

# YHM4202



## Tiny Size, Dual Channel Bi-direction Voltage-Level Translator

### Features

- Single 1.6V to 5.5V Supply Voltage
- Enable and High Voltage Supply from VCCEN
- Low Voltage Decided by Internal LDO, down to 0.9V
- Supports 10MHz Open-Drain Operation without external pull up resistor
- I2C Requirements for Standard, Fast, and High Speeds
- Low Transmission Gate Ron: 20Ω
- Pullup Resistor Enabled for High Voltage Side
- 1.3uA Supply Current
- Tiny 0.9mm x 1.1mm 6-pin DFN or 2.07mm x 2.30mm 6-pin SC70

### Applications

- I2C, SMBus, PMBus, MDIO, UART, low-speed SDIO, GPIO, and other two-signal interfaces

### General Description

The YHM4202 is a dual channel, bidirectional I2C, SMBus or GPIO voltage-level translator, designed specifically for low power consumption making it suitable for portable and battery powered equipment. Externally applied voltages, VH and VL, set the logic levels on either side of the device. A logic signal present on the VL side of the device appears as the same logic signal on the VH side of the device, and vice-versa.

The device is operational from 0.9V to 3.3V VL and 1.6V to 5.5V VH, with only one VCCEN pin which is tied to VH for enable and internal LDO input. The VL is decided by internal LDO output, which can be used for 0.9V/1.2V/1.8V/2.5V/3V/3.3V IO by different device version A/B/C/D/E. When VCCEN is low, the translator switch is off, and a high-impedance state exists between ports.

The Device also integrate one shot block to reduce the rise time for high speed application.

The YHM4202 comes in a 6 PIN, 0.4mm Pitch, 0.9mmx1.1mm DFN-6 package or a 6 PIN, 2.07mm x 2.30mm SC70-6 package.

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### YHM4202 DFN Pin Configurations

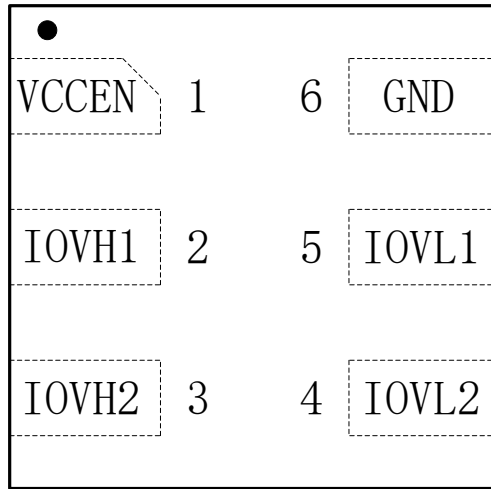


Fig 2. YHM4202 DFN-6 Pin Assignment(Top Through View)

### YHM4202 DFN Pin Descriptions

DFN	Name	Description
1	VCCEN	Power Supply and Enable. Connect to VH GPIO. Bypass a 0.1uF capacitor.
2	IOVH1	High Voltage Input/Output 1. Reference to VH.
3	IOVH2	High Voltage Input/Output 2. Reference to VH.
4	IOVL2	Low Voltage Input/Output 2. Reference to VL.
5	IOVL1	Low Voltage Input/Output 1. Reference to VL.
6	GND	Ground.

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## Tiny Size, Dual Channel Bi-direction Voltage-Level Translator

### YHM4205 SC70 Pin Configurations

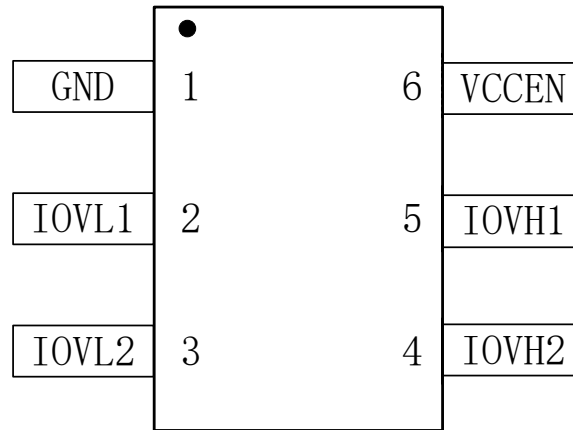


Fig 3. YHM4202 SC70-6 Pin Assignment(Top Through View)

### YHM4205 SC70 Pin Descriptions

SC70	Name	Description
1	GND	Ground.
2	IOVL1	Low Voltage Input/Output1. Reference to VL.
3	IOVL2	Low Voltage Input/Output2. Reference to VL.
4	IOVH2	High Voltage Input/Output2. Reference to VH.
5	IOVH1	High Voltage Input/Output1. Reference to VH.
6	VCCEN	Power Supply and Enable. Connect to VH GPIO. Bypass a 0.1uF capacitor.

