

**ZLNB2016**  
**STANDARD DBS DUAL CHANNEL VOLTAGE AND TONE DETECTOR**

NEW PRODUCT

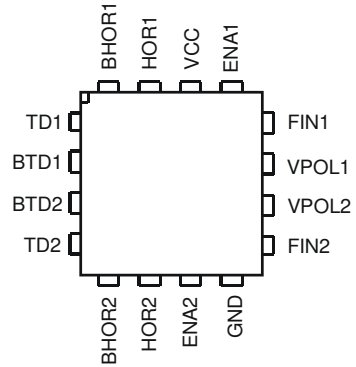
**Summary**

The ZLNB2016 is a dual channel polarisation (voltage) and band select (tone) detector IC, primarily for satellite applications such as Low Noise Blocks (LNBs) and satellite distribution systems. An optimised design provides a low supply current and a wide operating voltage whilst increasing performance and reliability. The ZLNB2016 offers excellent interference rejection with minimal application cost and packaged in the 3x3mm QFN it provides a very small solution.

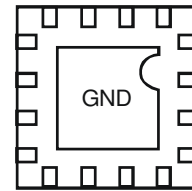
**Features**

- Two polarisation voltage detectors
- Two robust, interference tolerant 22kHz tone detection (without external signal filtering)
- “No Receiver” detect function for power saving and isolation control
- Low quiescent supply current, 2mA typical
- Wide operating supply voltage 3V to 8V
- Low external component count minimises application cost
- True and inverted outputs to support popular multiplexer ICs

**Pin Assignments**



Top View

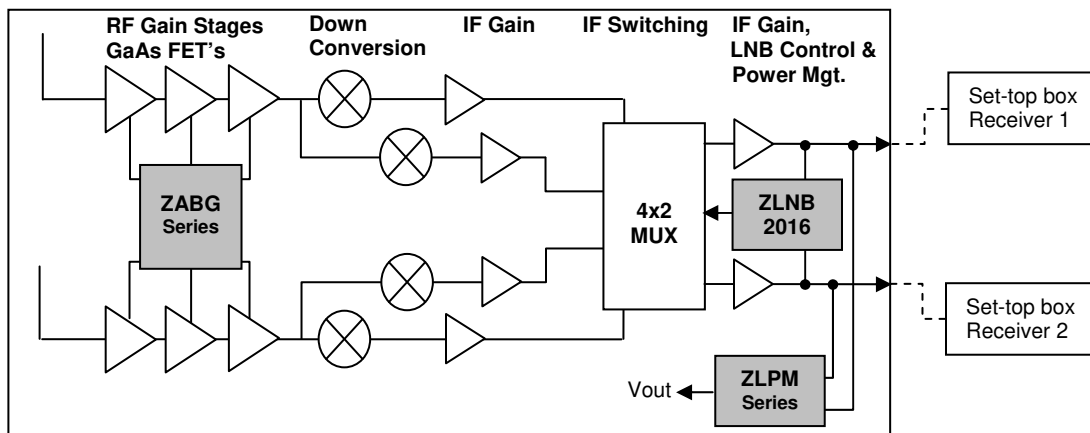


Bottom View

**Application**

- Twin Universal LNBs
- Quad Universal LNBs
- Multi Output LNBs
- Satellite Multi-Switches

**Twin Universal LNB System Diagram**



## Device Description

The ZLNB2016 dual polarization and tone switch controller is one of a wide range of satellite receiver LNB support circuits available from Diodes Incorporated. It features two completely independent channels, each providing logic outputs to control LNB polarization selection, local oscillator selection and down feed disable. It's intended to be used in voltage and tone controlled LNBs and satellite distribution systems, replacing many discrete components to save both manufacturing cost and PCB size whilst improving reliability.

The ZLNB2016 has been designed to be compatible in low power consumption LNBs so to improve efficiency it operates from a single supply of 3V to 8V and has a quiescent current typically of only 2mA. The quiescent current does not change significantly with load or logic state.

The two polarization control inputs of the ZLNB2016 have a nominal threshold of 14.75V and the threshold is guaranteed over the range of 14.0V to 15.5V. The threshold is temperature compensated to minimize drift and it also has a high rejection against the tone signal making the detector very accurate without the need of further external filtering. Each features a low and stable input current that enables transient protection to be achieved with the addition of only a single resistor per channel. Multi Feed LNBs can be called to operate with one or more of their controlling receivers powered down or disconnected, with attendant cable mismatch problems.

