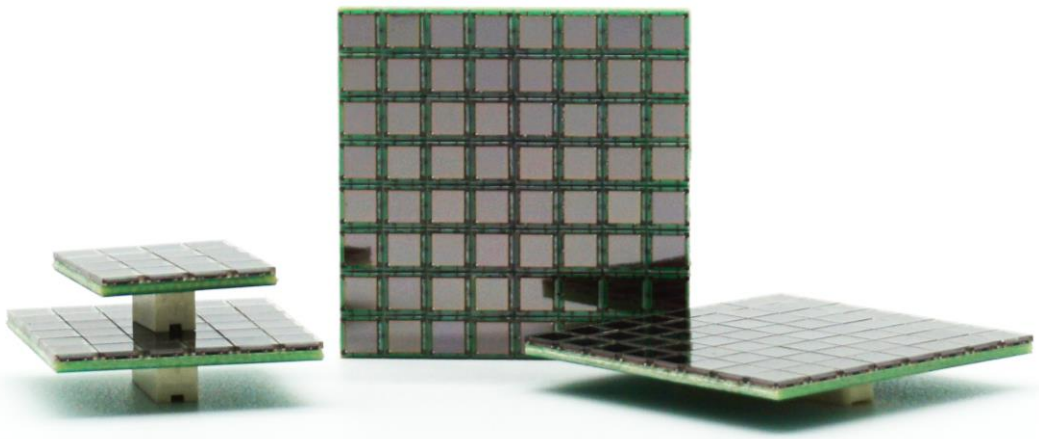
Joinbon
PASSION FOR LIGHT DETECTION

# Array with TN3050 SiPM

Plug and play SiPM array



## HIGHLIGHT FEATURES

- Excellent Timing Resolution
- Low Dark Count Rate
- High PDE Up To 35%
- Single Photon Sensitivity
- Excellent Magnetic Immunity
- Plug And Play

## APPLICATIONS

- PET／Small Animal PET
- Spectral Analyzer
- High Energy Physical Experiment
- Fluorescence Analysis
- Security Inspection

## Array Inputs and Outputs (I/O)

Figure 1 shows the array schematic for a portion of an Array. Each array has two connectors: output and common. The cathode of all sensors are summed together to the common pin. The anode of each sensor has individual output pin. The performance of SiPM in the array can be found in the TN Series datasheet.

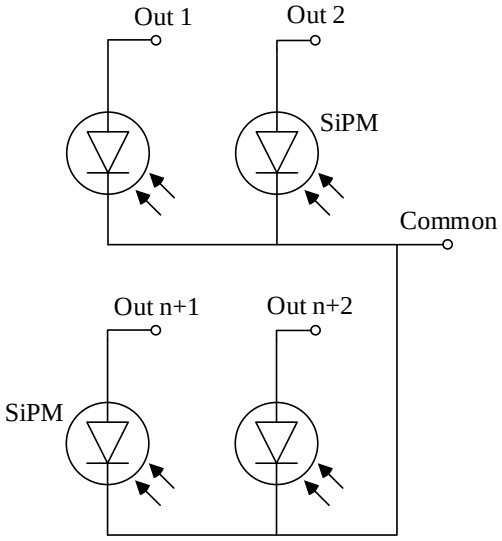



Fig.1 Signal connection of an SiPM array

## Structure

### JARY-TN3050-4×4C

| Parameter | JARY-TN3050-4×4C | Unit |
|---|---|---|
| Number of Channels | 16 (4×4) | - |
| Active Area | 3×3 | mm |
| Pixel Pitch | 50 | μm |
| Number of Pixels Per SiPM | 3364 | - |
| Fill Factor | 70.6% | -- |
| Package Type | With Connector [1] | - |

*1 A connector (DF12B (5.0)-20DP-0.5V (86)) made by HIROSE is mounted on the back side of the board. This connector mates with a HIROSE receptacle (DF12B-20DS-0.5V (86)).

### JARY-TN3050-6×6C

| Parameter | JARY-TN3050-6×6C | Unit |
|---|---|---|
| Number of Channels | 36 (6×6) | - |
| Active Area | 3×3 | mm |
| Pixel Pitch | 50 | μm |
| Number Of Pixels Per SiPM | 3364 | - |
| Fill Factor | 70.6% | -- |
| Package Type | With Connector [2] | - |

*2 A connector (DF12B (5.0)-40DP-0.5V (86)) made by HIROSE is mounted on the back side of the board. This connector mates with a HIROSE receptacle (DF12B-40DS-0.5V (86)).