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## Tiny Size, Dual Channel Bi-direction Voltage-Level Translator

### 2 Detailed Electrical Characteristics

(VCCEN = 1.8V, T<sub>A</sub> = -40°C to +85°C. Typical values are at T<sub>A</sub> = +25°C, unless otherwise noted T<sub>A</sub> = +25°C, unless otherwise noted.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>POWER SUPPLY</b>						
Supply Voltage Range	VCCEN		1.6		5.5	V
Quiescent Supply Current	I <sub>VCCEN</sub>	T <sub>A</sub> = +25°C		1.3		μA
		-40°C ≤ T <sub>A</sub> ≤ +85°C			4	
IOVL, IOVH Three-State Leakage Current	I <sub>LEAK</sub>	VCCEN = GND, V <sub>I</sub> = 1.2V			1	uA
VCCEN Shutdown Threshold	V <sub>TH</sub>	VCCEN failing		0.7		V
IOVL to IOVH Resistance	R <sub>ON</sub>	VCCEN = 1.8V, V <sub>I</sub> = 0V, I <sub>O</sub> = 15mA		8		Ω
IOVH Pull Up Resistor	R <sub>IOV</sub>			5		kΩ
High Side Voltage	VH	VH=VCCEN	1.6		5.5	V
Low Side Voltage without pull up resistor	VL'	YHM4202A, for 0.9V VL VCCEN=VH=3.3V	0.81			V
		YHM4202B, for 1.2V VL VCCEN=VH=3.3V	1.08			
		YHM4202C, for 1.8V VL VCCEN=VH=3.3V	1.62			
		YHM4202D, for 2.5V VL VCCEN=VH=3.3V	2.25			
		YHM4202E, for 3V and 3.3V VL VCCEN=VH=3.6V	2.97			
<b>AC SPECIFICATIONS</b>						
(C <sub>IOVH</sub> ≤ 50pF, C <sub>IOVL</sub> ≤ 50pF. All timing is 10% to 90% for rise time and 90% to 10% for fall time).						
Turn On Time	t <sub>ON</sub>	VCCEN from 0 to 1.8V		50		μs
IOVL Rise Time	t <sub>RH</sub>	Open-drain driving, VL = 1.2V, VH = 1.8V		50		ns
IOVL Fall Time	t <sub>FH</sub>	Open-drain driving, VL = 1.2V, VH = 1.8V		45		ns
IOVH Rise Time	t <sub>RH</sub>	Open-drain driving, VL = 1.2V, VH = 1.8V		125		ns
IOVH Fall Time	t <sub>FH</sub>	Open-drain driving, VL = 1.2V, VH = 1.8V		50		ns
Maximum Data Rate		Open-drain operation		10		MHz
<b>THERMAL PROTECTION</b>						
Thermal Shutdown	T <sub>SHDN</sub>			150		°C
Thermal Hysteresis	T <sub>HYST</sub>			20		°C

**Note 1:** All specifications are 100% production tested at T<sub>A</sub> = +25°C, unless otherwise noted. Specifications are over T<sub>A</sub> = -40°C to +85°C and are guaranteed by design.

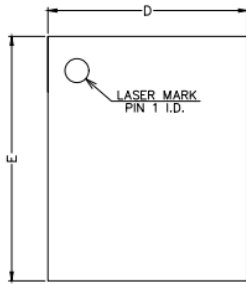
**Note 2:** Guaranteed by design; not production test.

