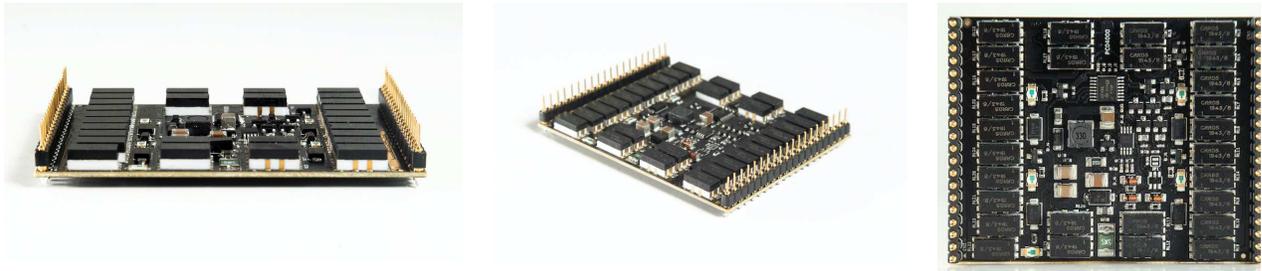
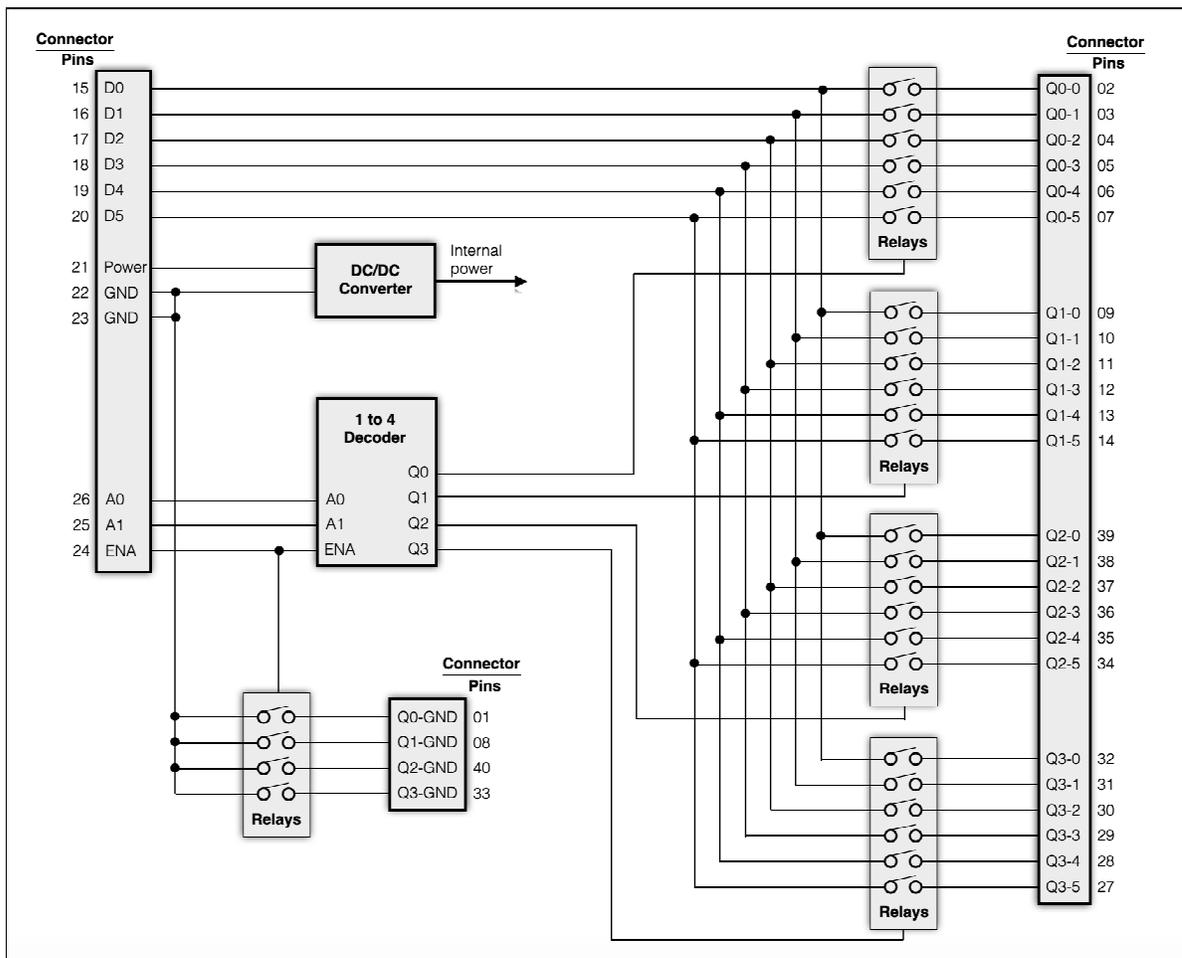


NanoPlex general description

NanoPlex NPS-06-01-04A Universal Relay ISP-Channel Multiplier allows the expansion of the number of channels of ISP-Programming tools, while also offering galvanic isolation. The total number of switched signals is 24. NanoPlex is used on PCBAs production lines, in ATE-controlled ISP programming. Thanks to its ultra-small size (only 51.0x66.5 mm), this NanoPlex model takes easily place in Test Fixtures. Designed for piggyback mounting, NanoPlex is universal and compatible with all types of ISP Programming tools.



