

# MOSFET - Power, Single P-Channel, SOT-23 -50 V, 10 $\Omega$

## BSS84L, BVSS84L, SBSS84L

- SOT-23 Surface Mount Package Saves Board Space
- BV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating                                                                                                       | Symbol            | Value        | Unit               |
|--------------------------------------------------------------------------------------------------------------|-------------------|--------------|--------------------|
| Drain-to-Source Voltage                                                                                      | $V_{DS}$          | -50          | Vdc                |
| Gate-to-Source Voltage - Continuous                                                                          | $V_{GS}$          | $\pm 20$     | Vdc                |
| Drain Current<br>Continuous @ $T_A = 25^\circ\text{C}$<br>Pulsed Drain Current ( $t_p \leq 10 \mu\text{s}$ ) | $I_D$<br>$I_{DM}$ | -130<br>-520 | mA                 |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$                                                           | $P_D$             | 225          | mW                 |
| Operating and Storage Temperature Range                                                                      | $T_J, T_{stg}$    | -55 to 150   | $^\circ\text{C}$   |
| Thermal Resistance - Junction-to-Ambient                                                                     | $R_{\theta JA}$   | 556          | $^\circ\text{C/W}$ |
| Thermal Resistance - Junction-to-Ambient (Note 1)                                                            | $R_{\theta JA}$   | 377.2        | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, for 10 seconds                                              | $T_L$             | 260          | $^\circ\text{C}$   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

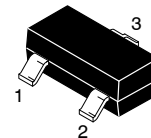
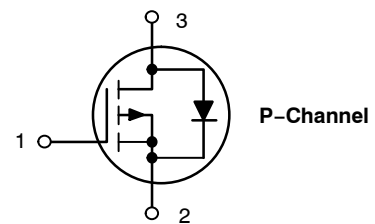
1.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. And the  $R_{\theta JA}$  is determined by the user's board design. The maximum rating presented here is based on mounting the part on JEDEC Standard 51-3/51-7.



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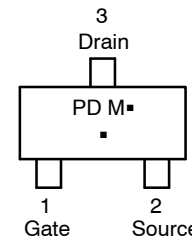
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|               |                          |
|---------------|--------------------------|
| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ MAX}$ |
| -50 V         | 10 $\Omega$ @ -10 V      |



SOT-23  
CASE 318  
STYLE 21

### MARKING DIAGRAM & PIN ASSIGNMENT



PD = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

(\*Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device                                  | Package             | Shipping†           |
|-----------------------------------------|---------------------|---------------------|
| BSS84LT1G,<br>BVSS84LT1G,<br>SBSS84LT1G | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel |
| BSS84LT7G                               | SOT-23<br>(Pb-Free) | 3,500 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                                                                                                                                                                                              |               |             |             |                    |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|-------------|--------------------|-----------------|
| Drain-to-Source Breakdown Voltage<br>( $V_{GS} = 0\text{ Vdc}$ , $I_D = -250\text{ }\mu\text{Adc}$ )                                                                                                                                         | $V_{(BR)DSS}$ | -50         | -           | -                  | Vdc             |
| Zero Gate Voltage Drain Current<br>( $V_{DS} = -25\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )<br>( $V_{DS} = -50\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )<br>( $V_{DS} = -50\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ , $T_J = 125^\circ\text{C}$ ) | $I_{DSS}$     | -<br>-<br>- | -<br>-<br>- | -0.1<br>-15<br>-60 | $\mu\text{Adc}$ |
| Gate-Body Leakage Current ( $V_{GS} = \pm 20\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )                                                                                                                                                         | $I_{GSS}$     | -           | -           | $\pm 10$           | nAdc            |

### ON CHARACTERISTICS (Note 2)

|                                                                                                     |              |      |     |      |          |
|-----------------------------------------------------------------------------------------------------|--------------|------|-----|------|----------|
| Gate-Source Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = -250\text{ }\mu\text{A}$ )               | $V_{GS(th)}$ | -0.9 | -   | -2.0 | Vdc      |
| Static Drain-to-Source On-Resistance ( $V_{GS} = -5.0\text{ Vdc}$ , $I_D = -100\text{ mAdc}$ )      | $R_{DS(on)}$ | -    | 4.7 | 10   | $\Omega$ |
| Transfer Admittance ( $V_{DS} = -25\text{ Vdc}$ , $I_D = -100\text{ mAdc}$ , $f = 1.0\text{ kHz}$ ) | $ Y_{fs} $   | 50   | -   | -    | mS       |

