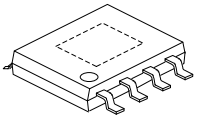
SINGLE LNB–BIAS, CONTROL AND POWER MANAGEMENT SOLUTION



HSOP-8

■ DESCRIPTION

The UTC **L8221** is a single chip power management and control solution for LNB's. The highly integrated solution provides all the required FET and mixer bias, control detection and decoding, local oscillator switching and a stable power supply for the IF amplifier and additional support functions. Being at the heart of the LNB monitoring the control, power management and environmental conditions the UTC **L8221** is able to provide reliable solution eliminating effects such as false switching and over loading.

■ FEATURES

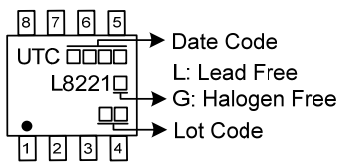
* Single chip LNB bias, control and power management
* 22kHz tone detector with signal rejection for band switching
* Zero Gate FET switching
* Integrated regulated supply for LNB
* Voltage detection for polarization switching
* Programmable mixer and FET bias
* Single pin for supply and control
* No external filtering required
* Temperature compensated protected FET bias

■ ORDERING INFORMATION

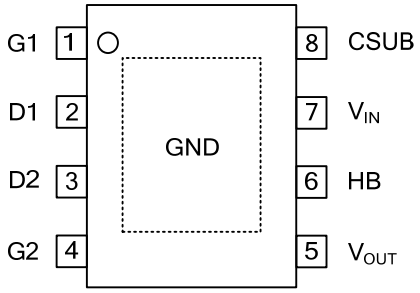
Ordering Number		Package	Packing
Lead Free	Halogen Free		
L8221L-SH2-R	L8221G-SH2-R	HSOP-8	Tape Reel

L8221G-SH2-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) SH2: HSOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



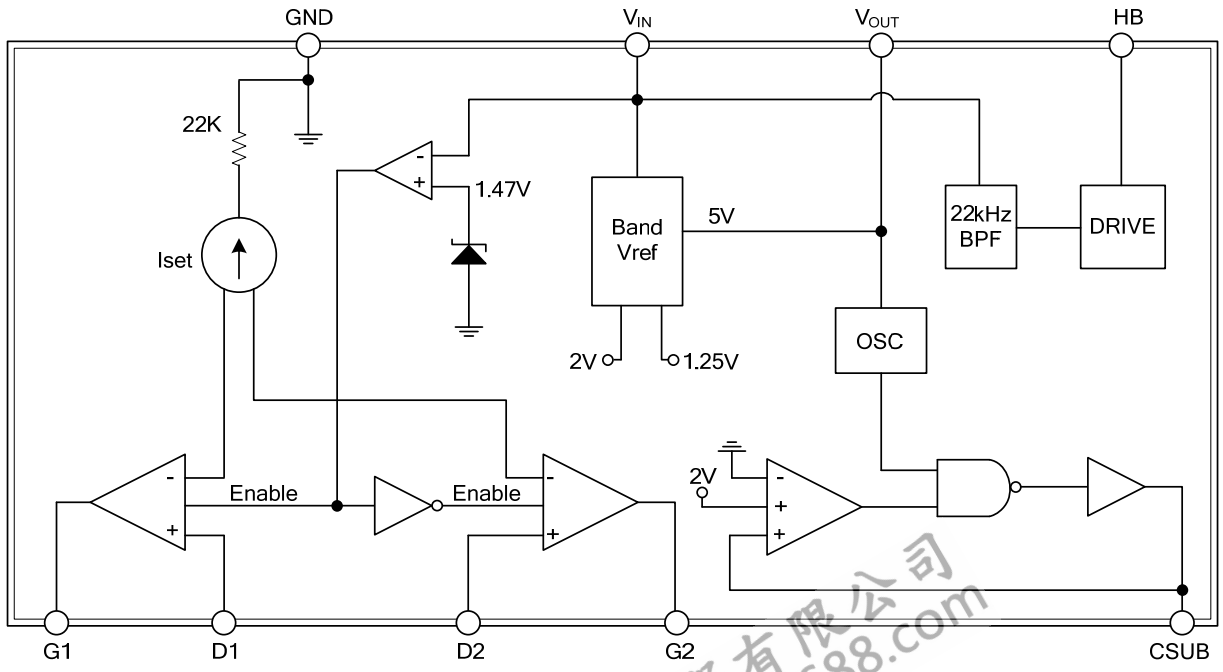
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	G1	To G of fet 1
2	D1	To D of fet 1
3	D2	To D of fet 2
4	G2	To G of fet 2
5	V_{OUT}	5V Output Terminal
6	HB	To HB osc.
7	V_{IN}	Power Supply (Include both voltage and tone signal)
8	CSUB	Connect an external cap to -2.5V
9	GND	Gnd (connect heat sink to ground)

