

## LNB Supply and control voltage regulator

#### Feature summary

- Simplest integrated solution for the LNB remote supply and control
- 500mA Guaranteed output current
- Dual input supply for reducing power dissipation
- 22KHZ Built-in tone oscillator (LNBP9 version)
- Fast oscillator start-up for DiSEqC<sup>TM</sup> encoding (LNBP9 version)
- Auxiliary modulation input for more flexibility (LNBP8 version)
- Stand-by function
- Short circuit and overtemperature protection
- Available in through-hole package

#### Description

Intended for analog and digital satellite receivers, the LNBP is a monolithic linear voltage regulator, assembled in PowerFlex<sup>TM</sup>, specifically decigned to provide the powering voltages and the interfacing signals to the LNB down-converter.

The regulator output can be logic controlled to be 13V or 18V (typ.) by mean of the  $v_{SEL}$  pin for the remote controlling of the LNE. In order to reduce the power dissipation of the device when the lowest output voltage is selected, the regulator has 2 supply mouts ( $V_{CC1}$  and  $V_{CC2}$ ). They must be powered respectively at 15V (min.) and 22V (min.), and an internal switch will automatically reject the appropriate supply voltage according to the selected output voltage.



... The TONE pin (only for the LNBP9 version) activates the internal oscillator so that the DC output is modulated by a 22KHz cquare wave. This internal oscillator is factory trianmed within a tolerance of +/- 2KHz, thus no further adjustment or external comporten s are required. A burst coding of the 22KHz tone can be accomplished thanks to the fart response of the TONE input and the pron of cecillator start-up. This helps designers which want to implement the DiSEcC<sup>TM</sup> protocols. In order to improve design 1.exibility and to allow implementation of other LNB remote control standards, an analogic modulation input pin (EXTM) is available (LNBP8 version only). An appropriate DC blocking capacitor must be used to couple the modulating signal source to the EXTM pin. Both versions integrate thermal and short circuit protection. The device is packaged in PowerFlex for an easy through-hole mounting. If an adequate Heatsink is provided and higher power losses are acceptable, both supply pins can be powered by the same 23V source without affecting any other circuit performance.

When the IC is powered and put in Stand-by (EN pin LOW), the regulator output is disabled and the IC power consumption is reduced to  $300\mu$ A typ.

### Order code

Part number	Package	Packaging
	SPAK-7L	Tape & reel
LNBP8	LNBP8K7	LNBP8K7-R
LNBP9	LNBP9K7	LNBP9K7-R
September 2006	Rev. 3	1/13

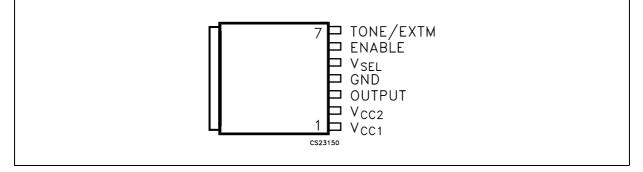
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# 1 Pin configuration

#### Figure 1. Pin connections (top view)



#### Table 1.Pin descriptions

	Name	function
1	V <sub>CC1</sub>	Supply Input 1: 15V to 25V supply. It is automatically selected when $V_0 = 13V$
2	V <sub>CC2</sub>	Supply Input 2: 22V to 25V supply. It is automatically selected when $V_0 = 18V$
3	OUTPUT	Regulator output. It is 13V typ. when $V_{SEL}$ LOW and 18V typ. when $V_{SEL}$ HIGH
4	GND	GROUND
5	V <sub>SEL</sub>	Output Voltage Selection: Logic Control Input; if LOW $V_0 = 13V$ , when HIGH $V_0 = 18V$
6	ENABLE	Logic Control Input; force LOW to put the IC in shutdown
7 (LNBP9)	TONE	Logic Control Input; force HIGH to activate the internal 22KHz tone
7 (LNBP8)	EXTM	External Modulation: Needs DC decoupling to the AC source. If not used can be left floating
		floating