To ease design for this situation, each polarization input of the ZLNB2016 has a second threshold set at a nominal of 8V. An input voltage below this threshold indicates "receiver not present", and switches the relevant Ena output low. This logic output can be used to disable the associated down feed driver, eliminating any problems due to cable mismatch.

Universal LNB local oscillator selection is achieved by detection of a low level AC voltage superimposed on the polarization control voltage. To facilitate this function, the ZLNB2016 includes a separate tone detector for each channel. Control of detector bandwidth and sensitivity is provided using an external resistor and capacitor for each channel. The tone detector has been designed give excellent rejection of low frequency control signals and DiSEqC™ tone bursts. The ZLNB2016 has been specifically designed to minimize the solution cost whilst being flexible. The ZLNB2016 only requires two external components per channel to give full user control and functionality. The ZLNB2016 also includes complimentary outputs so that it can directly drive many multiplexer ICs without the need of inverters. Any unused outputs can be left open circuit without any effect to the remaining circuits operation polarization switch and tone detector outputs can directly drive TTL and CMOS logic, pin diodes, IF-amp supply switching and multiplexer ICs.

## Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.6 to +10 Continuous	V
Supply Current	50	mA
V <sub>POL</sub> 1, 2 Input Voltage (Note 1)	25	V
Power Dissipation	500	mW
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +150	°C

## Electrical Characteristics (at Tamb = 25°C, Vcc = 3.3V unless otherwise specified.)

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Voltage Range		3.0		8.0	V
Supply Current	All outputs unloaded, any combination of inputs		2.0	3.0	mA

V <sub>POL</sub> 1, 2 Inputs (Note 1)					
Input Current	V <sub>POL</sub> 1,2 = 15V	32	42.5	53	uA
HOR Threshold	T <sub>AMB</sub> = -40 to +85°C	14.0	14.75	15.5	V
ENA Threshold	T <sub>AMB</sub> = -40 to +85°C	7.5	8.0	8.5	V
Switching Speed	HOR, BHOR and ENA outputs			1	ms

HOR1, 2 Outputs					
Voltage High	I <sub>LOAD</sub> = -1mA, V <sub>POL</sub> 1,2 = 15.5V	V <sub>CC</sub> -0.5	V <sub>CC</sub> -0.3	V <sub>CC</sub>	V
Voltage Low	I <sub>LOAD</sub> = 5mA, V <sub>POL</sub> 1,2 = 14.0V	0	0.3	0.5	V

BHOR1, 2 Outputs					
Voltage High	I <sub>LOAD</sub> = -1mA, V <sub>POL</sub> 1,2 = 14.0V	V <sub>CC</sub> -0.5	V <sub>CC</sub> -0.3	V <sub>CC</sub>	V
Voltage Low	I <sub>LOAD</sub> = 5mA, V <sub>POL</sub> 1,2 = 15.5V	0	0.3	0.5	V

ENA1, 2 Outputs					
Voltage High	I <sub>LOAD</sub> = -1mA, V <sub>POL</sub> 1,2 = 8.5V	V <sub>CC</sub> -0.5	V <sub>CC</sub> -0.3	V <sub>CC</sub>	V
Voltage Low	I <sub>LOAD</sub> = 5mA, V <sub>POL</sub> 1,2 = 7.5V	0	0.3	0.5	V