JARY-TN3050-8×8C

| Parameter | JARY-TN3050-8×8C | Unit |
|---|---|---|
| Number of Channels | 64 (8×8) | - |
| Active Area | 3×3 | mm |
| Pixel Pitch | 50 | μm |
| Number of Pixels | 3364 | - |
| Fill Factor | 70.6% | -- |
| Package Type | With Connector [3] | - |

*3 A connector (DF17B (1.0H)-80DP-0.5V (57)) made by HIROSE is mounted on the back side of the board.
This connector mates with a HIROSE receptacle (DF17B (3.0)-80DS-0.5V (57)).

## Electrical and Optical Characteristics

| Parameter | | Value JARY-TN3050-xxxC | Condition | Unit |
|---|---|---|---|---|
| Spectral Response Range | | 250-950 | -- | nm |
| Peak Sensitivity Wavelength | | 420 | -- | nm |
| Breakdown Voltage | | 25±0.2 | @ 25℃ | V |
| Overvoltage [4] | | 1 - 5 | -- | V |
| PDE @420nm [5] | | 35% | Vov=2V | -- |
| Gain | | $2.7\times10^6$ | Vov=2V | -- |
| Rise Time | | 1.3 | Vov=2V | ns |
| Recovery Time τ [6] | | 45 | Vov=2V | ns |
| Dark Count Rate[7] | Typ. | 124 | Vov=2V | kHz/mm$^2$ |
| | Max. | 288 | Vov=2V | |
| Dark Current | Typ. | 714 | Vov=2V | nA |
| | Max. | 1600 | Vov=2V | |
| Temperature Dependency of $V_{br}$ | | 35.2 | -- | mV/℃ |
| Crosstalk Probability | | 3.0% | Vov=2V | -- |
| Afterpulse Probability | | 2.7% | Vov=2V | -- |
| Pixel Capacitance | | 165 | Vov=2V | fF |

*4 Overvoltage ($V_{ov}$) =Operating Voltage ($V_{op}$)-Breakdown Voltage ($V_{br}$)

*5 Photon detection efficiency does not include crosstalk and afterpulse

*6 RC charging time of the pixel

*7 Threshold=0.5 p.e at 25℃

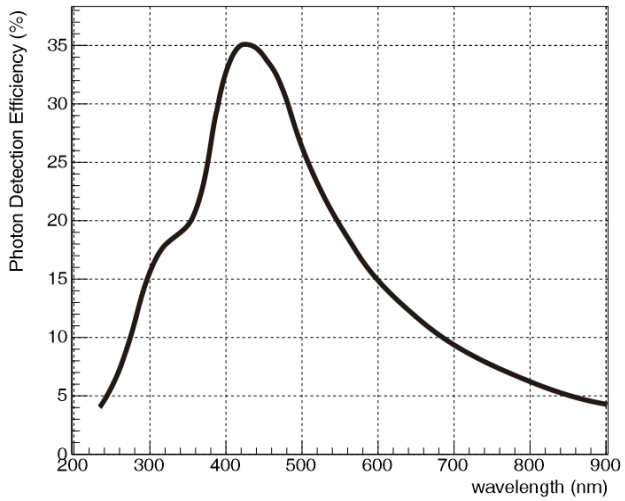
## Absolute Maximum Ratings

| Parameter | JARY-TN3050-xxxC |
|---|---|
| Storage Temperature Range | -45℃~+100℃ |
| Operating Temperature Range | -45℃~+85℃ |