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# 2 Maximum ratings

Symbol	Parameter	Value	Unit
V <sub>CC1,</sub> V <sub>CC2</sub>	Input voltage	-0.3 to 28	V
ENABLE, TONE, V <sub>SEL</sub>	Logic input voltage	-0.3 to 7	V
Vo	Output voltage	-0.3 to 28	V
TJ	Operating junction temperature range	-40 to 125	°C
T <sub>STG</sub>	Storage temperature range	-55 to 150	°C

#### Table 2. Absolute maximum ratings

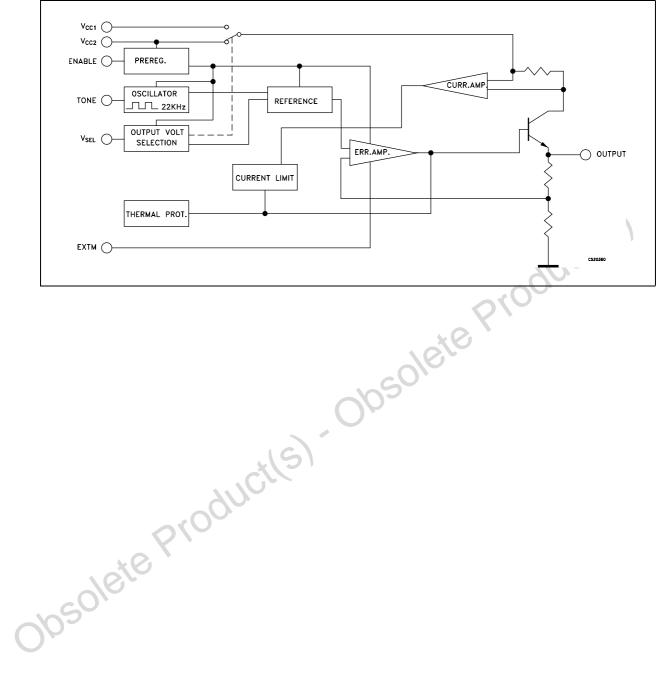
# Note: Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied

Symbol	Parameter	Value	Unit
R <sub>thJC</sub>	Thermal resistance junction-case	2	°C/W
		oleter	
		010	
	U.		
	te Producils) -		
	ALICE C		
	2100.0		
	xe <sup>Y</sup> `		
cole			
ps			