### DYNAMIC CHARACTERISTICS

|                      |                           |           |   |     |   |    |
|----------------------|---------------------------|-----------|---|-----|---|----|
| Input Capacitance    | $V_{DS} = 5.0\text{ Vdc}$ | $C_{iss}$ | - | 36  | - | pF |
| Output Capacitance   | $V_{DS} = 5.0\text{ Vdc}$ | $C_{oss}$ | - | 17  | - |    |
| Transfer Capacitance | $V_{DG} = 5.0\text{ Vdc}$ | $C_{rss}$ | - | 6.5 | - |    |

### SWITCHING CHARACTERISTICS (Note 3)

|                     |                                                                                   |              |   |     |   |    |
|---------------------|-----------------------------------------------------------------------------------|--------------|---|-----|---|----|
| Turn-On Delay Time  | $V_{DD} = -15\text{ Vdc}$ , $I_D = -2.5\text{ Adc}$ ,<br>$R_L = 50\text{ }\Omega$ | $t_{d(on)}$  | - | 3.6 | - | ns |
| Rise Time           |                                                                                   | $t_r$        | - | 9.7 | - |    |
| Turn-Off Delay Time |                                                                                   | $t_{d(off)}$ | - | 12  | - |    |
| Fall Time           |                                                                                   | $t_f$        | - | 1.7 | - |    |
| Gate Charge         | $V_{DD} = -40\text{ Vdc}$ , $I_D = -0.5\text{ A}$ ,<br>$V_{GS} = -10\text{ V}$    | $Q_T$        | - | 2.2 | - | nC |

### SOURCE-DRAIN DIODE CHARACTERISTICS

|                          |                                                 |                 |   |   |        |   |
|--------------------------|-------------------------------------------------|-----------------|---|---|--------|---|
| Continuous Current       |                                                 | I <sub>S</sub>  | – | – | –0.130 | A |
| Pulsed Current           |                                                 | I <sub>SM</sub> | – | – | –0.520 |   |
| Forward Voltage (Note 3) | V <sub>GS</sub> = 0 V, I <sub>S</sub> = –130 mA | V <sub>SD</sub> | – | – | –2.2   | V |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

