Version 2
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Dual Channel Sensitive Hall Effect Switch CYD8536

With Quadrature Outputs

The CYD8536 a dual-channel, bipolar switch with two Hall Effect sensing elements, each providing a separate digital output for rotational speed measurement and direction detection. The Hall elements are photolithogrphically aligned to better than 1µm. Maintaining accurate mechanical location between the two active Hall elements eliminates the major manufacturing hurdle encounted in fine-pitch detection applications. The CYD8536 is a highly sensitive, temperature stable magnetic sensing device, which is ideal for use in ring magnet based speed and direction systems located in harsh automotive and uíndustrial environments.

The Hall elements of the sensor CYD8536 are spaced 1.6mm apart, which provides excellent ṣpeed and direction information for small-geometric targets. Extremely low-drift amplifiers guarantee symmetry between the switches to maintain signal quadrature. An on-chip regulator allows the use of this device over a wide operating voltage range of 2.8V to 24V.

The CYD8536 is available in a 4-pin SIP package. The package is lead (Pb) free, with 100% matte tin leadframe plating.

Features

- Two matched Hall switches on a substrate
- Dual channel outputs
- Good temperature stability
- High sensitivity (B_{OP} and B_{RP})
- 2.8V to 24V supply voltage
- Solid-state reliability
- Small package sizes
- RoHS compliant

Applications

- Anti-pinch electric motor control
- Motor and fan control
- Magnetic encoder
- Rotating shaft monitoring
- Auto-motive transmission position
- Garage door openers
- Power sliding doors
- Sunroofs motors

Device information

Part number	Packing	Mounting	Temperature	B_{OP} (typ.)	BRP (Typ.)
CYD8536VB	Bulk, 1000pcs/bag	4-pin SIP	-40°C~150°C	+2.0mT	-2.0mT

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Electrical Specifications

Over operating free-air temperature range (V_{DD} = 5.0V, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{DD}	Operating supply voltage	$T_J < T_{J\ (max)}$	2.80	--	24	V
I_{DD}	Operating supply current	V_{DD}=2.8 to 24V	1.5	3.0	4.5	mA
t_{on}	Power on time		--	35	50	µs
I_{OL}	Off-state leakage current	Output Hi-Z	--	--	1	µA
$R_{DS(on)}$	FET on resistance	V_{DD}=5V, Io=10mA, TA=25°C	--	20	--	Ω
td	Output delay time	B=B_{RP} to B_{OP}	--	13	25	µs
tr	Output rise time	R1=1kΩ, Co=50pF	--	--	0.5	µs
tf	Output fall time	R1=1kΩ, Co=50pF	--	--	0.2	µs
f_{BW}	Bandwidth		40	--	--	kHz

Magnetic Specifications

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
B_{OP}	Operating point	VB Package	0.5	2.0	3.5	mT
B_{RP}	Release point		-3.5	-2.0	-0.5	mT
B_{HYS}	Hysteresis		--	4.0	--	mT
Bo	Magnetic Offset	Bo=(B_{OP}+B_{RP})/2	--	0	--	mT

1mT = 10Gs

Absolute Maximum Ratings

Over operating free-air temperature range

Parameter	**Symbol**	**Min**	**Max.**	**Unit**
Supply Voltage	V_{DD}	-0.5	28	V
Output voltage	V_{OUT}	-0.5	28	V
Output Sink Current, I_{OUT}	I_{SINK}	0	30	mA
Operating Temperature Range	T_A	-40	150	°C
Maximum junction temperature	T_J	-55	165	°C
Storage Temperature Range	T_{STG}	-65	175	°C

Note: Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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Thermal Characteristics

Symbol	Parameter	Test Conditions	Rating	Units
R_{QJA}	VB Package thermal resistance	Single-layer PCB, with copper limited to solder pads	177	℃/W
R_{QJA}	BU Package thermal resistance	Single-layer PCB, with copper limited to solder pads	140	℃/W