## Performance Plots

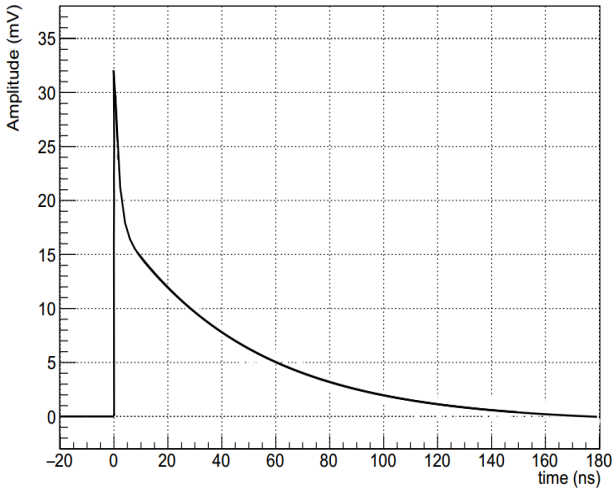
### PDE versus Wavelength

JSP-TN3050-SMT



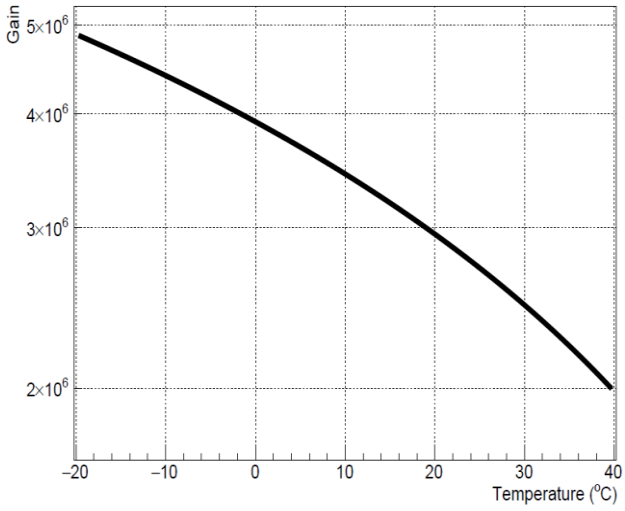

### Typical Impulse Response

JSP-TN3050-SMT




### Gain versus Temperature*

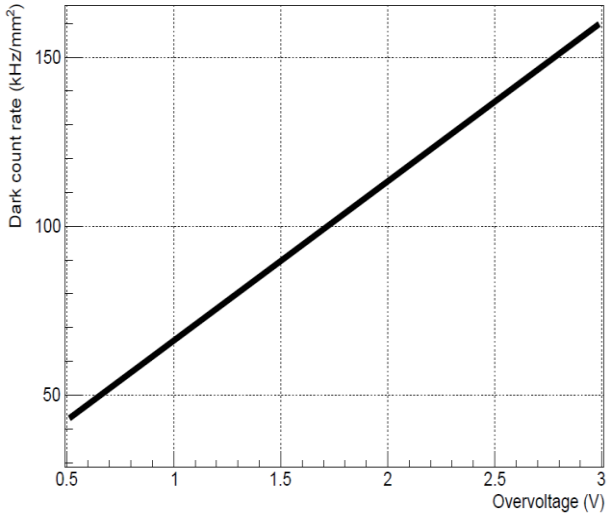
JSP-TN3050-SMT




*This data is tested at a fixed voltage of 26.9V (Vov=2V at room temperature, the breakdown voltage is typically 24.9V)

### Dark Count Rate versus Overvoltage

JSP-TN3050-SMT



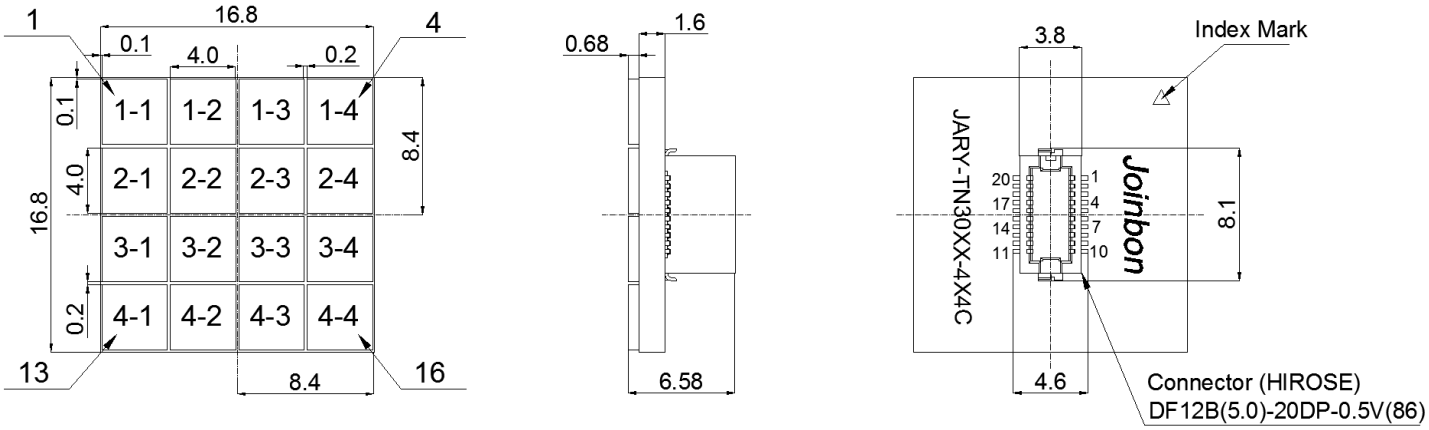

1 To use the product exceed the maximum rating condition may cause performance reduction or permanent damage.

2 All the measurement are made at voltage of Vov=2V unless otherwise noted.

## Dimensional Outlines and Connector Pins

### JARY-TN3050-4×4C DIMENSIONAL OUTLINES

unit: mm




Top view Side view Bottom view

The connector might be changed without notice, please contact our sales before ordering.