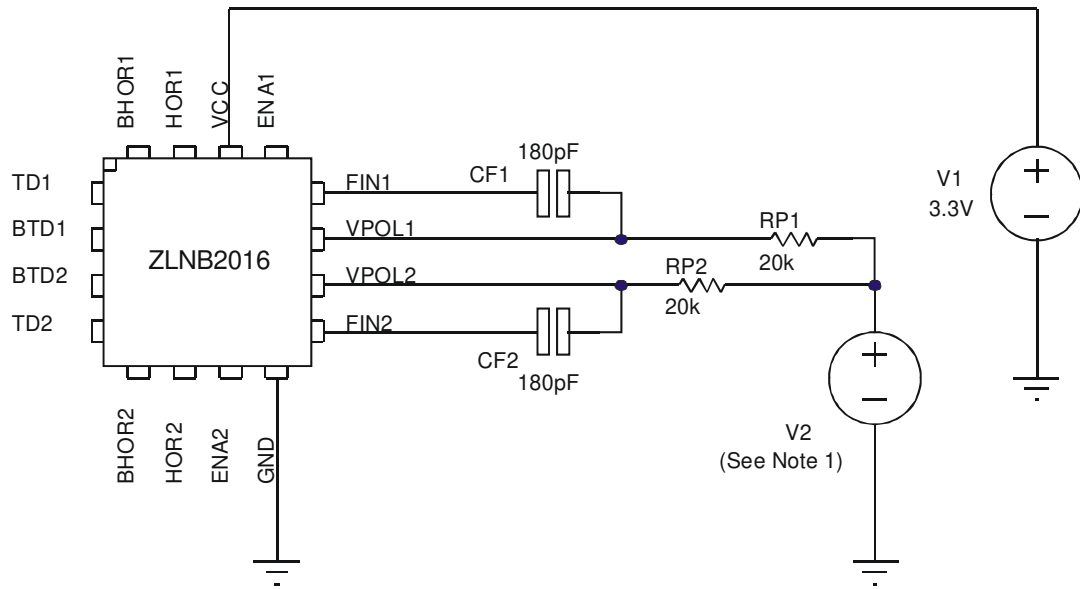
FIN 1, 2 Inputs (Using Test Circuit 1)					
Bias Voltage	I <sub>FIN</sub> = 0	1.25	1.74	2.25	V
Input Impedance	V <sub>FIN</sub> = 100mV <sub>P/P</sub>		40		kΩ
Amplifier Gain	V <sub>FIN</sub> = 100mV <sub>P/P</sub>		50		
Voltage Threshold		100	150	300	mV
Switching Delay	TD Outputs		3	10	ms

TD1, 2 Outputs (Using Test Circuit 1)					
Voltage High	I <sub>LOAD</sub> = -1mA, Tone Enabled	V <sub>CC</sub> -0.5	V <sub>CC</sub> -0.3	V <sub>CC</sub>	V
Voltage Low	I <sub>LOAD</sub> = 5mA, Tone Disabled	0	0.3	0.5	V

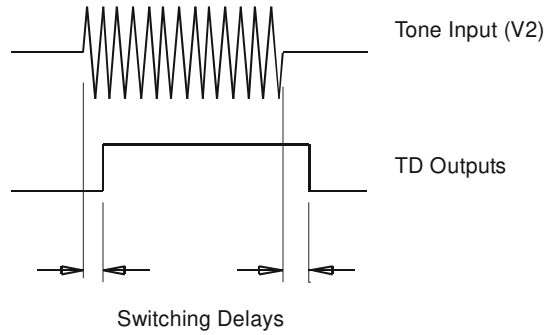
BTD1, 2 Outputs (Using Test Circuit 1)					
Voltage High	I <sub>LOAD</sub> = -1mA, Tone Disabled	V <sub>CC</sub> -0.5	V <sub>CC</sub> -0.3	V <sub>CC</sub>	V
Voltage Low	I <sub>LOAD</sub> = 5mA, Tone Enabled	0	0.3	0.5	V

Notes: 1. V<sub>POL</sub> stimulus applied via 20k resistors. All levels measured on the input to these resistors.  
2. ESD sensitive, handling precautions are recommended.