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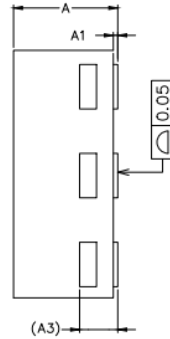
## Tiny Size, Dual Channel Bi-direction Voltage-Level Translator

### Package Dimensions

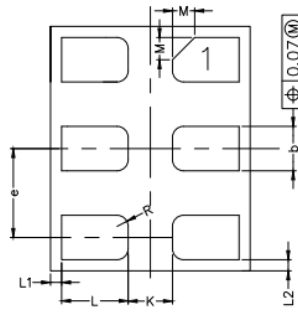
DFN-6 0.9x1.1x0.55



TOP VIEW



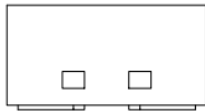
SIDE VIEW



BOTTOM VIEW

COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
A3	0.152REF		
b	0.15	0.20	0.25
D	0.85	0.90	0.95
E	1.05	1.10	1.15
e	0.35	0.40	0.45
K	0.15	0.20	0.25
L	0.25	0.30	0.35
L1	0.00	0.05	0.10
L2	0.00	0.05	0.10
M	0.10REF		
R	0.05REF		



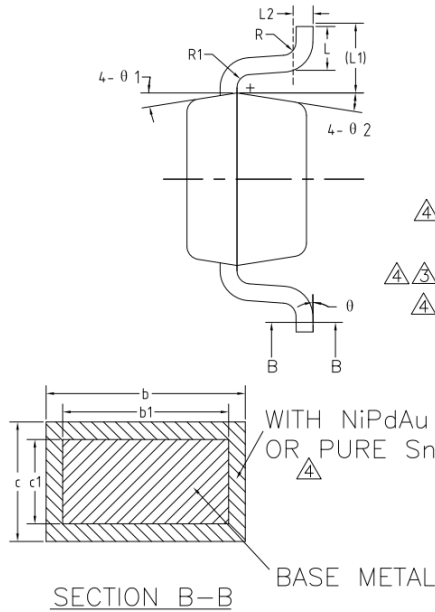
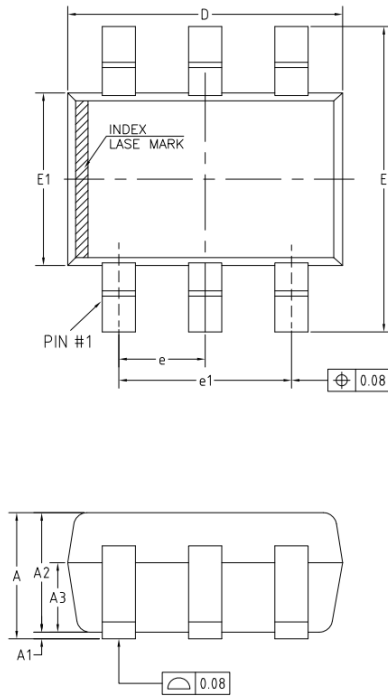
SIDE VIEW

NOTES:  
ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSION.

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## Tiny Size, Dual Channel Bi-direction Voltage-Level Translator

SC70-6 2.07 x 2.30 x 0.95



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.85	—	1.05
A1	0	—	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	NiPdAu 0.22	—	0.29
	PURE Sn 0.23	—	0.33
b1	0.22	0.25	0.28
c	NiPdAu 0.115	—	0.15
	PURE Sn 0.12	—	0.18
c1	0.115	0.13	0.14
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.60	0.65	0.70
e1	1.20	1.30	1.40
L	0.28	0.33	0.38
L1	0.50REF		
L2	0.15BSC		
R	0.10	—	—
R1	0.10	—	0.25
0	0°	—	8°
0 1	6°	9°	12°
0 2	6°	9°	12°

NOTES:  
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-203 AB  
DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.  
MOLD FLASH, PROTRUSIONS OR GATE BURRS WILL NOT EXCEED 0.15mm PER SIDE.

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### Ordering Information

Part Number	Temp Range	Pin Package	Top Mark	MOQ
YHM4202AD6T	-40°C to 85°C	6 DFN	2A	3000
YHM4202BD6T	-40°C to 85°C	6 DFN	2B	3000
YHM4202CD6T	-40°C to 85°C	6 DFN	2C	3000
YHM4202DD6T	-40°C to 85°C	6 DFN	2D	3000
YHM4202ED6T	-40°C to 85°C	6 DFN	2E	3000
YHM4202AS6T	-40°C to 85°C	6 SC70	4202A	3000
YHM4202BS6T	-40°C to 85°C	6 SC70	4202B	3000
YHM4202CS6T	-40°C to 85°C	6 SC70	4202C	3000
YHM4202DS6T	-40°C to 85°C	6 SC70	4202D	3000
YHM4202ES6T	-40°C to 85°C	6 SC70	4202E	3000

*T = Tape and reel.*