



## L8211

## LINEAR INTEGRATED CIRCUIT

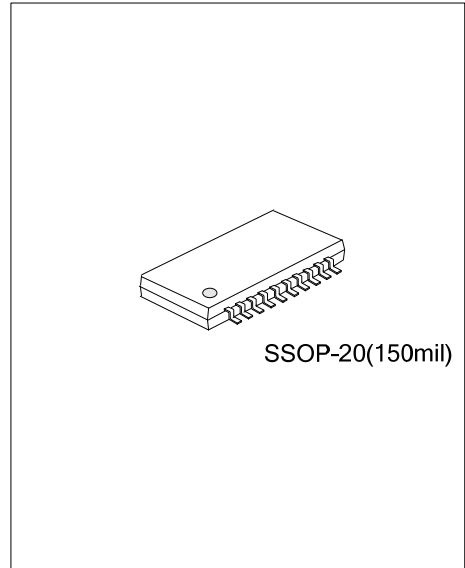
### FET BIAS CONTROLLER WITH POLARIZATION SWITCH AND TONE DETECTION

#### DESCRIPTION

The UTC **L8211** is designed to bias the MOSFETs that are commonly used in LNBS that can implies minimum external components requires.

#### FEATURES

- \* Three outputs that can drive up to 3 FETs.
- \* Drain current adjustable by external resistor.
- \* HB and LB switch for LNBS.
- \* Band switching by 22kHz tone detection.

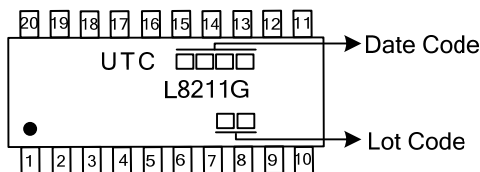


#### ORDERING INFORMATION

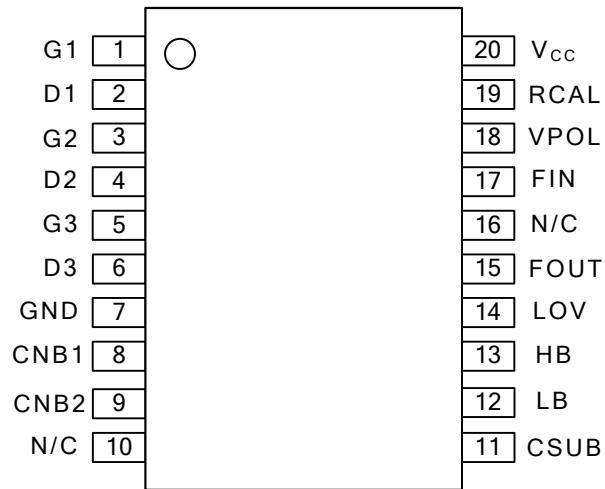
Ordering Number	Package	Packing
L8211G-R20-R	SSOP-20	Tape Reel
L8211G-R20-T	SSOP-20	Tube

<p>L8211G-R20-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel, T: Tube</li> <li>(2) R20: SSOP-20</li> <li>(3) G: Halogen Free and Lead Free</li> </ul>
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#### MARKING



### ■ PIN CONFIGURATION



### ■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	G1	To Gate of FET 1
2	D1	To Drain of FET 1
3	G2	To Gate of FET 2
4	D2	To Drain of FET 2
5	G3	To Gate of FET 3
6	D3	To Drain of FET 3
7	GND	Ground
8	CNB1	Connect 47nF capacitance to CNB2
9	CNB2	Connect 47nF capacitance to CNB1
10, 16	N/C	Nothing connect
11	CSUB	Connect an external 47nF cap to -3V
12	LB	Low band switch output
13	HB	High band switch output
14	LOV	LB and HB's switch
15	FOUT	Filter output
17	FIN	LNB input
18	VPOL	Control input switch
19	RCAL	Connect 33kohm to set Id1, Id2 and Id3 to 10mA
20	V <sub>CC</sub>	Power supply

### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.6 ~ +12	V
Supply Current	$I_{CC}$	100	mA
Input Voltage	$V_{IN}$	25 Continuous	V
Drain Current (per FET)(set by $R_{CAL}$ )	$I_D$	0 ~ 15	mA
Power Dissipation( $T_A=25^\circ\text{C}$ )	$P_D$	600	mW
Operating Temperature	$T_{OPR}$	-40~+70	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-50~+85	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ ELECTRICAL CHARACTERISTICS

( $T_A=25^\circ\text{C}$ ,  $V_{CC}=5\text{V}$ ,  $I_D=10\text{mA}$ ,  $R_{CAL}=33\text{K}\Omega$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		5		10	V
Supply Current	$I_{CC}$	$I_{D1}$ to $I_{D3}=0$		6	15	mA
		$I_{D1}=0$ , $I_{D2}$ to $I_{D3}=10\text{mA}$ , $V_{POL}=14\text{V}$		25	35	mA
		$I_{D2}=0$ , $I_{D1}$ to $I_{D3}=10\text{mA}$ , $V_{POL}=15.5\text{V}$		25	35	mA
		$I_{D1}$ to $I_{D3}=0$ , $I_{LB}=10\text{mA}$		16	25	mA
		$I_{D1}$ to $I_{D3}=0$ , $I_{HB}=10\text{mA}$		16	25	mA
Substrate Voltage	$V_{SUB}$	(Internally generated) $I_{SUB}=0$	-3.5	-3	-2.5	V
		$I_{SUB} = -200\mu\text{A}$			-2.4	V
Output Noise	Gate Voltage	$E_{NG}$	$C_G=4.7\text{nF}$ , $C_D=10\text{nF}$		0.005	Vpkpk
	Drain Voltage	$E_{ND}$	$C_G=4.7\text{nF}$ , $C_D=10\text{nF}$		0.02	Vpkpk
Oscillator Freq	$f_o$		200	350	800	kHz

### ■ GATE CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
Output Current Range	$I_{GO}$		-30		2000	$\mu\text{A}$		
Output Voltage Gate 1	Off	$V_{G1O}$	$I_{D1}=0\text{mA}$ , $V_{POL}=14\text{V}$ , $I_{GO1}=0\mu\text{A}$		-0.05	0	0.05	V
	Low	$V_{G1L}$	$I_{D1}=12\text{mA}$ , $V_{POL}=15.5\text{V}$ , $I_{GO1}=-10\mu\text{A}$		-2.7	-2.4	-2	V
	High	$V_{G1H}$	$I_{D1}=8\text{mA}$ , $V_{POL}=15.5\text{V}$ , $I_{GO1}=0\mu\text{A}$		0.4	0.75	1.0	V
Output Voltage Gate 2	Off	$V_{G2O}$	$I_{D2}=0\text{mA}$ , $V_{POL}=15.5\text{V}$ , $I_{GO2}=0\mu\text{A}$		-0.05	0	0.05	V
	Low	$V_{G2L}$	$I_{D2}=12\text{mA}$ , $V_{POL}=14\text{V}$ , $I_{GO2}=-10\mu\text{A}$		-2.7	-2.4	-2	V
	High	$V_{G2H}$	$I_{D2}=8\text{mA}$ , $V_{POL}=14\text{V}$ , $I_{GO2}=0\mu\text{A}$		0.4	0.75	1.0	V
Output Voltage Gate 3	Low	$V_{G3L}$	$I_{D3}=12\text{mA}$ , $I_{GO3}=-10\mu\text{A}$		-3.5	-2.9	-2	V
	High	$V_{G3H}$	$I_{D3}=8\text{mA}$ , $I_{GO3}=0\mu\text{A}$		0.4	0.75	1.0	V

