



**THE DATASHEET OF
BFR31LT1**



BFR30LT1, BFR31LT1

JFET Amplifiers

N-Channel

Features

- Pb-Free Package is Available

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|----------------------|----------|-------|------|
| Drain-Source Voltage | V_{DS} | 25 | Vdc |
| Gate-Source Voltage | V_{GS} | 25 | Vdc |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

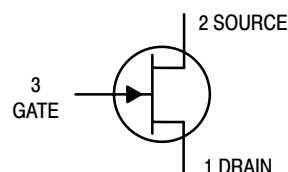
| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|----------------------------|
| Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 2.4 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

- Device mounted on FR4 glass epoxy printed circuit board using the recommended footprint.
- Alumina = $0.4 \times 0.3 \times 0.024$ in 99.5% alumina.

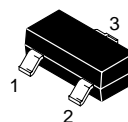


ON Semiconductor®

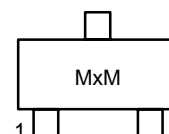
<http://onsemi.com>



MARKING DIAGRAM



SOT-23
CASE 318
STYLE 10



x = 1 or 2
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------|---------------------|------------------|
| BFR30LT1 | SOT-23 | 3000/Tape & Reel |
| BFR30LT1G | SOT-23 (Pb-Free) | 3000/Tape & Reel |
| BFR31LT1 | SOT-23 | 3000/Tape & Reel |
| BFR31LT1G | SOT-23 (Pb-Free) | 3000/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.

BFR30LT1, BFR31LT1

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|----------------------------|---|----------------------|------|------|------|
| OFF CHARACTERISTICS | | | | | |
| Gate Reverse Current | (V _{GS} = 10 Vdc, V _{DS} = 0) | I _{GSS} | – | 0.2 | nAdc |
| Gate Source Cutoff Voltage | (I _D = 0.5 nAdc, V _{DS} = 10 Vdc) | V _{GS(OFF)} | – | 5.0 | Vdc |
| | | | – | 2.5 | |
| Gate Source Voltage | (I _D = 1.0 mAdc, V _{DS} = 10 Vdc) | V _{GS} | –0.7 | –3.0 | Vdc |
| | | | – | –1.3 | |
| | (I _D = 50 μAdc, V _{DS} = 10 Vdc) | | – | –4.0 | |
| | | | – | –2.0 | |

ON CHARACTERISTICS

| | | | | | | |
|---------------------------------|---|----------------|------------------|------------|-----------|------|
| Zero-Gate-Voltage Drain Current | (V _{DS} = 10 Vdc, V _{GS} = 0) | BFR30 BFR31 | I _{DSS} | 4.0 1.0 | 10 5.0 | mAdc |
|---------------------------------|---|----------------|------------------|------------|-----------|------|

SMALL-SIGNAL CHARACTERISTICS

| | | | | | | |
|------------------------------|--|----------------|------------------|-------------|------------|-------|
| Forward Transconductance | (I _D = 1.0 mAdc, V _{DS} = 10 Vdc, f = 1.0 kHz) | BFR30 BFR31 | y _{fs} | 1.0 1.5 | 4.0 4.5 | mmhos |
| | (I _D = 200 μAdc, V _{DS} = 10 Vdc, f = 1.0 kHz) | BFR30 BFR31 | | 0.5 0.75 | – – | |
| Output Admittance | (I _D = 1.0 mAdc, V _{DS} = 10 Vdc, f = 1.0 kHz) | BFR30 | y _{os} | 40 | 25 | μmhos |
| | (I _D = 200 μAdc, V _{DS} = 10 Vdc) | BFR31 | | 20 | 15 | |
| Input Capacitance | (I _D = 1.0 mAdc, V _{DS} = 10 Vdc, f = 1.0 MHz) | | C _{iss} | – | 5.0 | pF |
| | (I _D = 200 μAdc, V _{DS} = 10 Vdc, f = 1.0 MHz) | | | – | 4.0 | |
| Reverse Transfer Capacitance | (I _D = 1.0 mAdc, V _{DS} = 10 Vdc, f = 1.0 MHz) | | C _{rss} | – | 1.5 | pF |
| | (I _D = 200 μAdc, V _{DS} = 10 Vdc, f = 1.0 MHz) | | | – | 1.5 | |