ESD Protection

Human body model (HBM) tests according to: Standard EIA/JESD22-A114-B HBM

Parameter	Symbol	Min.	Max.	units
ESD-Protection	V_{ESD}	-6	6	KV

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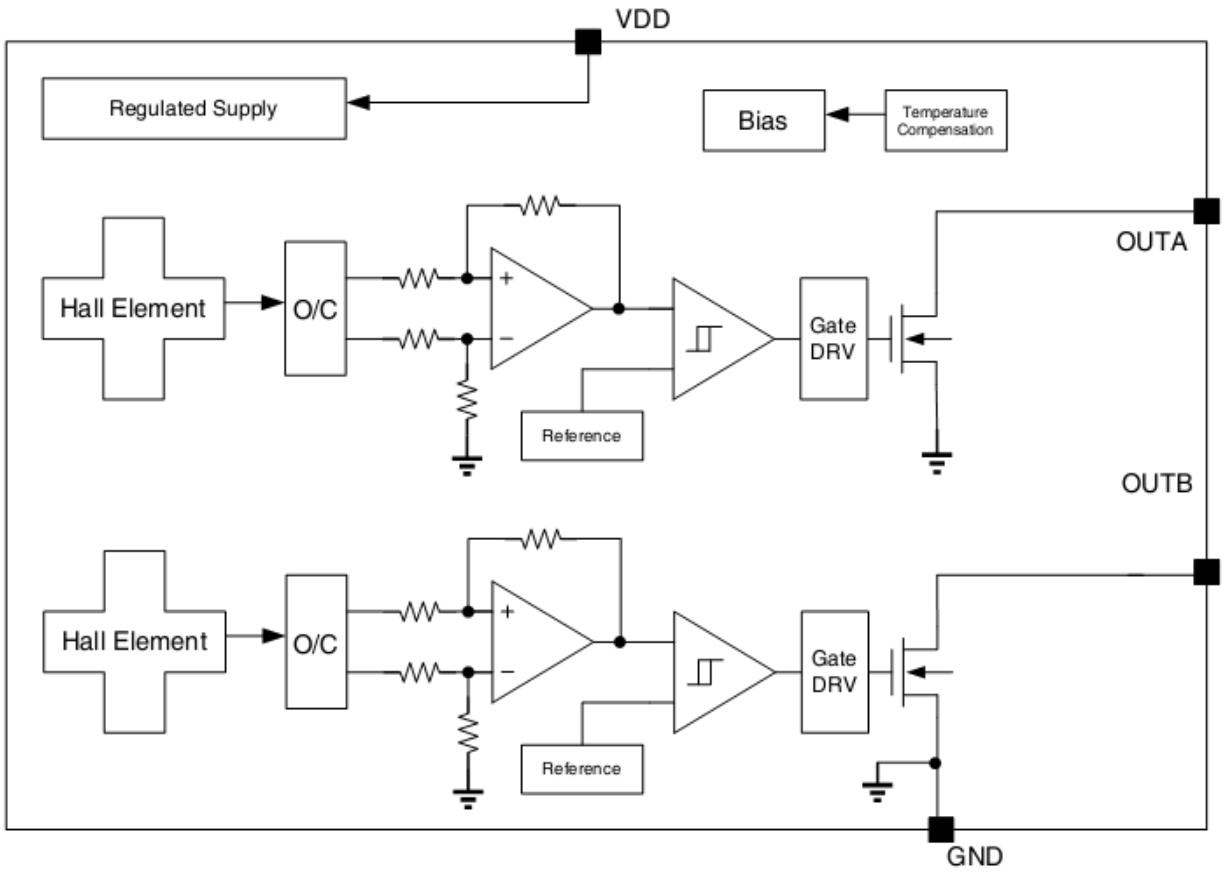
Functional Diagram



