

ZLNB2015
ADVANCED DBS DUAL CHANNEL VOLTAGE AND TONE DETECTOR

NEW PRODUCT

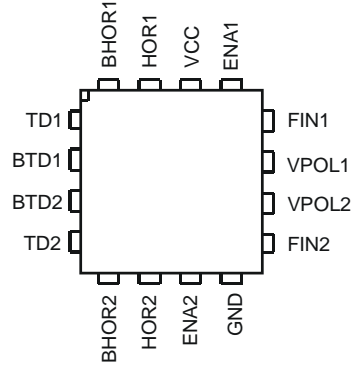
Summary

The ZLNB2015 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 ZLNB2015 offers excellent interference rejection with minimal application cost and packaged in the 3x3mm QFN it provides a very small solution.

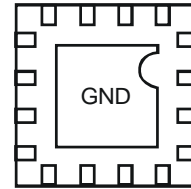
Features

- Two high accuracy polarisation voltage detection meeting the most stringent market needs
- 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

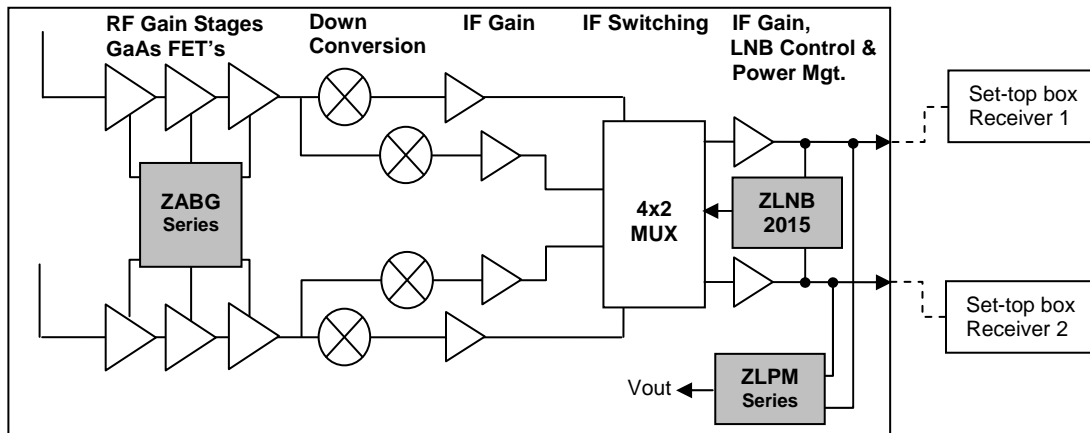


Bottom View

Application

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

Twin Universal LNB System Diagram



Device Description

The ZLNB2015 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 downfeed disable. It is intended use is in American voltage and tone controlled LNBs as well as high performance Twin, Quad and multiple feed Universal type LNBs, replacing many discrete components to save both manufacturing cost and PCB size whilst improving reliability.

The ZLNB2015 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 highly accurate polarization control inputs of the ZLNB2015 have a nominal threshold of 14.25V and to meet the required demanding needs of broadcasters they have a guaranteed threshold range of 14.0V to 14.5V. 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 ZLNB2015 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 downfeed 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 ZLNB2015 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 ZLNB2015 has been specifically designed to minimize the solution cost whilst being flexible. The ZLNB2015 only requires two external components per channel to give full user control and functionality. The ZLNB2015 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 _{POL} 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 _{POL} 1, 2 Inputs (Note 1) | | | | | |
|---------------------------------------|---------------------------------|------|-------|------|----|
| Input Current | V _{POL} 1,2 = 15V | 32 | 42.5 | 53 | µA |
| HOR Threshold | T _{AMB} = -40 to +85°C | 14.0 | 14.25 | 14.5 | V |
| ENA Threshold | T _{AMB} = -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 _{LOAD} = -1mA, V _{POL} 1,2 = 14.5V | V _{CC} -0.5 | V _{CC} -0.3 | V _{CC} | V |
| Voltage Low | I _{LOAD} = 5mA, V _{POL} 1,2 = 14.0V | 0 | 0.3 | 0.5 | V |