TYPICAL CHARACTERISTICS

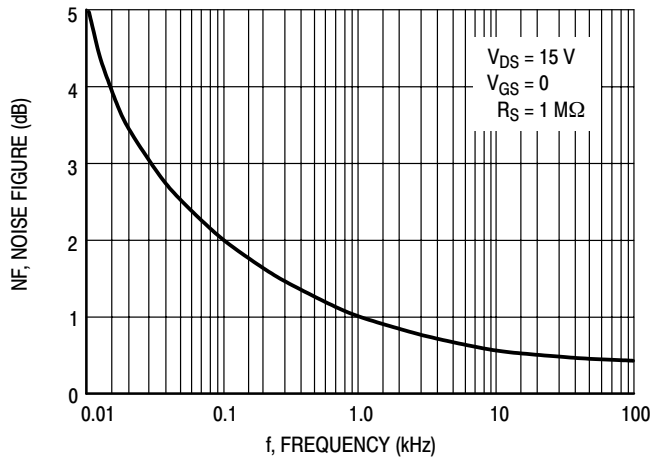


Figure 1. Noise Figure versus Frequency

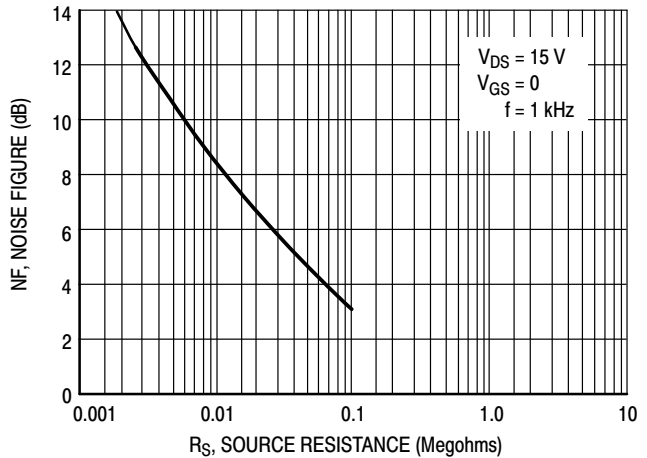


Figure 2. Noise Figure versus Source Resistance

BFR30LT1, BFR31LT1

TYPICAL CHARACTERISTICS

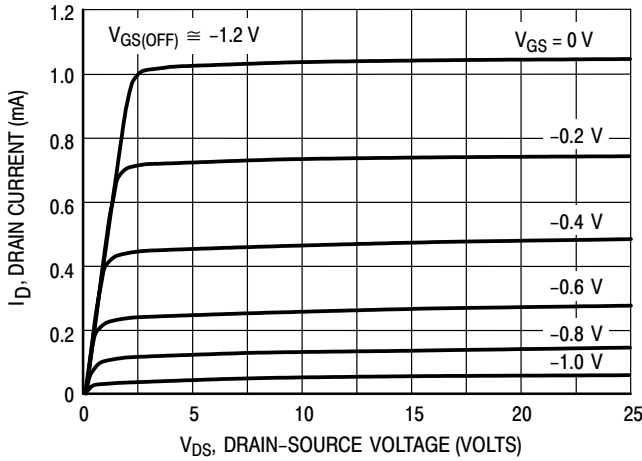


Figure 3. Typical Drain Characteristics

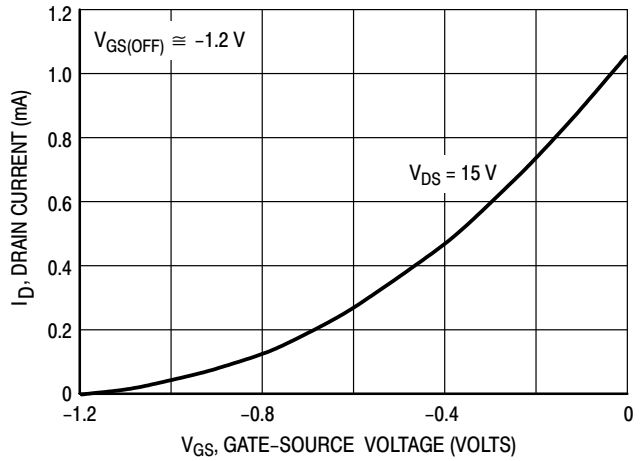


Figure 4. Common Source Transfer Characteristics

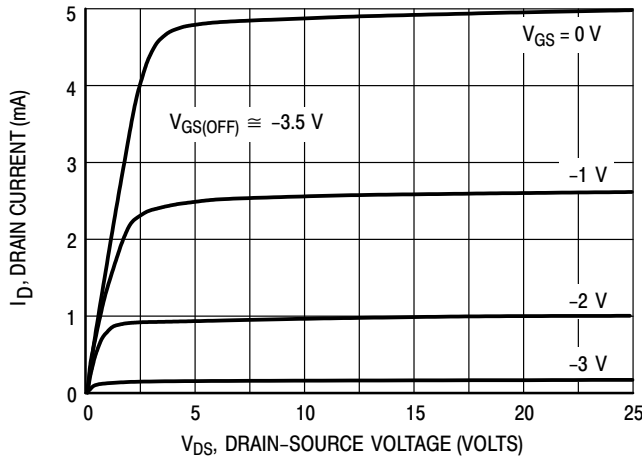


Figure 5. Typical Drain Characteristics

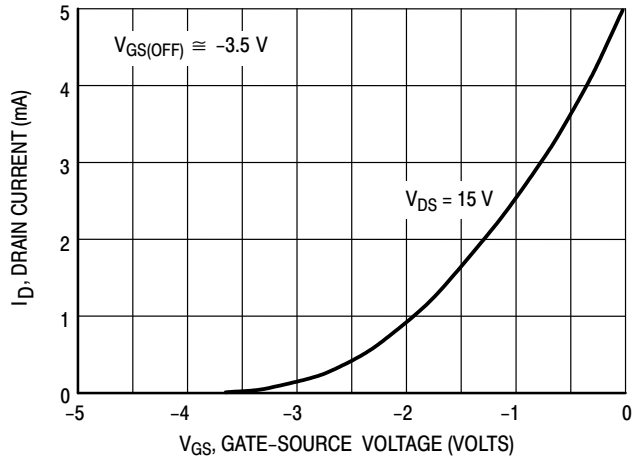


Figure 6. Common Source Transfer Characteristics

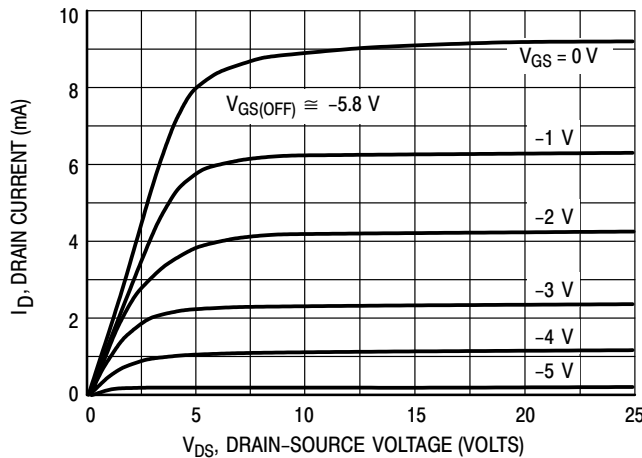


Figure 7. Typical Drain Characteristics

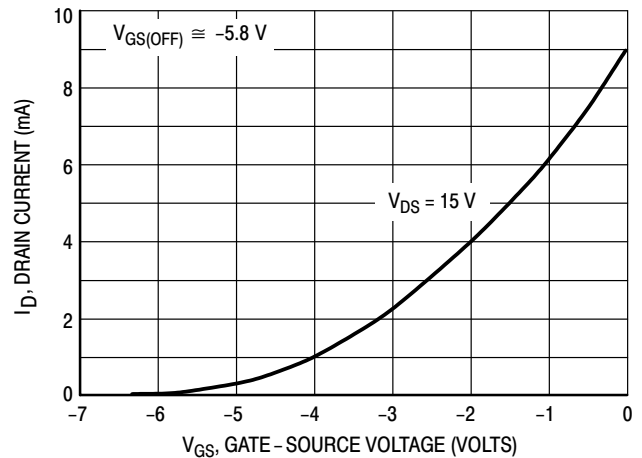


Figure 8. Common Source Transfer Characteristics

Note: Graphical data is presented for dc conditions. Tabular data is given for pulsed conditions (Pulse Width = 630 ms, Duty Cycle = 10%). Under dc conditions, self heating in higher I_{DSS} units reduces I_{DSS} .

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

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 |
| H _E | 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. Some products may not follow the Generic Marking.



RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



SOT-23 (TO-236) CASE 318 ISSUE AT

DATE 01 MAR 2023

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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