### ■ DRAIN CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Current	$I_D$		8	10	12	mA
Current Change	With $V_{CC}$	$\Delta I_{DV}$	$V_{CC}=5 \sim 10\text{V}$		0.5	%/V
	With $T_J$	$\Delta I_{DT}$	$T_J = -40 \sim +70^\circ\text{C}$		0.05	%/ $^\circ\text{C}$
Drain 1 Voltage: High	$V_{D1}$	$I_{D1}=10\text{mA}$ , $V_{POL}=15.5\text{V}$	1.8	2	2.2	V
Drain 2 Voltage: High	$V_{D2}$	$I_{D2}=10\text{mA}$ , $V_{POL}=14\text{V}$	1.8	2	2.2	V
Drain 3 Voltage: High	$V_{D3}$	$I_{D3}=10\text{mA}$	1.8	2	2.2	V
Voltage Change	With $V_{CC}$	$\Delta V_{DV}$	$V_{CC} = 5 \sim 10\text{V}$		0.5	%/V
	With $T_J$	$\Delta V_{DT}$	$T_J = -40 \sim +70^\circ\text{C}$		50	ppm
Leakage Current	Drain 1	$I_{LEAK1}$	$V_{D1}=0.5\text{V}$ , $V_{POL}=14\text{V}$		10	$\mu\text{A}$
	Drain 2	$I_{LEAK2}$	$V_{D2}=0.5\text{V}$ , $V_{POL}=15.5\text{V}$		10	$\mu\text{A}$

■ TONE DETECTION CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>Filter Amplifier</b>							
Input Bias Current	$I_B$	$R_{F1}=150k\Omega$	0.02	0.07	0.25	$\mu A$	
Output Voltage	$V_{OUT}$	$R_{F1}=150k\Omega$	1.75	1.95	2.05	V	
Output Current	$I_{OUT}$	$V_{OUT}=1.96V, V_{FIN}=2.1V$	400	520	650	$\mu A$	
Voltage Gain	$G_V$	$f=22kHz, V_{IN}=1mV$		46		dB	
Rejection Frequency	$f_R$	$V_{(AC)IN}=1V$ p/p sq.w	1.0	7.5		kHz	
V Threshold	$F_{VT}$		100		350	mV p/p	
<b>Output Stage</b>							
Lov Volt.Range	$V_{LOV}$	$I_L=50mA$ (LB or HB)	-0.5		$V_{CC}-1.8$	V	
Lov Bias Current	$I_{LOV}$	$V_{LOV}=0V$	0.02	0.15	1	$\mu A$	
LB Output Low	$V_{LBL}$	$V_{LOV}=0V, I_L=-10\mu A$	Enable	-3.5	-2.75	-2.5	V
		$V_{LOV}=3V, I_L=0mA$	Enable	-0.01	0	0.01	V
LB Output High	$V_{LBH}$	$V_{LOV}=0V, I_L=10mA$	Disable	-0.025	0	0.025	V
		$V_{LOV}=3V, I_L=50mA$	Disable	2.9	3	3.1	V
HB Output Low	$V_{HBL}$	$V_{LOV}=0V, I_L=-10\mu A$	Disable	-3.5	-2.75	-2.5	V
		$V_{LOV}=3V, I_L=0mA$	Disable	-0.01	0	0.01	V
HB Output High	$V_{HBH}$	$V_{LOV}=0V, I_L=10mA$	Enable	-0.025	0	0.025	V
		$V_{LOV}=3V, I_L=50mA$	Enable	2.9	3	3.1	V

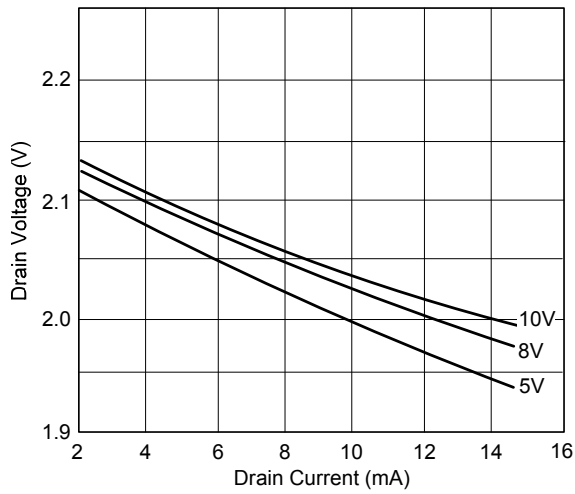
Note: Noise voltage measurement would be ignored in production.