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{IN}	-0.6 ~ 25	V
Supply Current	I_{IN}	120	mA
Power Dissipation	P_D	1000	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-40 ~ +125	°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°C, V_{IN}=13V, unless otherwise specified)

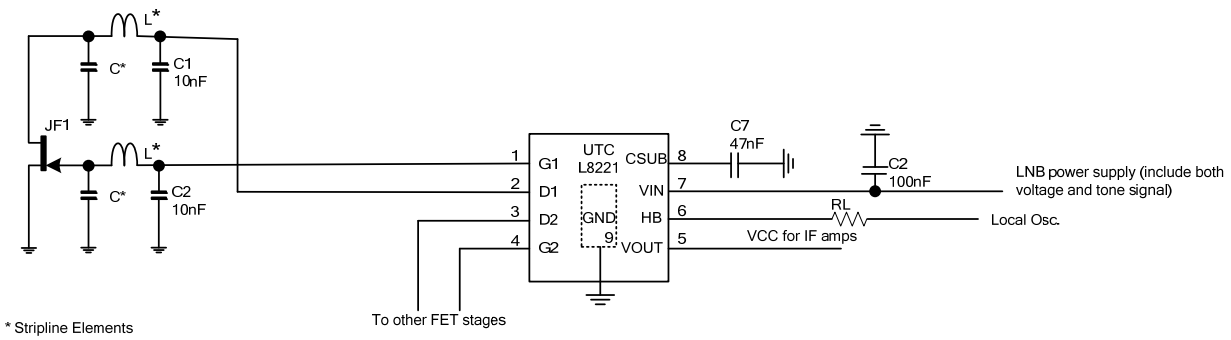
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage Operating Range	V_{IN}		8		22	V
Supply Current						
No Load Supply Current	I_{IN} (no load)	I_{D1}=I_{D2}=0mA		2	3	mA
Max Bias Load Current (Note1)		I_{D1} or I_{D2}			20	mA
Max Osc Load Current (Note 1)		HB			20	mA
Max Lout Load Current (Note 1)					80	mA
V_{OUT}						
V_{OUT}	V_{OUT}	V_{IN}=10.5V ~ 21V, I_{OUT}=30mA	4.75	5	5.25	V
Substrate Voltage	V_{SUB}	(Internally generated), I_{SUB}=0mA	-3.0	-2.5	-2.0	V
		I_{SUB}=-20uA			-2.0	V
V_{POL} Threshold	V_{POL}	Applied Via V_{IN}	14.1	14.7	15.4	V
Pol Switching Speed	T_{POL}	V_{IN} (Low)=13V, V_{IN} (High)=18V			1	ms
Output Noise						
Drain Voltage		$C_{GATE-GND}$=4.7nF, $C_{DRAIN-GND}$=10nF			0.02	Vpk-pk
Gate Voltage		$IC_{GATE-GND}$=4.7nF, $C_{DRAIN-GND}$=10nF			0.005	Vpk-pk
Tone Detector						
Tdetect Threshold	V_{TONE}	Test Circuit	100	170	300	mV
Rejection Freq (Note 2)	F_{TONE}	Test Circuit, V (AC) in=1Vp/p sq.w.	1.0	7.5		kHz
Lo Output Stage						
HB V_{OUT} Low	V_{HBL}	II=0, Test Circuit , Tone disabled	-0.01	0	0.01	V
HB V_{OUT} High	V_{HBH}	II=20mA, Test Circuit, Tone enabled	4.5		V_{OUT}	V
Gate Characteristics						
G1 Output						
Voltage Off	V_{G1O}	I_{D1}=0, V_{IN}=14V, I_{G1}=0	-0.05	0	0.05	V
Voltage Low	V_{G1L}	I_{D1}<=12mA, V_{IN}=15.5V, I_{G1}=-10uA	-3.0	-2.5	-2.0	V
Voltage High	V_{G1H}	I_{D1}=>8mA, V_{IN}=15.5V, I_{G1}=0	0.35	0.5	1.0	V
G2 Output						
Voltage Off	V_{G2O}	I_{D2}=0, V_{IN}=15.5V, I_{G2}=0	-0.05	0	0.05	V
Voltage Low	V_{G2L}	I_{D1}<=12mA, V_{IN}=14V, I_{G2}=-10uA	-3.0	-2.5	-2.0	V
Voltage High	V_{G2H}	I_{G2}=>8mA, V_{IN}=14V, I_{G2}=0	0.35	0.5	1.0	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain Characteristics						
D1 Output						
Voltage High	V_{D1}	I_{D1}=10mA, V_{IN}=15.5V	1.8	2.0	2.2	V
Leakage Current	I_{LEAK1}	V_{D1}=0.5, V_{IN}=14V			10	uA
D2 Output						
Voltage High	V_{D2}	I_{D2}=10mA, V_{IN}=14V	1.8	2.0	2.2	V
Leakage Current	I_{LEAK2}	V_{D2}=0.5, V_{IN}=15.5V			10	uA
D1, 2						
Delta V_D vs. V_{CC}	ΔV_{DV}	V_{CC}=9 ~ 21V		0.5		%/V
Delta V_D vs. T_J	ΔV_{DT}	T_J=-40 ~ +85°C		50		ppm
FET Current Range		I_{D1}, I_{D2}	0		15	mA
Drain Current	I_D	I_{D1}, I_{D2}, R_{CALA}=22K	8	10	12	mA
Delta Id vs. V_{CC}	ΔI_{DV}	V_{CC}=9 ~ 21V		0.5		%/V
Delta Id vs. T_J	ΔI_{DT}	T_J=-40 ~ +85°C		0.05		%/°C