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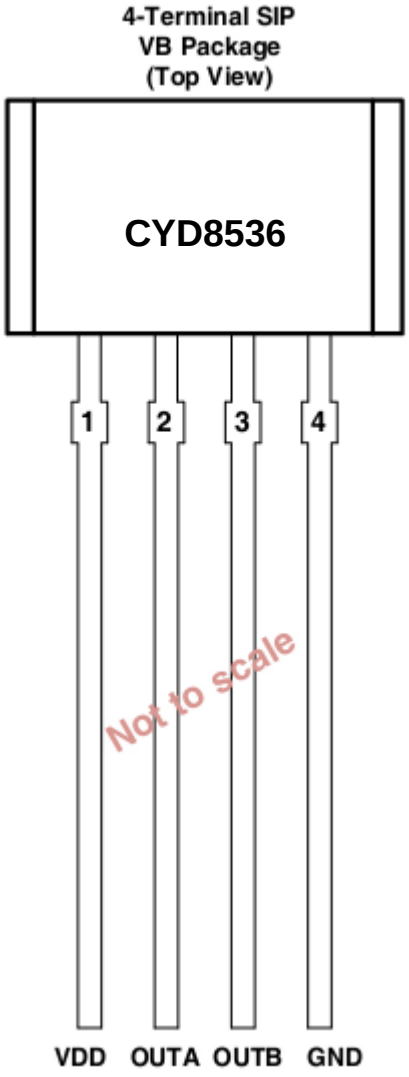
Terminal Configuration and Functions



Pin Arrangement

Terminal		Type	Description
Name	Pin (VB Package)		
V_{DD}	1	Power supply	2.8V to 24V power supply
OUTA	2	Output A	A Channel output, OC, needs a pull-up resistor
OUTB	3	Output B	B Channel output, OC, needs a pull-up resistor
GND	4	Ground	Ground terminal