■ POLARITY SWITCH CHARACTERISTICS

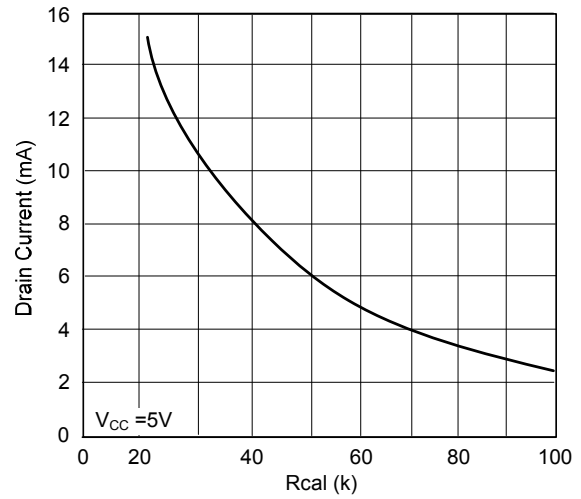
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Current	$I_{POL}$	$V_{POL}=25V$ (Applied via $R_{POL}=10k\Omega$ )	10	20	40	$\mu A$
Threshold Voltage	$V_{TPOL}$	$V_{POL}=25V$ (Applied via $R_{POL}=10k\Omega$ )	14	14.75	15.5	V
Switching Speed	$T_{SPOL}$	$V_{POL}=25V$ (Applied via $R_{POL}=10k\Omega$ )			100	ms