**Test Circuit**

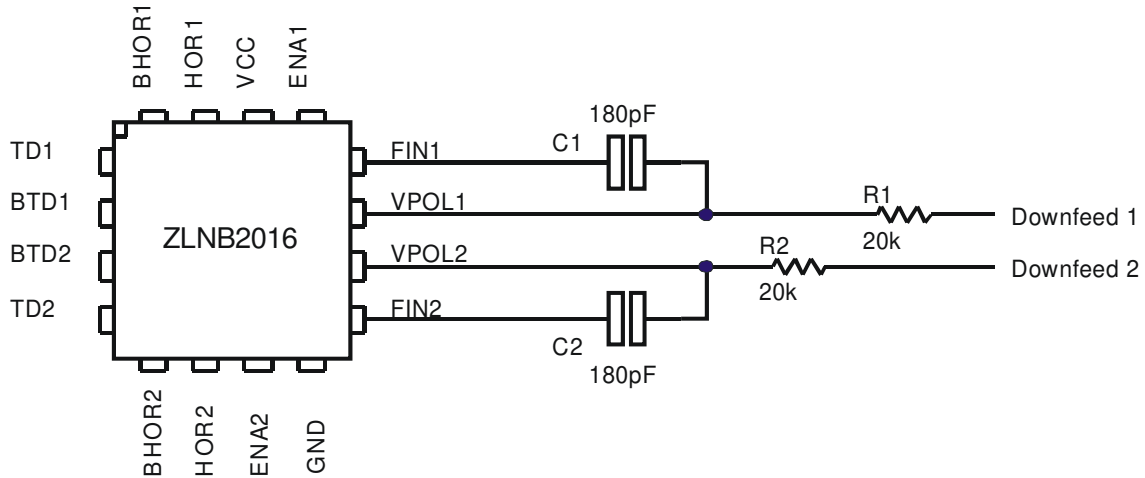


Note 1: V2 Characteristics  
 Type:- AC source  
 Frequency:- 22kHz  
 Voltage:- 300mVp/p Enabled  
 Zero Disabled



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**Applications Information**



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Above is a partial applications circuit for the ZLNB2016 showing all external components needed for a typical twin LNB design. The inputs Vpol1 and Vpol2 are designed to be wired to the power inputs of the LNB via ESD protection resistors (20k). These inputs control the HOR1/2, BHOR1/2 and ENA1/2 logic outputs. The HOR outputs will be low when their corresponding Vpol input is at or below 14V and high when Vpol is at or above 15.5V. The BHOR outputs give inverted versions of their related HOR outputs. The HOR/BHOR outputs are intended to activate polarisation selection circuitry within an LNB, under control of the LNB supply voltage. The ENA1/2 outputs are set high when their corresponding Vpol input is at or above 8.5V and low when Vpol is at or below 7.5V. These logic outputs can be used to disable any LNB RF output connected to a receiver (STB) that has been powered down or disconnected (and hence not providing correct cable matching).

The ZLNB2016 includes circuitry necessary to detect the presence of a 22kHz tone modulated on either of two supply inputs to the LNB. These detectors control the TD1/2 and BTD1/2 outputs. The TD outputs are set high on detection of a valid tone on their corresponding LNB input and low in the absence of a tone. The BTD outputs give an inverted version of their corresponding TD outputs. The main elements of each tone detector are an amplifier, a band-pass filter, a rectifier/smoothing and a comparator. User control is given over the gain of the amplifier and the lower frequency limit of the filter, using an external resistor and capacitor. (The ESD protection resistor noted above can be used to set amplifier gain, hence requiring only one component for both functions.) The higher frequency limit of the filter is set internally to block signals above 100kHz. The comparator circuit utilises no external components.

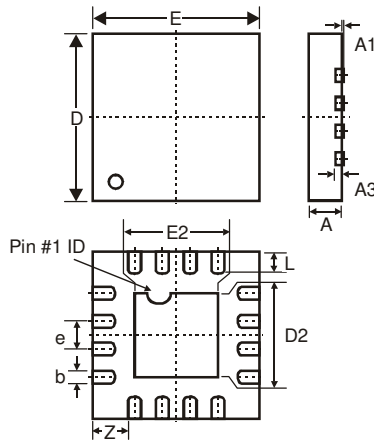
The HOR, BHOR, TD, BTD and ENA outputs are designed to be compatible with LSTTL, CMOS and common MIMIC multiplexer loads. Any input or output that is not required can be left open circuit.

**Output Truth Table**

The ZLNB2016 includes two independent channels, each containing a voltage detector and tone detector. The following truth table applies to each channel.

Tone	Vpol	TD	BTD	HOR	BHOR	ENA
Off	14V	Low	High	Low	High	High
Off	14.5V	Low	High	High	Low	High
On	14V	High	Low	Low	High	High
On	14.5V	High	Low	High	Low	High
-	<7.5V	-	-	Low	High	Low

**Package Outline Dimensions**



QFN16 3x3		
Dim	Min	Max
A	0.55	0.65
A1	0.00	0.05
A3	0.15 Typ	
b	0.18	0.28
D	2.95	3.05
D2	1.40	1.60
e	0.50 BSC	
E	2.95	3.05
E2	1.40	1.60
L	0.35	0.45
Z	0.625 Typ	
<b>All Dimensions in mm</b>		

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches.  
The package appearance may vary as shown, for further details please contact your local Diodes sales office.

**Ordering Information** (Note x)

Device	Package	Reel Size (inches)	Tape Width (mm)	Quantity (per reel)
ZLNB2016JA16TC	QFN1633	13	8	3000

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