

# 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

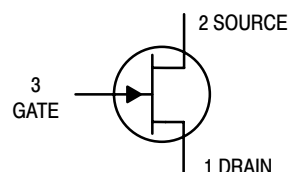
Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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.

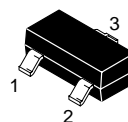


ON Semiconductor®

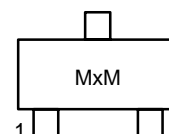
<http://onsemi.com>



#### 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<sub>A</sub> = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Gate Reverse Current	(V <sub>GS</sub> = 10 Vdc, V <sub>DS</sub> = 0)	I <sub>GSS</sub>	–	0.2	nAdc
Gate Source Cutoff Voltage	(I <sub>D</sub> = 0.5 nAdc, V <sub>DS</sub> = 10 Vdc)	BFR30	–	5.0	Vdc
		BFR31	–	2.5	
Gate Source Voltage	(I <sub>D</sub> = 1.0 mAdc, V <sub>DS</sub> = 10 Vdc)	BFR30	–0.7	–3.0	Vdc
		BFR31	–	–1.3	
	(I <sub>D</sub> = 50 μAdc, V <sub>DS</sub> = 10 Vdc)	BFR30	–	–4.0	
		BFR31	–	–2.0	

## ON CHARACTERISTICS

Zero-Gate-Voltage Drain Current	(V <sub>DS</sub> = 10 Vdc, V <sub>GS</sub> = 0)	BFR30 BFR31	I <sub>DSS</sub>	4.0 1.0	10 5.0	mAdc
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## SMALL-SIGNAL CHARACTERISTICS