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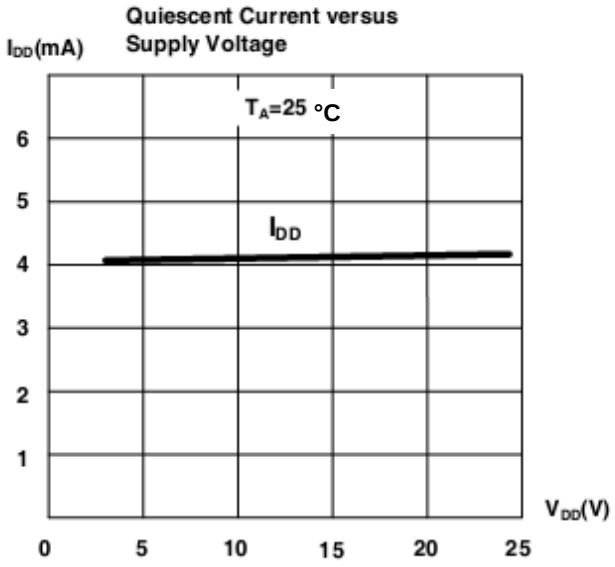
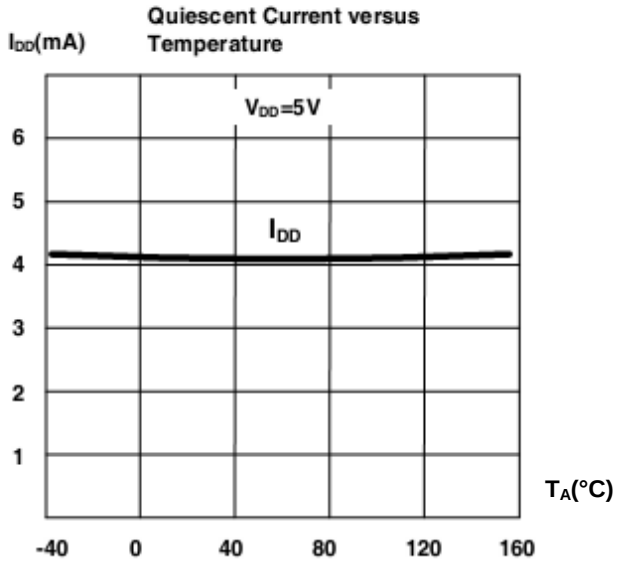
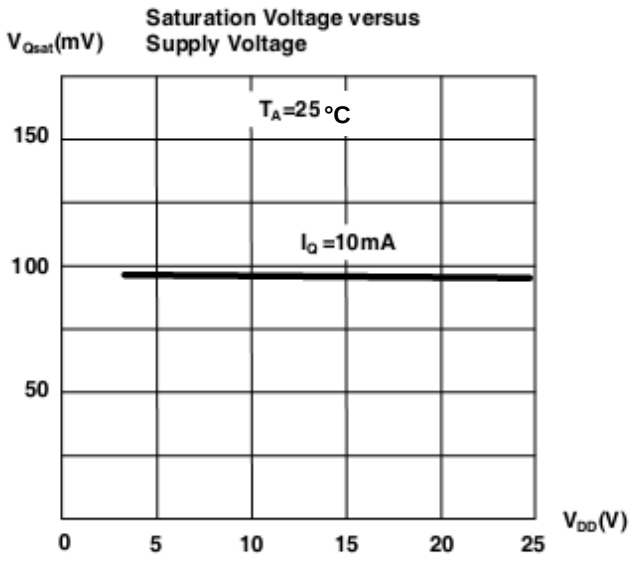
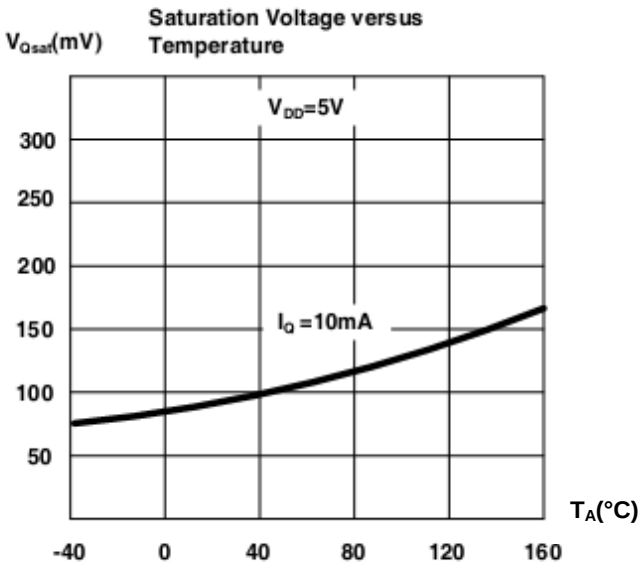
Characteristic Data