NanoPlex NPS-06-01-04A Block Diagram



STMicroelectronics STM32 Microcontrollers

STMicroelectronics STM32 Series of microcontrollers is programmed through SWD interface.

Most microcontrollers of this family only require three signals (SWDCLK, SWDIO, RESET) to accomplish the ISP Programming.

However, some devices (STM32L0xx and STM32L1xx subfamilies) also require Vdd to be controlled. This brings the number of necessary signals to four.

NanoPlex NPS-06-01-04A offers four operating modes: 1x4, 2x8, 3x12 and 6x24.
For details of this NanoPlex model, please refer to:

- ▶ DC04023 NanoPlex NPS-06-01-04A Data Sheet
- ▶ DC04016 Flexibility of NanoPlex NPS-06-01-04A Application Note

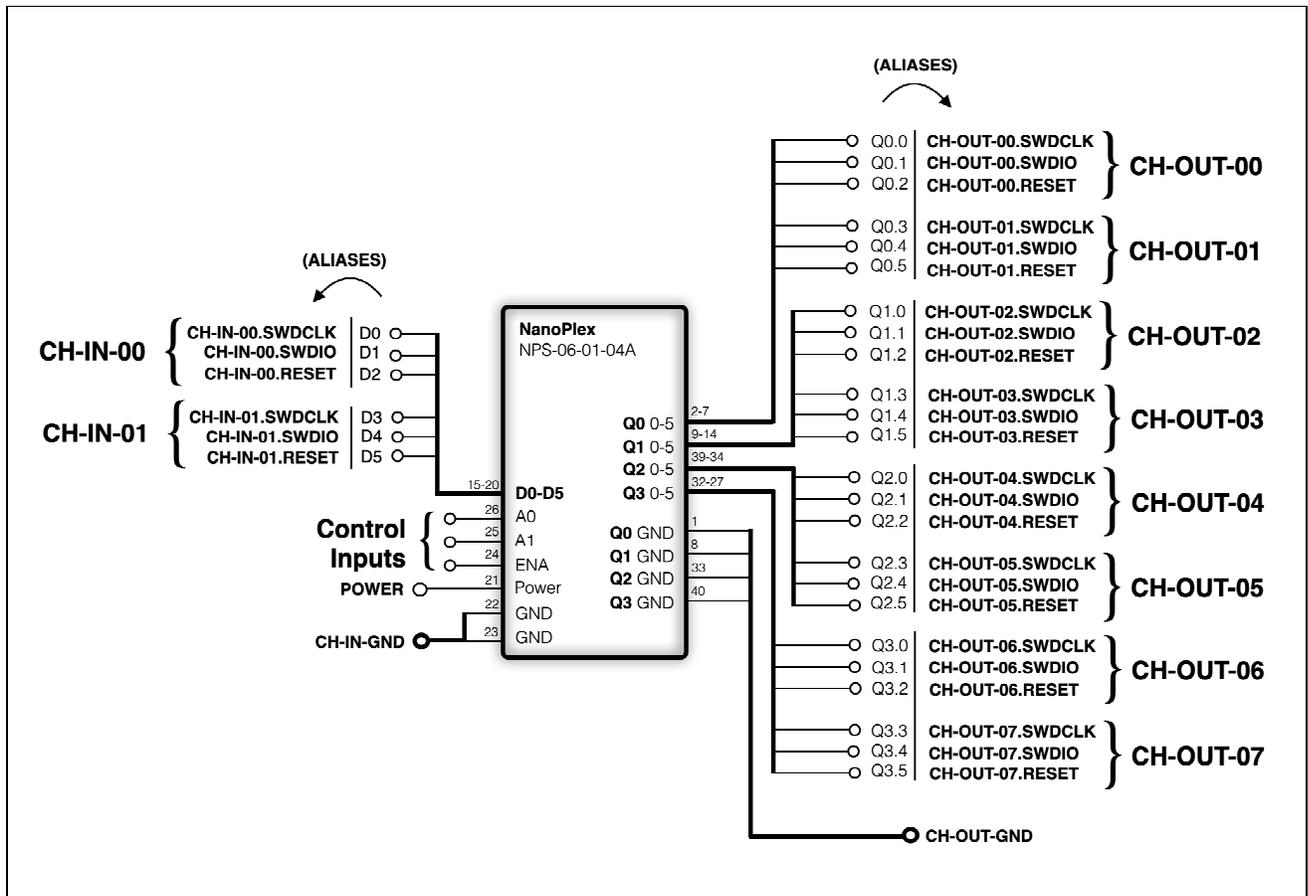
Depending on the number of signals used by the SWD interface, NanoPlex NPS-06-01-04A is used in two different modes: **2x8** (max three signals) or **1x4** (max six signals).