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## 3 Block diagram





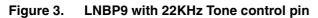
# 4 **Electrical characteristics**

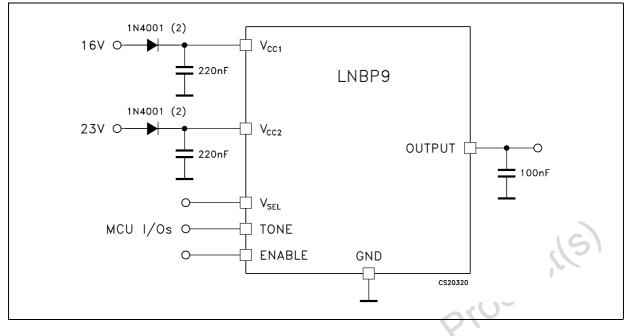
Table 4.Electrical characteristics for LNBP Series ( $V_{CC1} = 16V$ ,  $V_{CC2} = 22V$ ,  $C_{11} = C_{12} = 0.22\mu$ F,<br/> $C_O = 0.1\mu$ F, Enable = H, Tone = L (LNBP9), EXTM floating (LNBP8),  $I_O = 50$ mA,<br/> $T_J = 0$  to 85°C unless otherwise specified.)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Uni	
V <sub>CC1</sub>	V <sub>CC</sub> Supply voltage input 1	I <sub>O</sub> = 500 mA, TONE = H, V <sub>SEL</sub> = L	15		25	V	
V <sub>CC2</sub>	V <sub>CC</sub> Supply voltage input 2	$I_{O} = 500 \text{ mA}, \text{ TONE} = \text{H}, \text{ V}_{\text{SEL}} = \text{H}$	22		25	V	
M	Output valtage	I <sub>O</sub> = 500 mA, V <sub>SEL</sub> = L	12.5	13	13.5	V	
Vo	Output voltage	I <sub>O</sub> = 500 mA, V <sub>SEL</sub> = H	17.3	18	18.7	V	
A) /	Line regulation	$V_{CC1}$ = 15 to 18V, $V_{SEL}$ = L		4	40	m)	
$\Delta V_{O}$		$V_{CC2}$ = 22 to 25V, $V_{SEL}$ = H		4	40	40 m\	
$\Delta V_{O}$	Load regulation	$V_{CC1} = V_{CC2} = 22V$ , $I_O = 50$ to 500mA $V_{SEL} = L$ or H		80	180	۳۱	
I <sub>MAX</sub>	Output current limiting		500		800	m/	
f <sub>TONE</sub>	Tone frequency	LNBP9 version, TONE = H	20	22	24	KH	
A <sub>TONE</sub>	Tone amplitude	LNBP9 version, TONE = H	0.55	0.72	0.9	V	
D <sub>TONE</sub>	Tone duty cycle	LNBP9 version, TONE = H	40	50	60	%	
t <sub>r</sub> , t <sub>f</sub>	Tone rise and fall time	d fall time LNBP9 version, TONE = H		10	15	με	
G <sub>EXTM</sub>	External modulation gain	LNBP8 version, $\Delta V_O / \Delta V_{EXTM}$ , f = 10Hz to 40KHz		5			
V <sub>EXTM</sub>	External modulation input oltage				400	۳۱	
Z <sub>EXTM</sub>	External modulation impedance LNBP8 version, f = 10Hz to 4			400		Ω	
V <sub>IL</sub>	Control input logic LOW	ENABLE, TONE (LNBP9 version), $V_{SEL}$			0.8	V	
V <sub>IH</sub>	Control input logic HIGH	ENABLE, TONE (LNBP9 version), V <sub>SEL</sub>	2.5			V	
I <sub>IH</sub>	Control pins input current	V <sub>IH</sub> = 5V, ENABLE, TONE (LNBP9 version), V <sub>SEL</sub>		20		μA	
	. 0.	Output disabled (ENABLE = L)		0.3	1	m	
I <sub>CC</sub>	Supply current	Output enabled (ENABLE = H), TONE = H, $I_0 = 500$ mA		3	6	m	
T <sub>SHDN</sub>	Temperature shutdown			150		°C	