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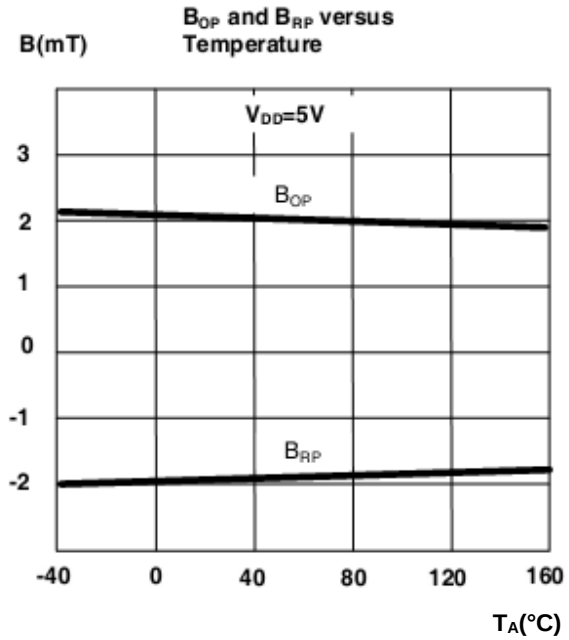
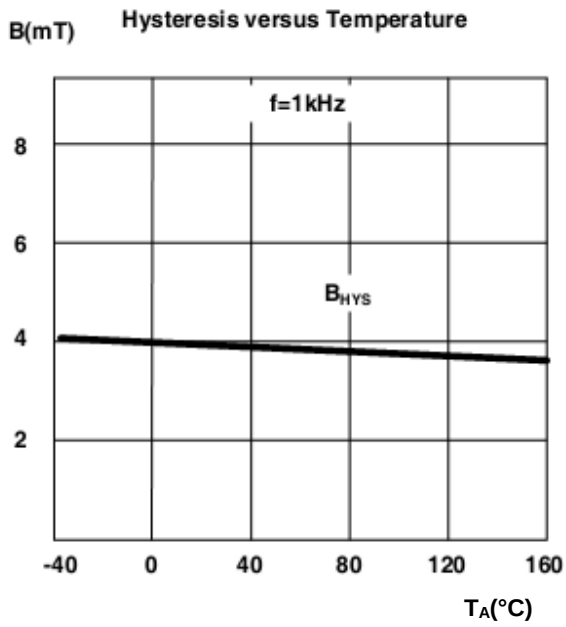
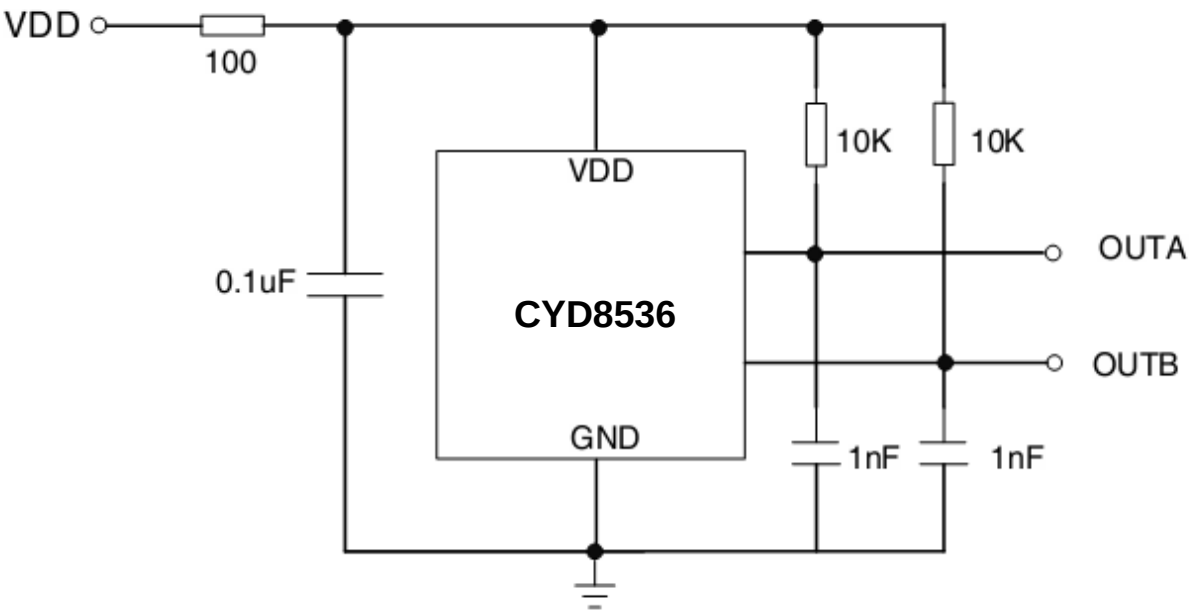
Characteristic Data (Continued)