| BHOR1, 2 Outputs | | | | | |
|------------------|--|----------------------|----------------------|-----------------|---|
| Voltage High | I _{LOAD} = -1mA, V _{POL} 1,2 = 14.0V | V _{CC} -0.5 | V _{CC} -0.3 | V _{CC} | V |
| Voltage Low | I _{LOAD} = 5mA, V _{POL} 1,2 = 14.5V | 0 | 0.3 | 0.5 | V |

| ENA1, 2 Outputs | | | | | |
|-----------------|---|----------------------|----------------------|-----------------|---|
| Voltage High | I _{LOAD} = -1mA, V _{POL} 1,2 = 8.5V | V _{CC} -0.5 | V _{CC} -0.3 | V _{CC} | V |
| Voltage Low | I _{LOAD} = 5mA, V _{POL} 1,2 = 7.5V | 0 | 0.3 | 0.5 | V |

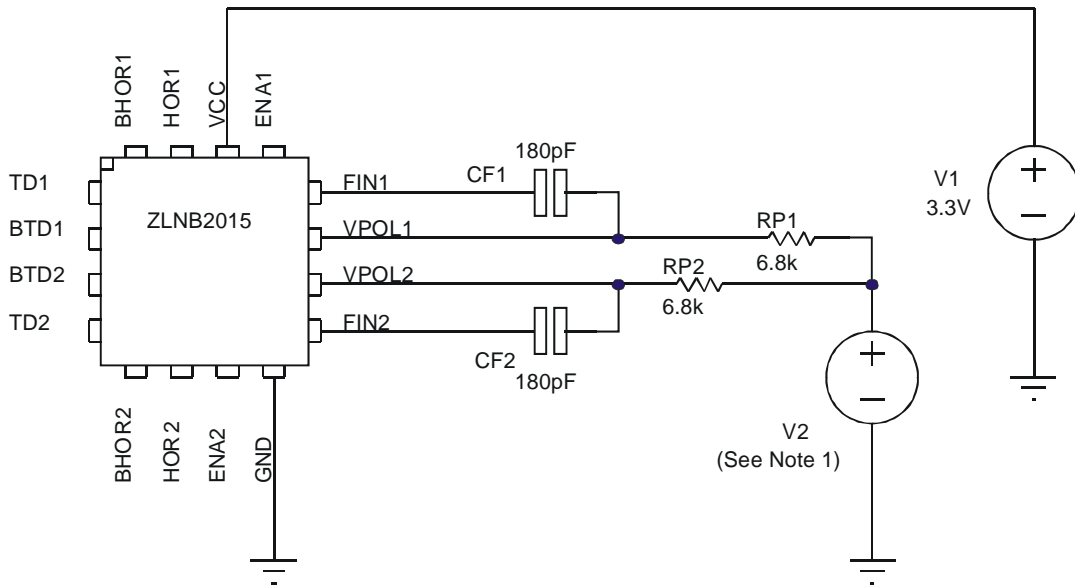
| FIN 1, 2 Inputs (Using Test Circuit 1) | | | | | |
|--|---|------|------|------|----|
| Bias Voltage | I _{FIN} = 0 | 1.25 | 1.74 | 2.25 | V |
| Input Impedance | V _{FIN} = 100mV _{P/P} | | 40 | | kΩ |
| Amplifier Gain | V _{FIN} = 100mV _{P/P} | | 50 | | |
| Voltage Threshold | | 100 | 150 | 300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

| TD1, 2 Outputs (Using Test Circuit 1) | | | | | |
|---------------------------------------|--|----------------------|----------------------|-----------------|---|
| Voltage High | I _{LOAD} = -1mA, Tone Enabled | V _{CC} -0.5 | V _{CC} -0.3 | V _{CC} | V |
| Voltage Low | I _{LOAD} = 5mA, Tone Disabled | 0 | 0.3 | 0.5 | V |