How to use NanoPlex NPS-06-01-04A for 3-signal SWD interface

Three-signal SWD: 2x8 Operating mode

The most convenient way to ISP program multiple STM32 Series Microcontrollers (SWD 3-signal interface) through NanoPlex is using this model in **2x8 operating mode**. Two NanoPlex input channels are multiplied to eight different, galvanic isolated output channels.

On the following mode example diagram, for a better explanation, signal names are assigned with aliases (texts are in **bold**).



Truth table

(the symbol ► stands for “connected to”)

ENA	A1	A0	CH-IN-	00.SWDCLK ►	00.SWDIO ►	00.RESET ►	01.SWDCLK ►	01.SWDIO ►	01.RESET ►
1	0	0	CH-OUT-	00.SWDCLK	00.SWDIO	00.RESET	01.SWDCLK	01.SWDIO	01.RESET
1	0	1	CH-OUT-	02.SWDCLK	02.SWDIO	02.RESET	03.SWDCLK	03.SWDIO	03.RESET
1	1	0	CH-OUT-	04.SWDCLK	04.SWDIO	04.RESET	05.SWDCLK	05.SWDIO	05.RESET
1	1	1	CH-OUT-	06.SWDCLK	06.SWDIO	06.RESET	07.SWDCLK	07.SWDIO	07.RESET
0	X	X	CH-OUT-	HI-Z	HI-Z	HI-Z	HI-Z	HI-Z	HI-Z

Operating sequence

ENA = 1

A1-A0 = “00”

CH-IN-00.SWDCLK ► CH-OUT-00.SWDCLK
 CH-IN-00.SWDIO ► CH-OUT-00.SWDIO
 CH-IN-00.RESET ► CH-OUT-00.RESET

CH-IN-01.SWDCLK ► CH-OUT-01.SWDCLK
 CH-IN-01.SWDIO ► CH-OUT-01.SWDIO
 CH-IN-01.RESET ► CH-OUT-01.RESET

A1-A0 = “01”

CH-IN-00.SWDCLK ► CH-OUT-02.SWDCLK
 CH-IN-00.SWDIO ► CH-OUT-02.SWDIO
 CH-IN-00.RESET ► CH-OUT-02.RESET

CH-IN-01.SWDCLK ► CH-OUT-03.SWDCLK
 CH-IN-01.SWDIO ► CH-OUT-03.SWDIO
 CH-IN-01.RESET ► CH-OUT-03.RESET

A1-A0 = “10”

CH-IN-00.SWDCLK ► CH-OUT-04.SWDCLK
 CH-IN-00.SWDIO ► CH-OUT-04.SWDIO
 CH-IN-00.RESET ► CH-OUT-04.RESET

CH-IN-01.SWDCLK ► CH-OUT-05.SWDCLK
 CH-IN-01.SWDIO ► CH-OUT-05.SWDIO
 CH-IN-01.RESET ► CH-OUT-05.RESET

A1-A0 = “11”

CH-IN-00.SWDCLK ► CH-OUT-06.SWDCLK
 CH-IN-00.SWDIO ► CH-OUT-06.SWDIO
 CH-IN-00.RESET ► CH-OUT-06.RESET

CH-IN-01.SWDCLK ► CH-OUT-07.SWDCLK
 CH-IN-01.SWDIO ► CH-OUT-07.SWDIO
 CH-IN-01.RESET ► CH-OUT-07.RESET

Connector pinout (aliases signals, top view)

Pin	Signal
01	CH-OUT-GND
02	CH-OUT-00.SWDCLK
03	CH-OUT-00.SWDIO
04	CH-OUT-00.RESET
05	CH-OUT-01.SWDCLK
06	CH-OUT-01.SWDIO
07	CH-OUT-01.RESET
08	CH-OUT-GND
09	CH-OUT-02.SWDCLK
10	CH-OUT-02.SWDIO
11	CH-OUT-02.RESET
12	CH-OUT-03.SWDCLK
13	CH-OUT-03.SWDIO
14	CH-OUT-03.RESET
15	CH-IN-00.SWDCLK
16	CH-IN-00.SWDIO
17	CH-IN-00.RESET
18	CH-IN-01.SWDCLK
19	CH-IN-01.SWDIO
20	CH-IN-01.RESET