Typical Application Circuit



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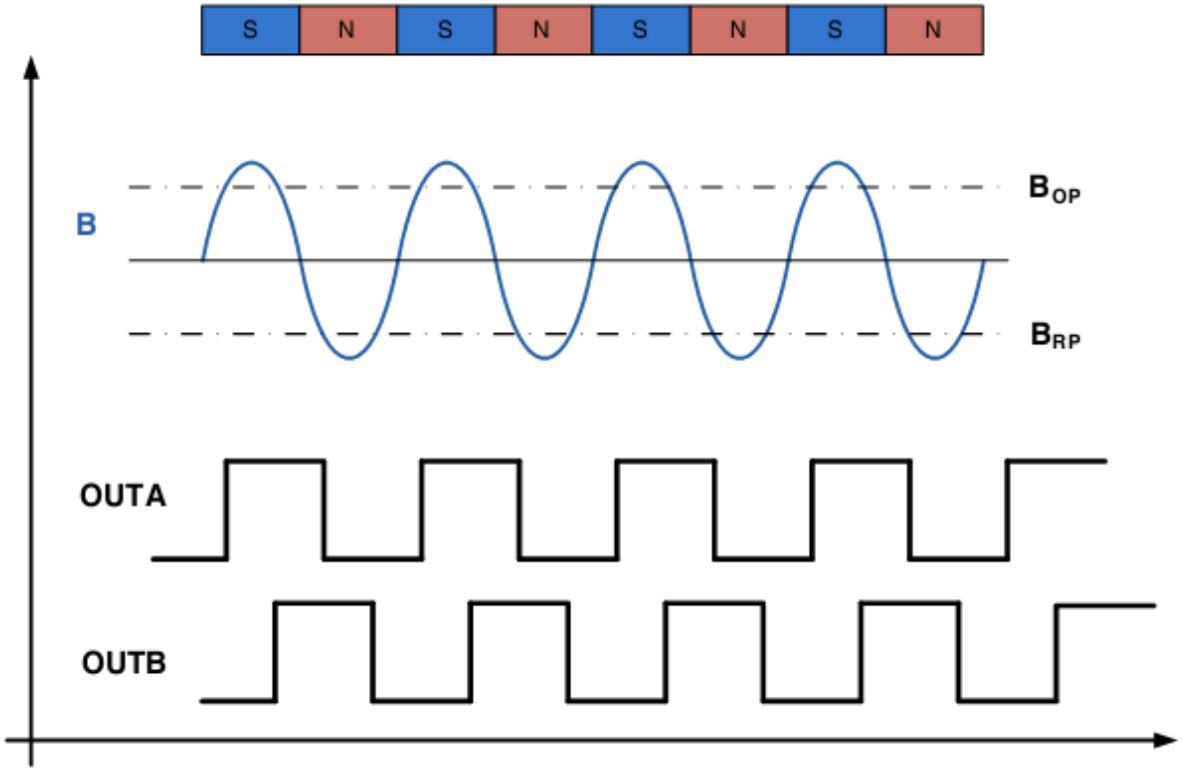
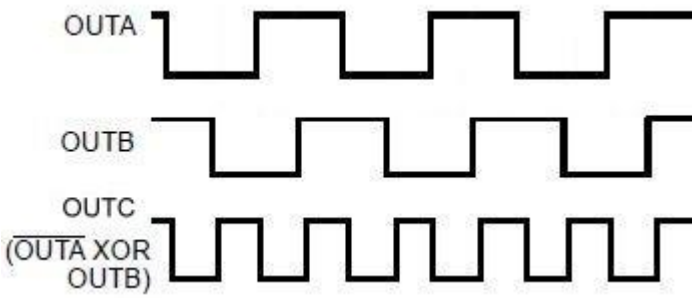
Typical Output Waveform



Using the following logic operation ($\overline{OUTA}$ XOR OUTB) one can get a new output signal OUTC, the frequency of which is the double as the frequency of the output OUTA or OUTB.



The signal OUTC can be used for speed measurement while OUTA and OUTB are used for direction detection.