## TYPICAL CHARACTERISTICS

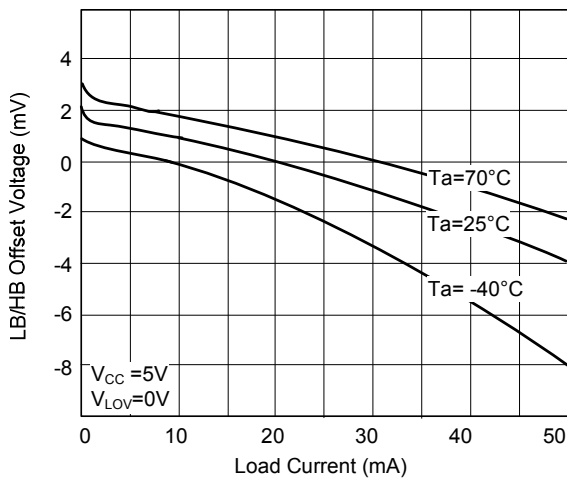
JFET Drain Voltage vs Drain Current



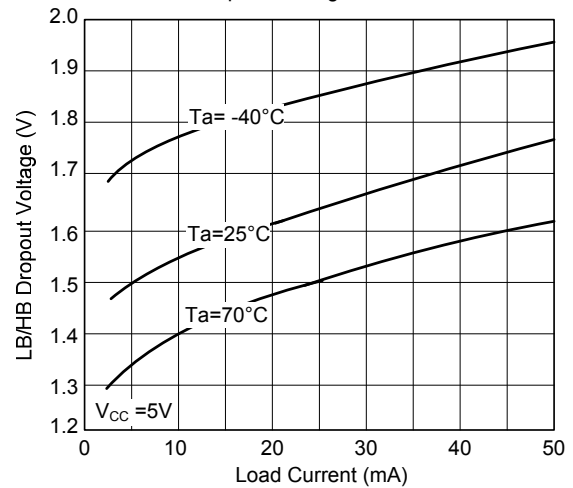
JFET Drain Current vs Rcal



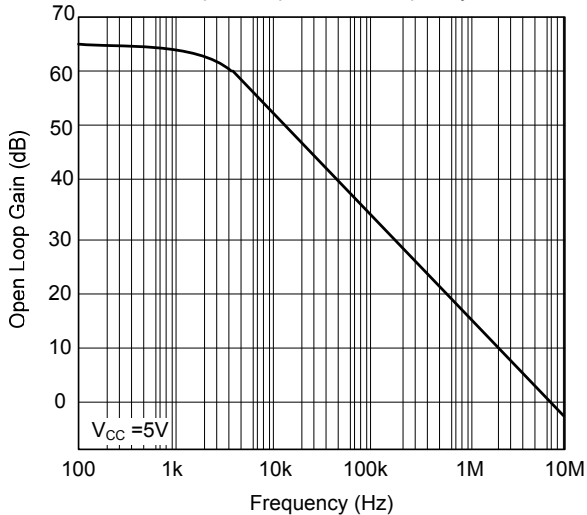
LB/HB Offset Voltage vs Load Current



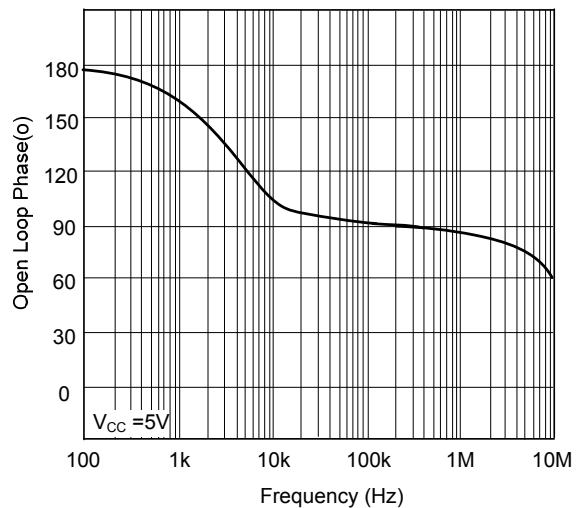
LB/HB Dropout Voltage vs Load Current



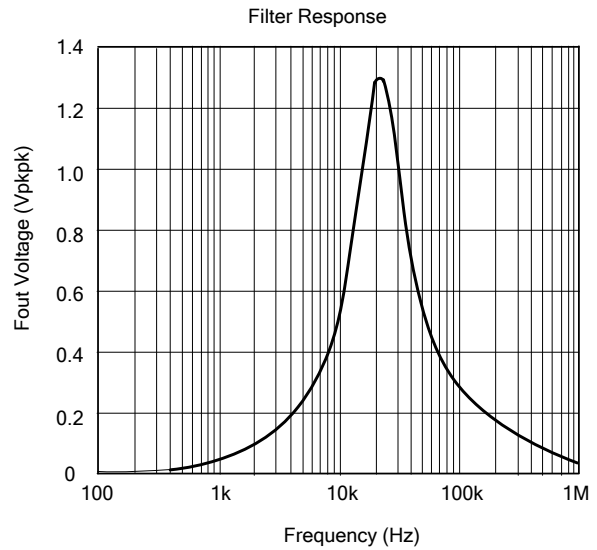
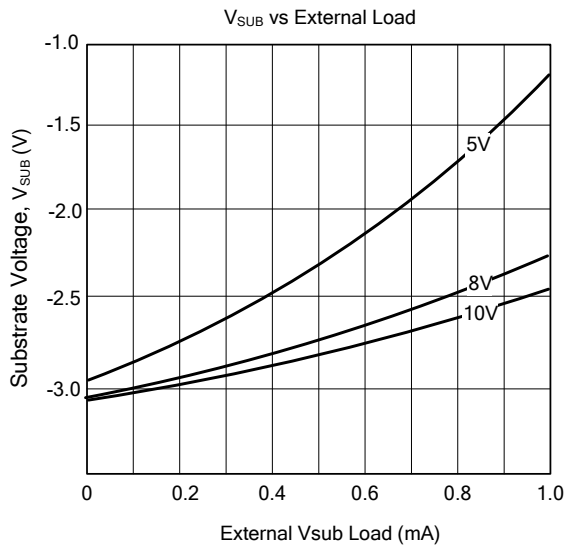
Open Loop Gain vs Frequency



Open Loop Phase vs Frequency



■ TYPICAL CHARACTERISTICS(Cont.)



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