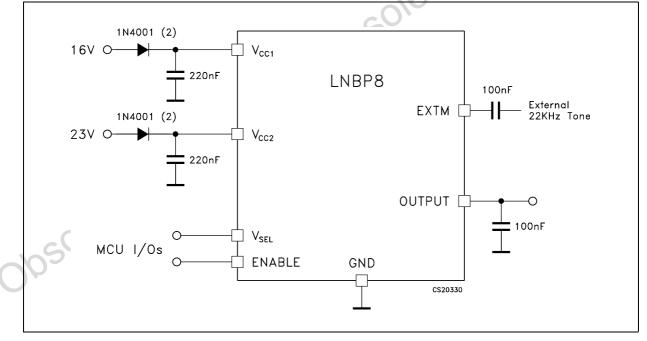


# 5 Typical application circuits

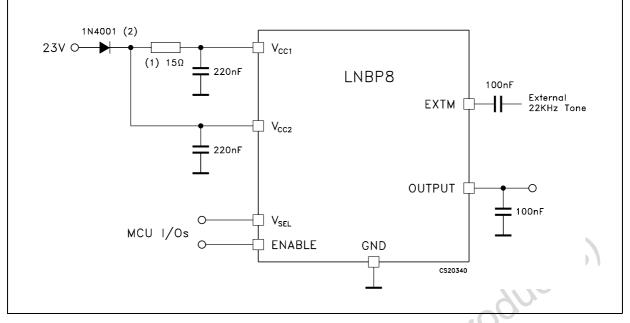




#### Figure 4. LNBP8 with external 22KHz Input pin (EXTM)







- 1. In a single supply configuration the presence of the input resistor in the  $12-15\Omega$  range is suggested only to reduce the device power dissipation during the 13V output condition. The resistor can be omitted in spite of power dissipation increase.
- 2. The input diodes are mandatory to protect the device from any reverse current.

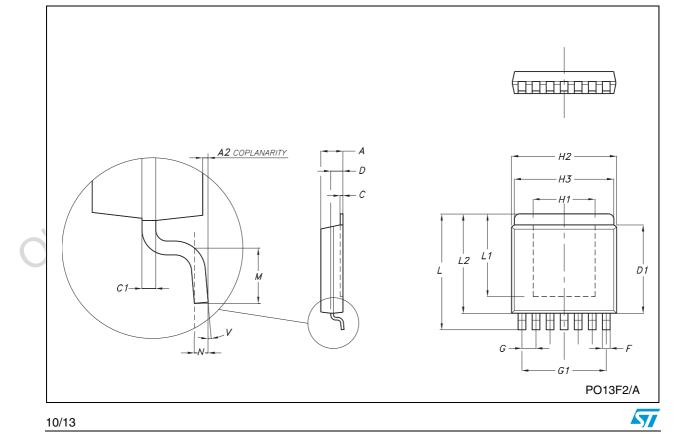
## 6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK<sup>®</sup> packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

obsolete Product(s)-Obsolete Product(s)

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DIM.		mm.		inch		
	MIN.	ТҮР	MAX.	MIN.	TYP.	MAX.
А	1.78		2.03	0.070		0.080
A2	0.03		0.13	0.001		0.005
С		0.25			0.010	
C1		0.25			0.010	
D	1.02		1.27	0.040		0.050
D1	7.87		8.13	0.310		0.320
F	0.63		0.79	0.025		0.031
G		1.27			0.050	
G1		7.62			0.3	
H1		5.59			0.220	
H2	9.27		9.52	0.365		0.375
H3	8.89		9.14	0.350		0.360
L	10.41		10.67	0.410		0.420
L1		7.49			0.295	
L2	8.89		9.14	0.350		0.360
М	0.79		1.04	0.031		0.041
Ν		0.25			0.010	



#### SPAK-7L MECHANICAL DATA

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DIM.		mm.			inch			
DIN.	MIN.	ТҮР	MAX.	MIN.	TYP.	MAX.		
А			180			7.086		
С	12.8	13.0	13.2	0.504	0.512	0.519		
D	20.2			0.795				
Ν	60			2.362				
Т			14.4			0.567		
Ao	9.70	9.80	9.90	0.382	0.386	0.390		
Во	10.85	10.95	11.05	0.423	0.427	0.431		
Ko	2.30	2.40	2.50	0.090	0.094	0.098		
Po	3.9	4.0	4.1	0.153	0.157	0.161		
Р	11.9	12.0	12.1	0.468	0.472	0.476		

## ١ Ν D С А 4 A Т Po Βо $\bigcirc$ $\bigcirc$ ()T Ko Ao Ρ

#### Tape & Reel SPAK-xL MECHANICAL DATA

Note: Drawing not in scale

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## 7 Revision history

#### Table 5.Revision history

Date	Revision	Changes	
09-Nov-2004	1	First release.	
04-Jul-2005 2 Remove package heptawatt and add package SPAK		Remove package heptawatt and add package SPAK-7L.	
20-Sep-2006 3		Add value $V_O$ on table 2 and new template.	

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