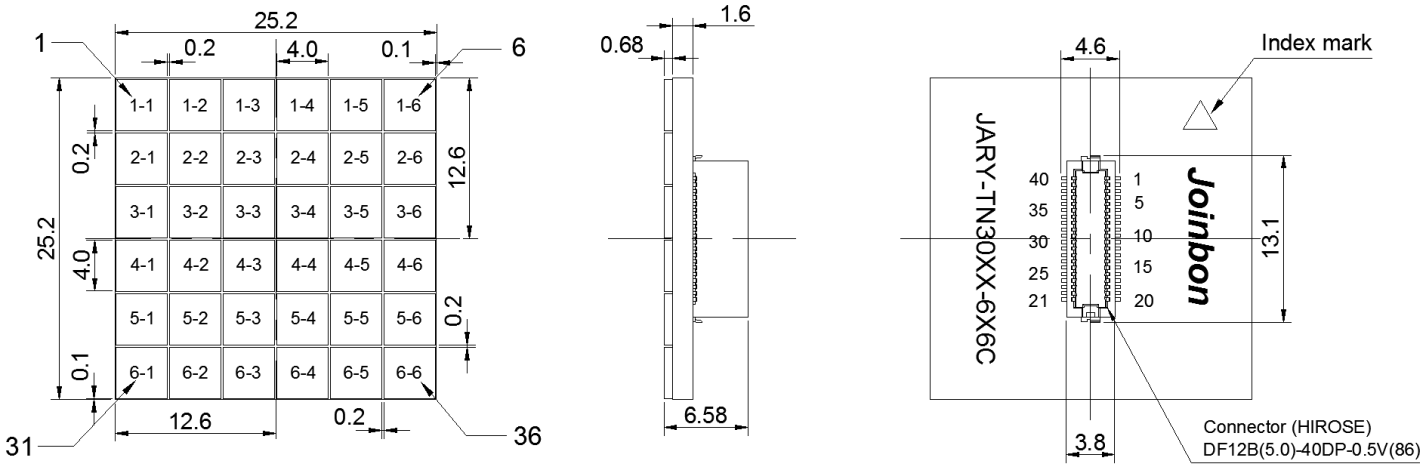
### Connector Pin-Outs for JARY-TN3050-4×4C

| Pin | Connection | Signal | Pin | Connection | Signal |
|---|---|---|---|---|---|
| 20 | A(1-3) | Out3 | 1 | A(2-2) | Out6 |
| 19 | A(2-3) | Out7 | 2 | A(1-2) | Out2 |
| 18 | A(2-4) | Out8 | 3 | A(2-1) | Out5 |
| 17 | C(1-3, 1-4, 2-3, 2-4) | Bias3 | 4 | C(1-1, 1-2, 2-1, 2-2) | Bias1 |
| 16 | A(1-4) | Out4 | 5 | A(1-1) | Out1 |
| 15 | A(4-4) | Out16 | 6 | A(4-1) | Out13 |
| 14 | C(3-3, 3-4, 4-3, 4-4) | Bias4 | 7 | C(3-1, 3-2, 4-1, 4-2) | Bias2 |
| 13 | A(3-4) | Out12 | 8 | A(3-1) | Out9 |
| 12 | A(4-3) | Out15 | 9 | A(3-2) | Out10 |
| 11 | A(3-3) | Out11 | 10 | A(4-2) | Out14 |

Note: A= Anode, C= Cathode.

## JARY-TN3050-6×6C DIMENSIONAL OUTLINES

unit: mm




Top view Side view Bottom view

The connector might be changed without notice, please contact our sales before ordering.