Notes: 1. The total combined load currents should not exceed the stated maximum load current.
2. The UTC **L8221** series will also reject DiSEqC and other common switching tone bursts.

■ TEST CIRCUIT



The above is partial application circuit for the UTC **L8221** series showing all external components required for appropriate biasing. The bias circuits are unconditionally stable over the full temperature range with the associated FETs and gate and drain capacitors in circuit. Capacitors C1 and C2 ensure that residual power supply and substrate generator noise is not allowed to affect other external circuits which may be sensitive to RF interference. They also serve to suppress any potential RF feed through between stages via the UTC **L8221** device. These capacitors are required for all stages used. Values of 10nF and 4.7nF respectively are recommended however this is design dependent and any value between 1nF and 100nF could be used.

The capacitor CSUB is an integral part of the UTC **L8221**'s negative supply generator. The negative bias voltage is generated on-chip using an internal oscillator. The required value of capacitor CSUB is 47nF. This generator produces a low current supply of approximately -3 volts. Although this generator is intended purely to bias the external FETs, it can be used to power other external low current circuits via the CSUB pin.

The UTC **L8221** devices have been designed to protect the external FETs form adverse operating conditions. With a JFET connected to any bias circuit, the gate output voltage of the bias circuit can not exceed the range -3.0V~1V under any conditions, including power up and power down transients. Should the negative bias generator be shorted or overloaded so that the drain current of the external FETs can no longer be controlled, the drain supply to FETs is shut down to avoid damage to the FETs by excessive drain current. The UTC **L8221** incorporates over and under voltage protection so is the receiver or installation develops a fault the LNB will shut down and restart once operating conditions are back to normal.