

# 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

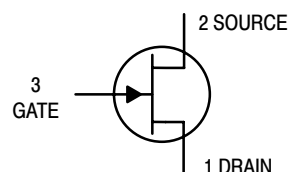
Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ 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 x 0.3 x 0.024 in 99.5% alumina.

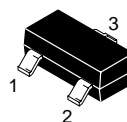


ON Semiconductor®

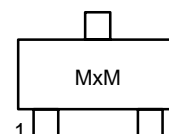
<http://onsemi.com>



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

## TYPICAL CHARACTERISTICS

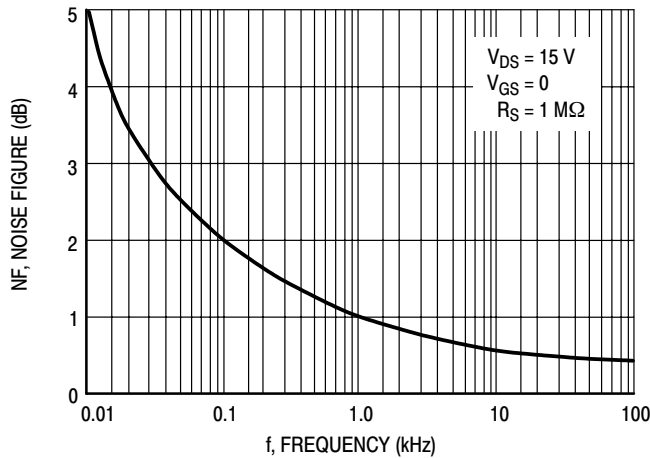


Figure 1. Noise Figure versus Frequency

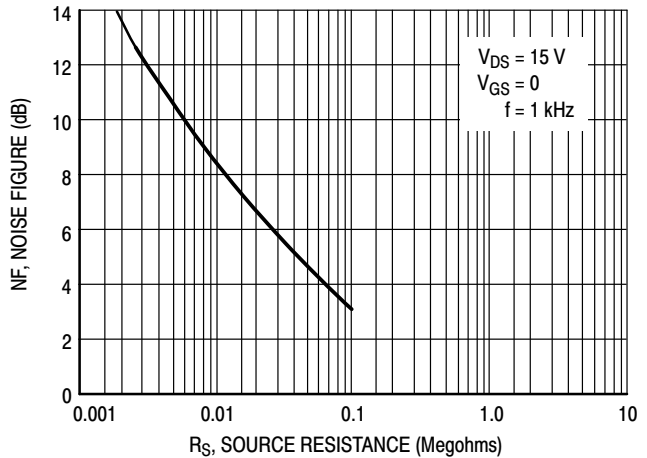


Figure 2. Noise Figure versus Source Resistance

# BFR30LT1, BFR31LT1

## TYPICAL CHARACTERISTICS

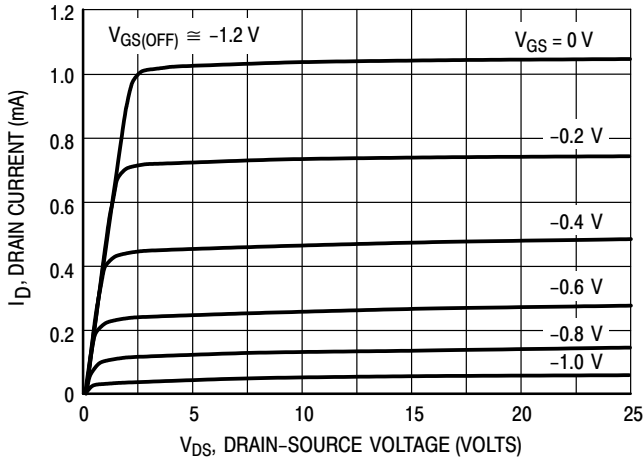


Figure 3. Typical Drain Characteristics