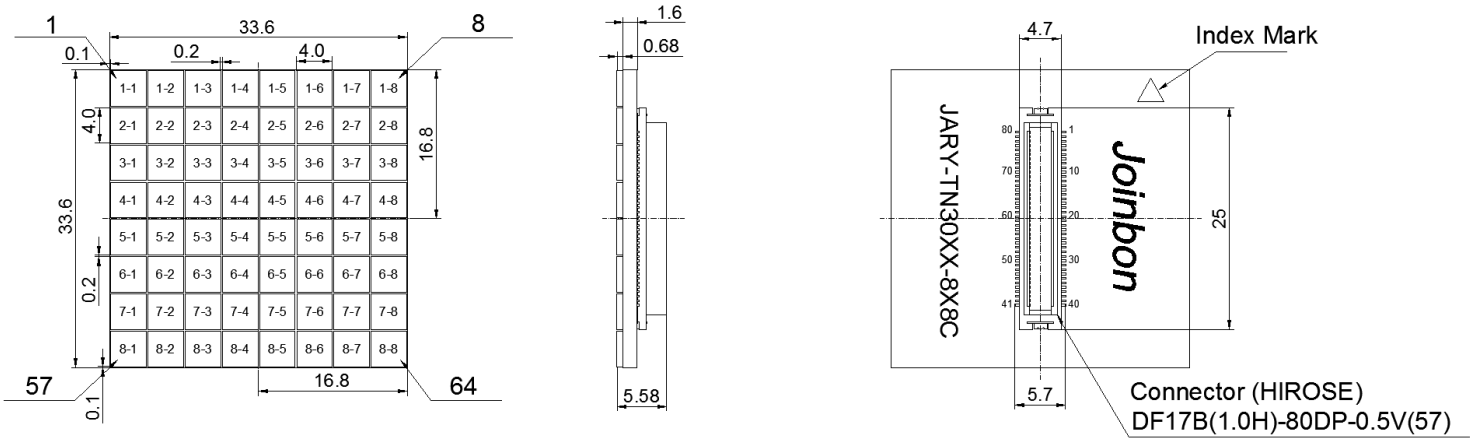
## Connector Pin-Outs for JARY-TN3050-6×6C

| Pin | Connection | Signal | Pin | Connection | Signal |
|---|---|---|---|---|---|
| 40 | A(2-4) | Out10 | 1 | A(2-3) | Out9 |
| 39 | A(1-4) | Out4 | 2 | A(1-3) | Out3 |
| 38 | A(2-5) | Out11 | 3 | A(2-2) | Out8 |
| 37 | A(1-5) | Out5 | 4 | A(1-2) | Out2 |
| 36 | A(1-6) | Out6 | 5 | A(1-1) | Out1 |
| 35 | A(3-5) | Out17 | 6 | A(3-3) | Out15 |
| 34 | A(3-4) | Out16 | 7 | A(3-2) | Out14 |
| 33 | C(1-4, 1-5, 1-6, 2-4, 2-5, 2-6, 3-4, 3-5, 3-6) | Bias3 | 8 | C(1-1, 1-2, 1-3, 2-1, 2-2, 2-3, 3-1, 3-2, 3-3) | Bias1 |
| 32 | A(2-6) | Out12 | 9 | A(2-1) | Out7 |
| 31 | A(3-6) | Out18 | 10 | A(3-1) | Out13 |
| 30 | A(4-6) | Out24 | 11 | A(4-1) | Out19 |
| 29 | A(5-6) | Out30 | 12 | A(5-1) | Out25 |
| 28 | C(4-4, 4-5, 4-6,5-4, 5-5, 5-6, 6-4, 6-5, 6-6) | Bias4 | 13 | C(4-1, 4-2, 4-3, 5-1, 5-2, 5-3, 6-1, 6-2, 6-3) | Bias2 |
| 27 | A(4-5) | Out23 | 14 | A(4-3) | Out21 |
| 26 | A(4-4) | Out22 | 15 | A(4-2) | Out20 |
| 25 | A(6-6) | Out36 | 16 | A(6-1) | Out31 |
| 24 | A(6-5) | Out35 | 17 | A(6-2) | Out32 |
| 23 | A(5-5) | Out29 | 18 | A(5-2) | Out26 |
| 22 | A(6-4) | Out34 | 19 | A(6-3) | Out33 |
| 21 | A(5-4) | Out28 | 20 | A(5-3) | Out27 |

Note: A= Anode, C= Cathode.

## JARY-TN3050-8×8C DIMENSIONAL OUTLINES

unit: mm




Top view Side view Bottom view

The connector might be changed without notice, please contact our sales before ordering.