3. Switching characteristics are independent of operating junction temperature.

## TYPICAL ELECTRICAL CHARACTERISTICS

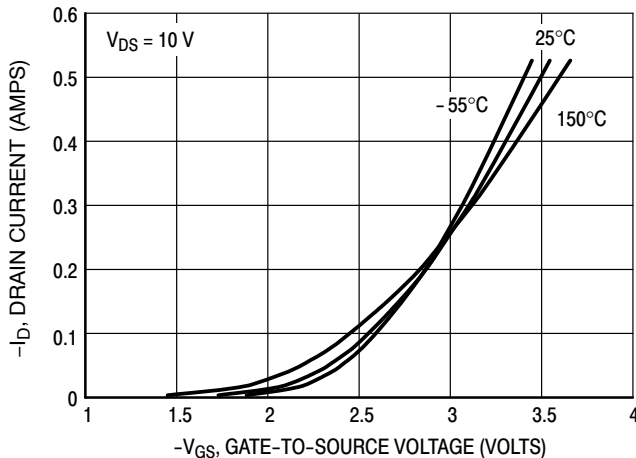


Figure 1. Transfer Characteristics

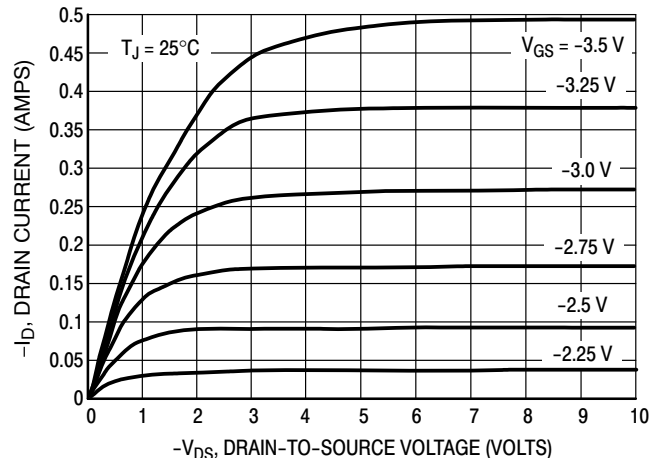


Figure 2. On-Region Characteristics

# BSS84L, BVSS84L, SBSS84L

## TYPICAL ELECTRICAL CHARACTERISTICS

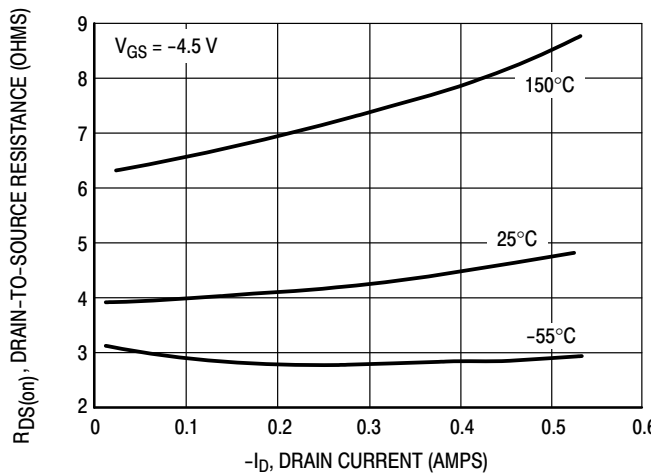


Figure 3. On-Resistance versus Drain Current

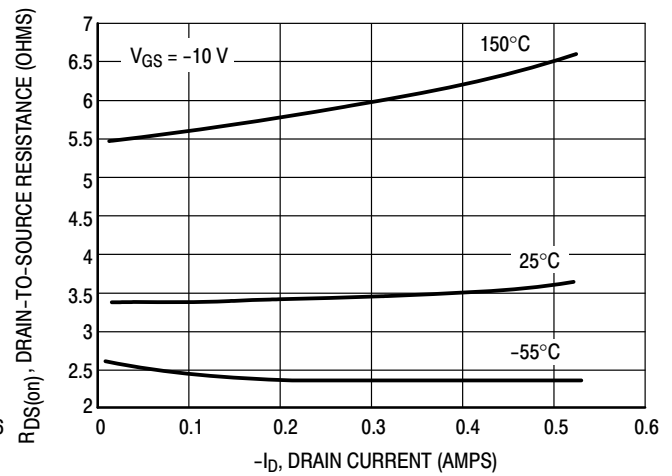


Figure 4. On-Resistance versus Drain Current

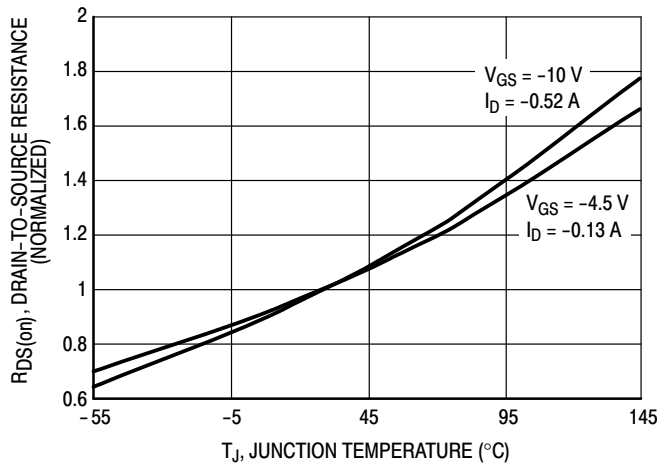


Figure 5. On-Resistance Variation with Temperature

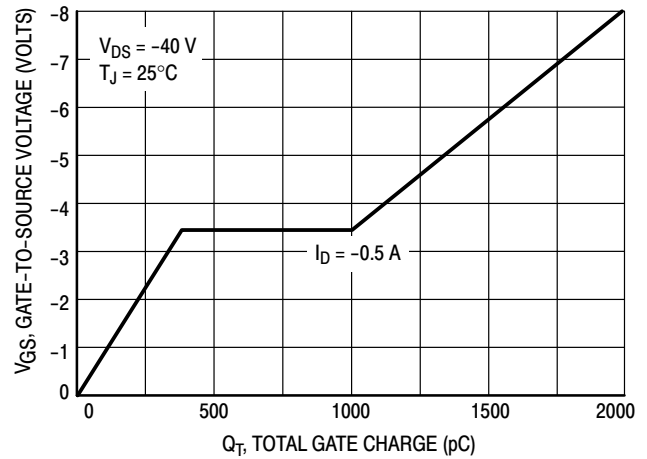


Figure 6. Gate Charge

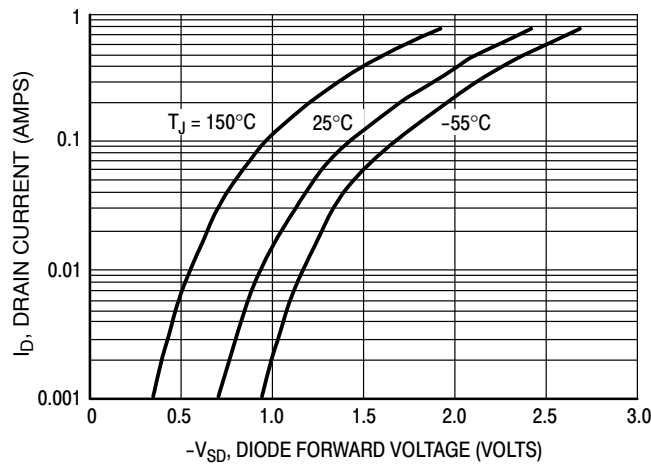


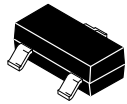
Figure 7. Body Diode Forward Voltage

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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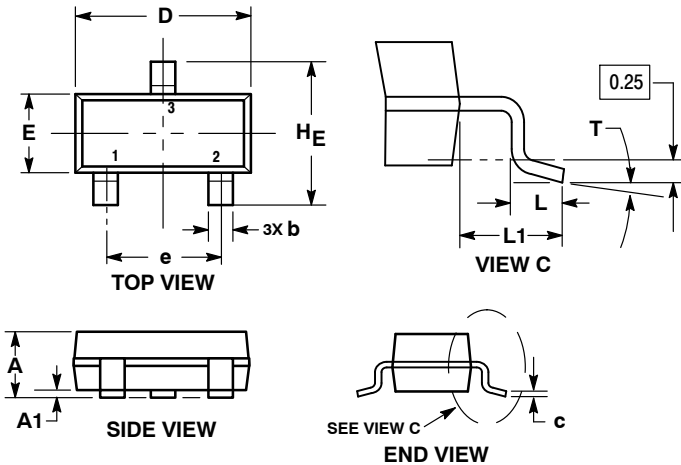
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### SOT-23 (TO-236) CASE 318-08 ISSUE AS

DATE 30 JAN 2018

SCALE 4:1

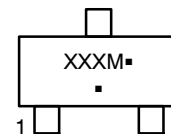


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c   | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.080 |
| L   | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T   | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

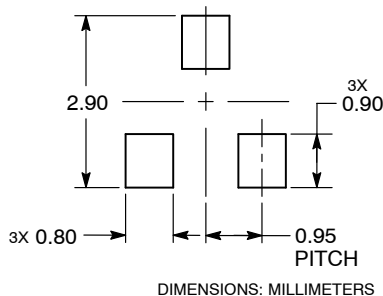
### GENERIC MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
■ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

### RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

STYLE 1 THRU 5:  
CANCELLED

STYLE 6:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 7:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE

STYLE 9:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 12:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 13:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 14:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 15:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 16:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE

STYLE 17:  
PIN 1. NO CONNECTION  
2. ANODE  
3. CATHODE

STYLE 18:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. ANODE

STYLE 19:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE-ANODE

STYLE 20:  
PIN 1. CATHODE  
2. ANODE  
3. GATE

STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 22:  
PIN 1. RETURN  
2. OUTPUT  
3. INPUT

STYLE 23:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 24:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE

STYLE 25:  
PIN 1. ANODE  
2. CATHODE  
3. GATE

STYLE 26:  
PIN 1. CATHODE  
2. ANODE  
3. NO CONNECTION

STYLE 27:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

STYLE 28:  
PIN 1. ANODE  
2. ANODE  
3. ANODE

|                  |                 |                                                                                                                                                                                  |
|------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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