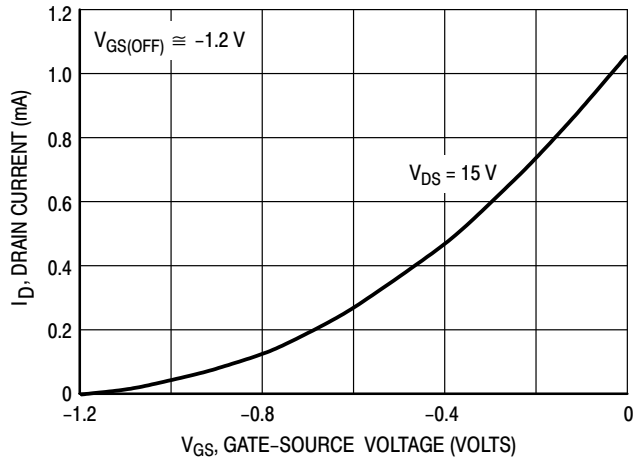


Figure 4. Common Source Transfer Characteristics

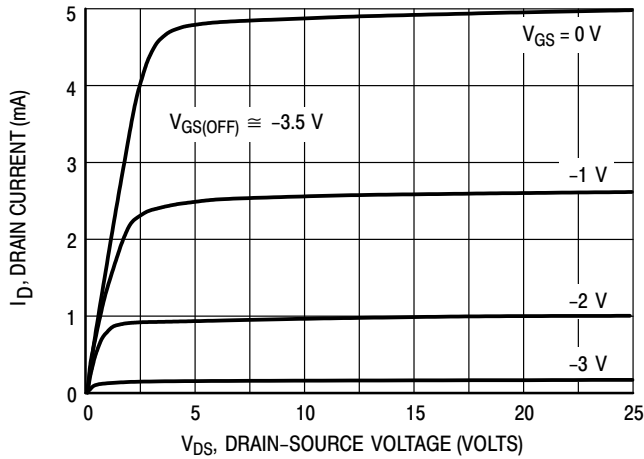


Figure 5. Typical Drain Characteristics

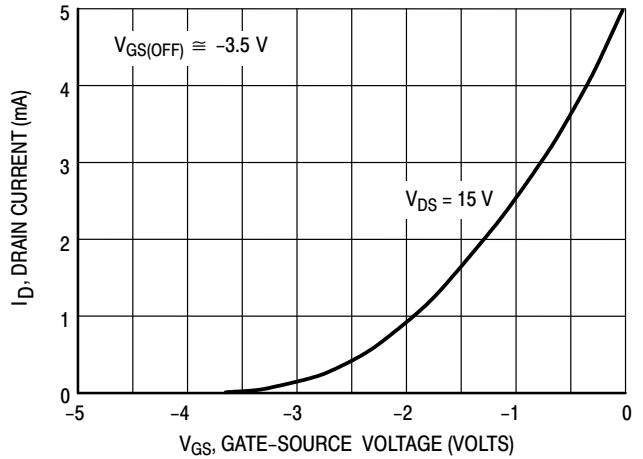


Figure 6. Common Source Transfer Characteristics

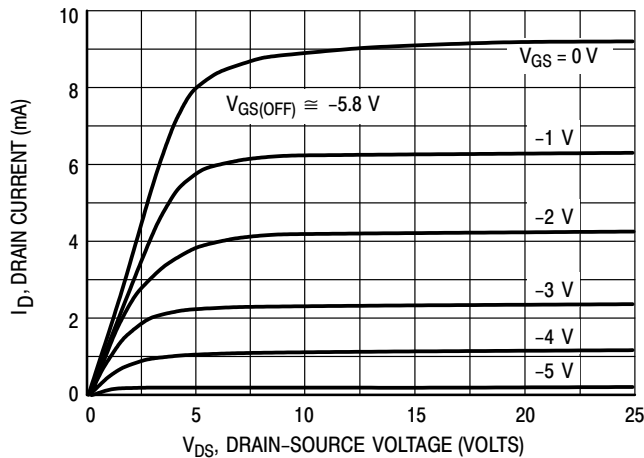


Figure 7. Typical Drain Characteristics

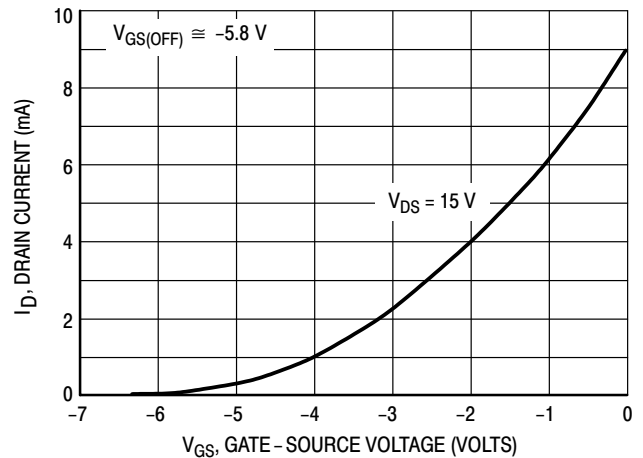


Figure 8. Common Source Transfer Characteristics

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

ON Semiconductor®



**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°

**RECOMMENDED SOLDERING FOOTPRINT**



**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.

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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