## Connector Pin-Outs for JARY-TN3050-8×8C

| Pin | Connection | Signal | Pin | Connection | Signal |
|---|---|---|---|---|---|
| 80 | A(1-5) | Out5 | 1 | A(2-4) | Out12 |
| 79 | A(2-5) | Out13 | 2 | A(1-4) | Out4 |
| 78 | A(2-6) | Out14 | 3 | A(2-3) | Out11 |
| 77 | A(1-6) | Out6 | 4 | A(1-3) | Out3 |
| 76 | A(1-7) | Out7 | 5 | A(1-2) | Out2 |
| 75 | A(2-7) | Out15 | 6 | A(2-2) | Out10 |
| 74 | NC | NC | 7 | A(3-4) | Out20 |
| 73 | A(3-6) | Out22 | 8 | A(3-3) | Out19 |
| 72 | NC | NC | 9 | NC | NC |
| 71 | C(1-1, 1-2, 1-3, 1-4, 2-1, 2-2, 2-3, 2-4, 3-1, 3-2, 3-3, 3-4, 4-1, 4-2, 4-3, 4-4) | Bias3 | 10 | C(1-5, 1-6, 1-7, 1-8, 2-5, 2-6, 2-7, 2-8, 3-5, 3-6, 3-7, 3-8, 4-5, 4-6, 4-7, 4-8) | Bias1 |
| 70 | A(3-5) | Out21 | 11 | A(3-2) | Out18 |
| 69 | A(3-7) | Out23 | 12 | A(1-1) | Out1 |
| 68 | A(1-8) | Out8 | 13 | A(2-1) | Out9 |
| 67 | A(2-8) | Out16 | 14 | A(4-4) | Out28 |
| 66 | A(3-8) | Out24 | 15 | A(3-1) | Out17 |
| 65 | A(4-6) | Out30 | 16 | NC | NC |
| 64 | A(4-5) | Out29 | 17 | A(4-3) | Out27 |
| 63 | A(4-7) | Out31 | 18 | NC | NC |
| 62 | A(4-8) | Out32 | 19 | A(4-2) | Out26 |
| 61 | NC | NC | 20 | A(4-1) | Out25 |
| 60 | A(5-8) | Out40 | 21 | NC | NC |

| | | | | | |
|---|---|---|---|---|---|
| 59 | A(5-7) | Out39 | 22 | A(5-1) | Out33 |
| 58 | NC | NC | 23 | A(5-2) | Out34 |
| 57 | A(5-6) | Out38 | 24 | A(5-4) | Out36 |
| 56 | NC | NC | 25 | A(5-3) | Out35 |
| 55 | A(6-8) | Out48 | 26 | A(6-1) | Out41 |
| 54 | A(5-5) | Out37 | 27 | A(7-1) | Out49 |
| 53 | A(7-8) | Out56 | 28 | A(8-1) | Out57 |
| 52 | A(8-8) | Out64 | 29 | A(6-2) | Out42 |
| 51 | A(6-7) | Out47 | 30 | A(6-4) | Out44 |
| 50 | C(5-1, 5-2, 5-3, 5-4, 6-1, 6-2, 6-3, 6-4, 7-1, 7-2, 7-3, 7-4, 8-1, 8-2, 8-3, 8-4) | Bias4 | 31 | C(5-5, 5-6, 5-7, 5-8, 6-5, 6-6, 6-7, 6-8, 7-5, 7-6, 7-7, 7-8, 8-5, 8-6, 8-7, 8-8) | Bias2 |
| 49 | NC | NC | 32 | NC | NC |
| 48 | A(6-6) | Out46 | 33 | A(6-3) | Out43 |
| 47 | A(6-5) | Out45 | 34 | NC | NC |
| 46 | A(7-7) | Out55 | 35 | A(7-2) | Out50 |
| 45 | A(8-7) | Out63 | 36 | A(8-2) | Out58 |
| 44 | A(8-6) | Out62 | 37 | A(8-3) | Out59 |
| 43 | A(7-6) | Out54 | 38 | A(7-3) | Out51 |
| 42 | A(8-5) | Out61 | 39 | A(7-4) | Out52 |
| 41 | A(7-5) | Out53 | 40 | A(8-4) | Out60 |

Note: A= Anode, C= Cathode, NC= Not Connected.

All specifications are subject to change without notice

**Joinbon Technology Co., Ltd. (Hubei)**

Joinbon

Building A03, East Lake Hi-Tech Innovation City, No.9 Phoenix Avenue, Phoenix Lake, Ezhou, Hubei, P.R.China.
Postcode: 436060
Tel: 027-5937 0337
Fax: 027-5937 0337
Email: info@joinbon.com
Site: www.joinbon.com