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

## TYPICAL CHARACTERISTICS

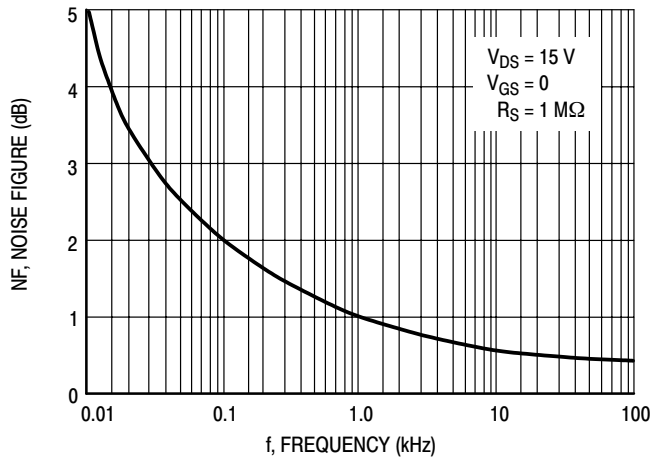


Figure 1. Noise Figure versus Frequency

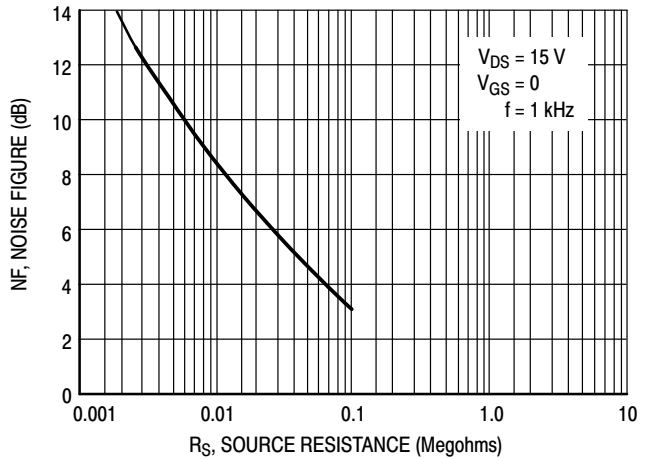


Figure 2. Noise Figure versus Source Resistance

# BFR30LT1, BFR31LT1

## TYPICAL CHARACTERISTICS

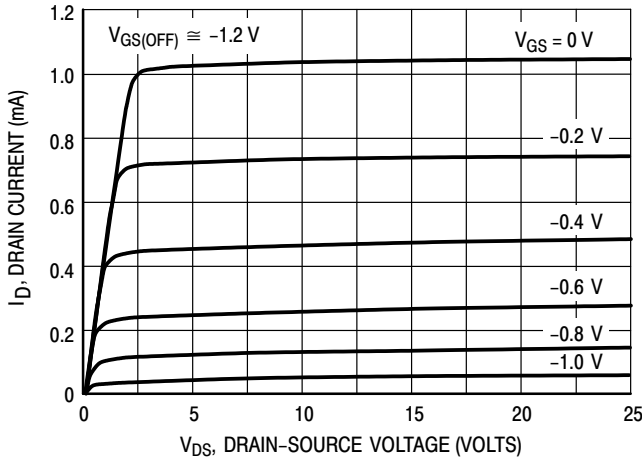


Figure 3. Typical Drain Characteristics

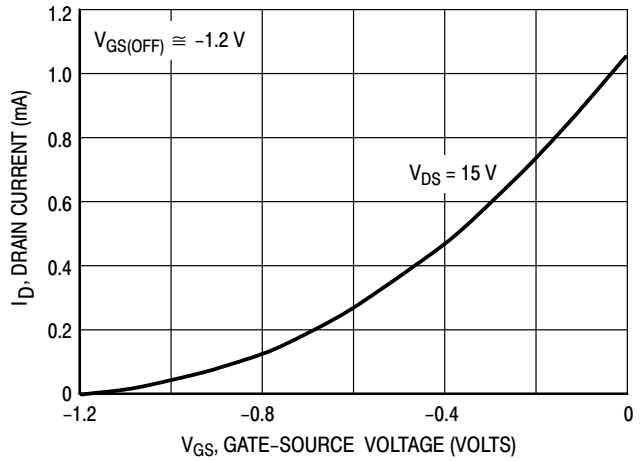


Figure 4. Common Source Transfer Characteristics

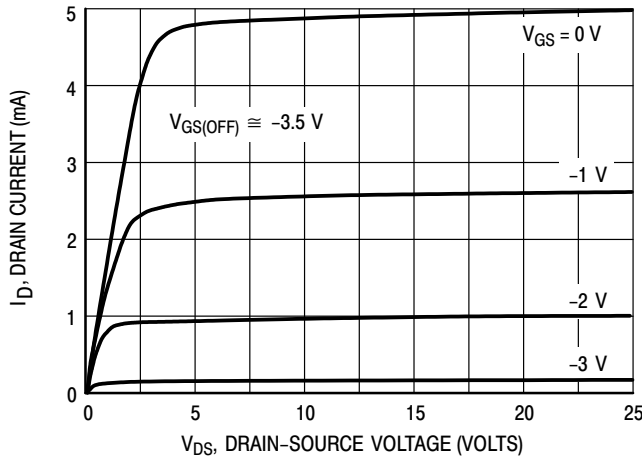


Figure 5. Typical Drain Characteristics

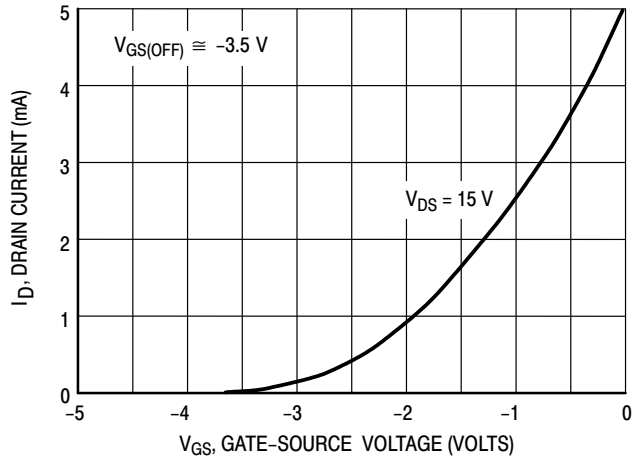


Figure 6. Common Source Transfer Characteristics

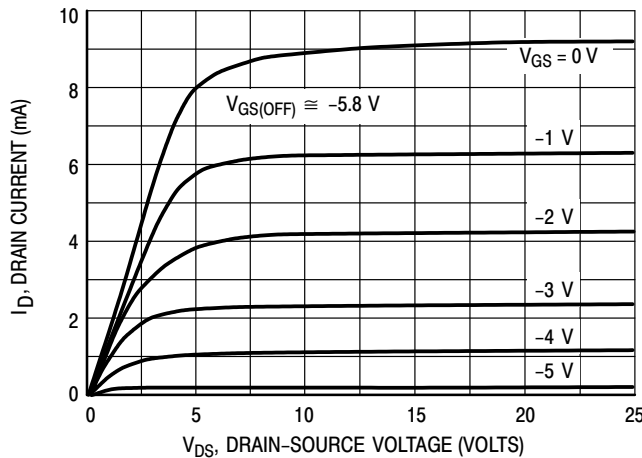


Figure 7. Typical Drain Characteristics

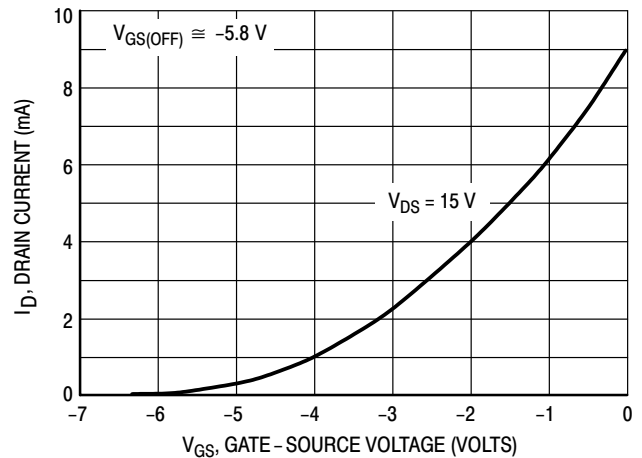


Figure 8. Common Source Transfer Characteristics

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 <sub>E</sub>	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:<br>CANCELLED                            | STYLE 6:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 7:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR       | STYLE 8:<br>PIN 1. ANODE<br>2. NO CONNECTION<br>3. CATHODE  |   |   |
| STYLE 9:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE      | STYLE 10:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE     | STYLE 11:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 12:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 13:<br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE           | STYLE 14:<br>PIN 1. CATHODE<br>2. GATE<br>3. ANODE          |
| STYLE 15:<br>PIN 1. GATE<br>2. CATHODE<br>3. ANODE      | STYLE 16:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE | STYLE 17:<br>PIN 1. NO CONNECTION<br>2. ANODE<br>3. CATHODE | STYLE 18:<br>PIN 1. NO CONNECTION<br>2. CATHODE<br>3. ANODE | STYLE 19:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE-ANODE | STYLE 20:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE          |
| STYLE 21:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN       | STYLE 22:<br>PIN 1. RETURN<br>2. OUTPUT<br>3. INPUT   | STYLE 23:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE         | STYLE 24:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE           | STYLE 25:<br>PIN 1. ANODE<br>2. CATHODE<br>3. GATE          | STYLE 26:<br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION |
| STYLE 27:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE | STYLE 28:<br>PIN 1. ANODE<br>2. ANODE<br>3. ANODE     |   |   |   |   |

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