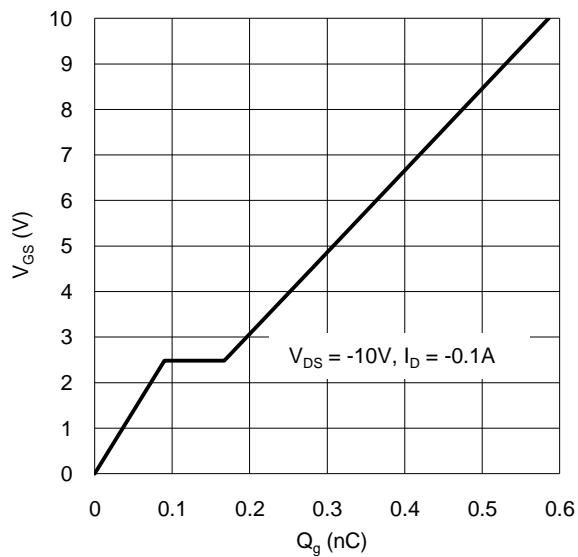
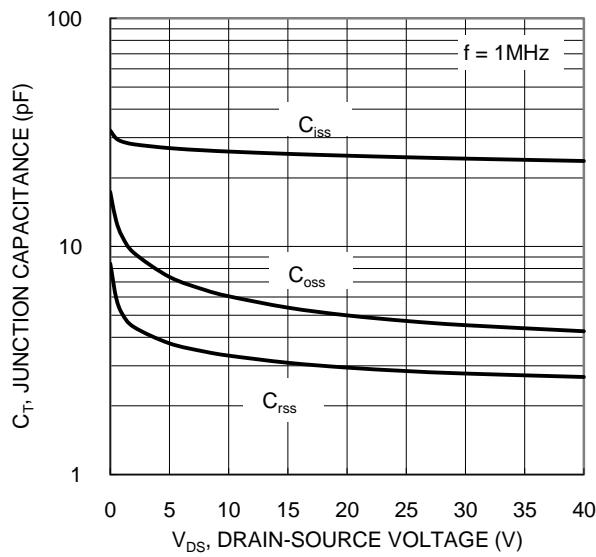


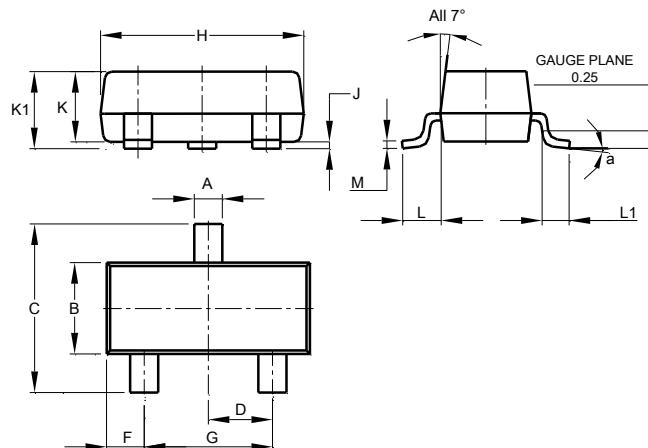
Fig. 6 On-Resistance vs. Drain-Current



## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**



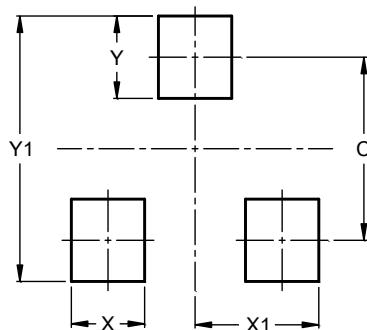
| <b>SOT23</b> |            |            |            |
|--------------|------------|------------|------------|
| <b>Dim</b>   | <b>Min</b> | <b>Max</b> | <b>Typ</b> |
| <b>A</b>     | 0.37       | 0.51       | 0.40       |
| <b>B</b>     | 1.20       | 1.40       | 1.30       |
| <b>C</b>     | 2.30       | 2.50       | 2.40       |
| <b>D</b>     | 0.89       | 1.03       | 0.915      |
| <b>F</b>     | 0.45       | 0.60       | 0.535      |
| <b>G</b>     | 1.78       | 2.05       | 1.83       |
| <b>H</b>     | 2.80       | 3.00       | 2.90       |
| <b>J</b>     | 0.013      | 0.10       | 0.05       |
| <b>K</b>     | 0.890      | 1.00       | 0.975      |
| <b>K1</b>    | 0.903      | 1.10       | 1.025      |
| <b>L</b>     | 0.45       | 0.61       | 0.55       |
| <b>L1</b>    | 0.25       | 0.55       | 0.40       |
| <b>M</b>     | 0.085      | 0.150      | 0.110      |
| <b>a</b>     | 0°         | 8°         | --         |

All Dimensions in mm

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT23**



| <b>Dimensions</b> | <b>Value (in mm)</b> |
|-------------------|----------------------|
| <b>C</b>          | 2.0                  |
| <b>X</b>          | 0.8                  |
| <b>X1</b>         | 1.35                 |
| <b>Y</b>          | 0.9                  |
| <b>Y1</b>         | 2.9                  |

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