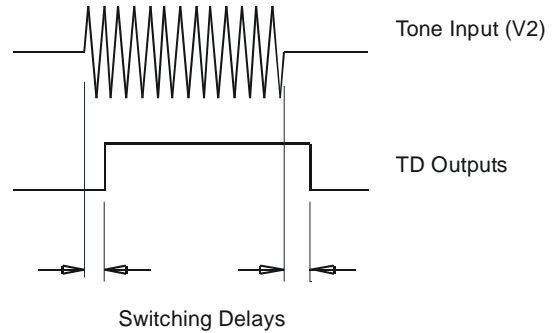
| BTD1, 2 Outputs (Using Test Circuit 1) | | | | | |
|--|---|----------------------|----------------------|-----------------|---|
| Voltage High | I _{LOAD} = -1mA, Tone Disabled | V _{CC} -0.5 | V _{CC} -0.3 | V _{CC} | V |
| Voltage Low | I _{LOAD} = 5mA, Tone Enabled | 0 | 0.3 | 0.5 | V |

Notes: 1. V_{POL} stimulus applied via 6.8k resistors. All levels measured on the input to these resistors.
2. ESD sensitive, handling precautions are recommended.

Test Circuit

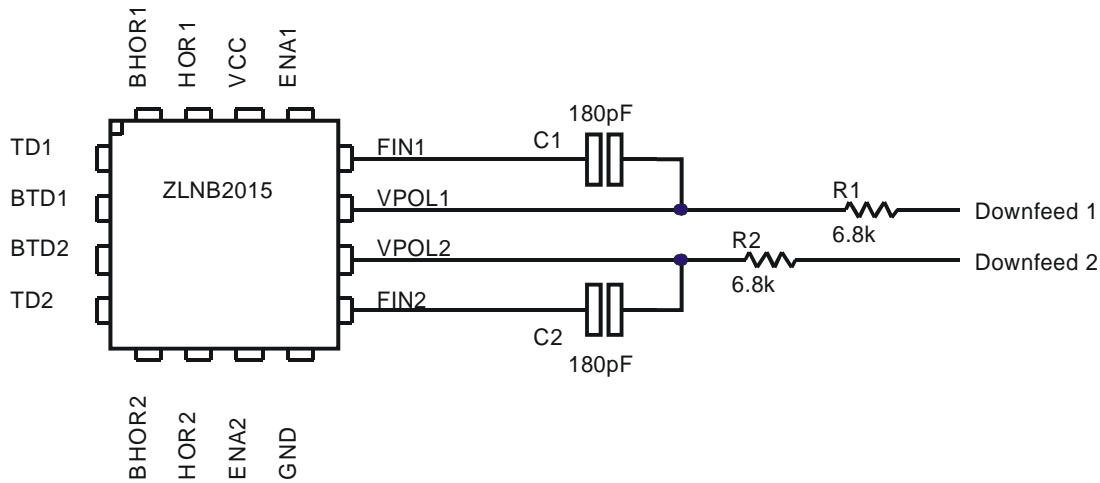


Note 1: V2 Characteristics
 Type:- AC source
 Frequency:- 22kHz
 Voltage:- 300mVp/p Enabled
 Zero Disabled



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Applications Information



Above is a partial applications circuit for the ZLNB2015 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 (6.8k). 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 14.5V. 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 ZLNB2015 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.

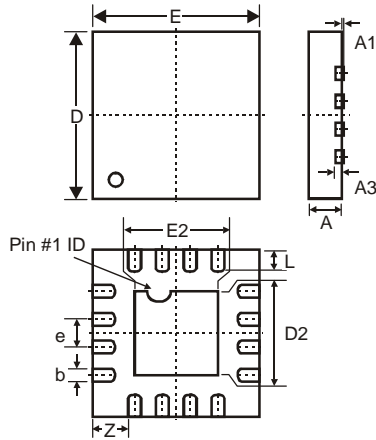
Output Truth Table

The ZLNB2015 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 |

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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 | |
| All Dimensions in mm | | |

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) |
|----------------|---------|--------------------|-----------------|---------------------|
| ZLNB2015JA16TC | QFN1633 | 13 | 8 | 3000 |

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