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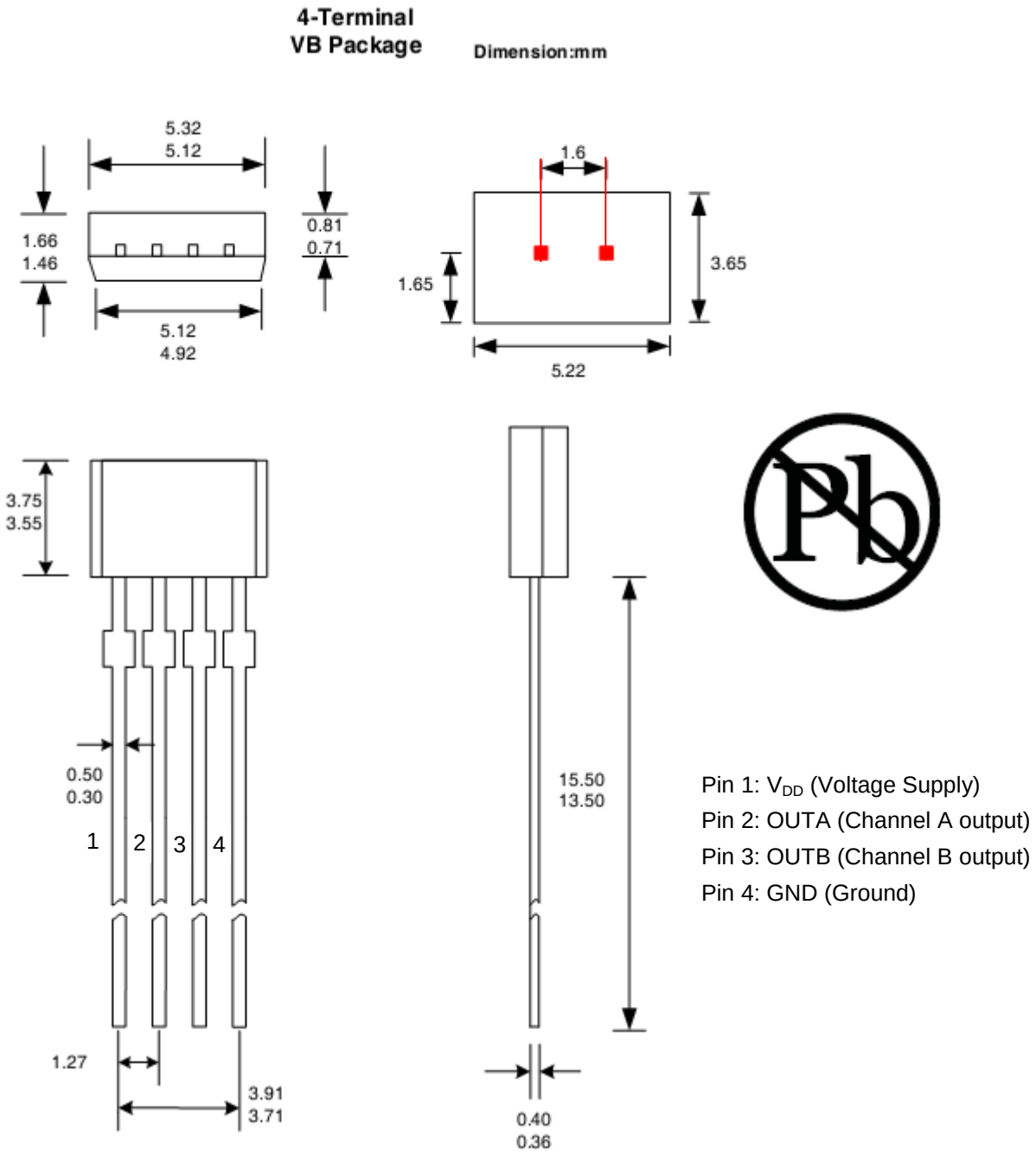
Geometric Dimensions (Package)



Pin 1: V_{DD} (Voltage Supply)
Pin 2: OUTA (Channel A output)
Pin 3: OUTB (Channel B output)
Pin 4: GND (Ground)

Notes:

1. Exact body and lead configuration at vendor's option within limits shown
2. Height does not include mold gate flash
3. Where no tolerance is specified, dimension is nominal

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