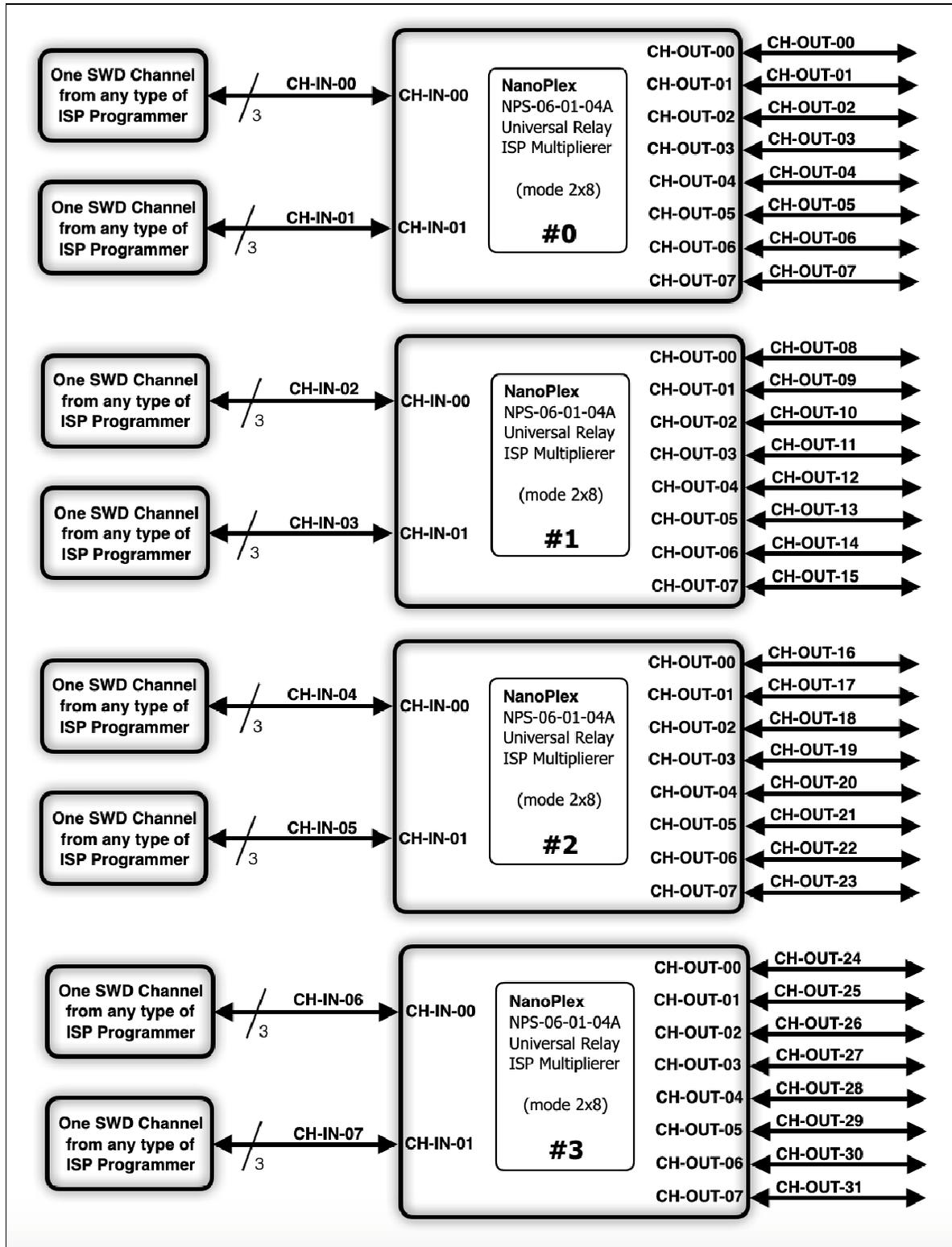
Signal	Pin
CH-OUT-GND	40
CH-OUT-04.SWDCLK	39
CH-OUT-04.SWDIO	38
CH-OUT-04.RESET	37
CH-OUT-05.SWDCLK	36
CH-OUT-05.SWDIO	35
CH-OUT-05.RESET	34
CH-OUT-GND	33
CH-OUT-06.SWDCLK	32
CH-OUT-06.SWDIO	31
CH-OUT-06.RESET	30
CH-OUT-07.SWDCLK	29
CH-OUT-07.SWDIO	28
CH-OUT-07.RESET	27
A0	26
A1	25
ENA	24
GND (*)	23
GND (*)	22
Power	21

(*) GND at pins 22/23 is used for both Power GND and CH-IN-GND.

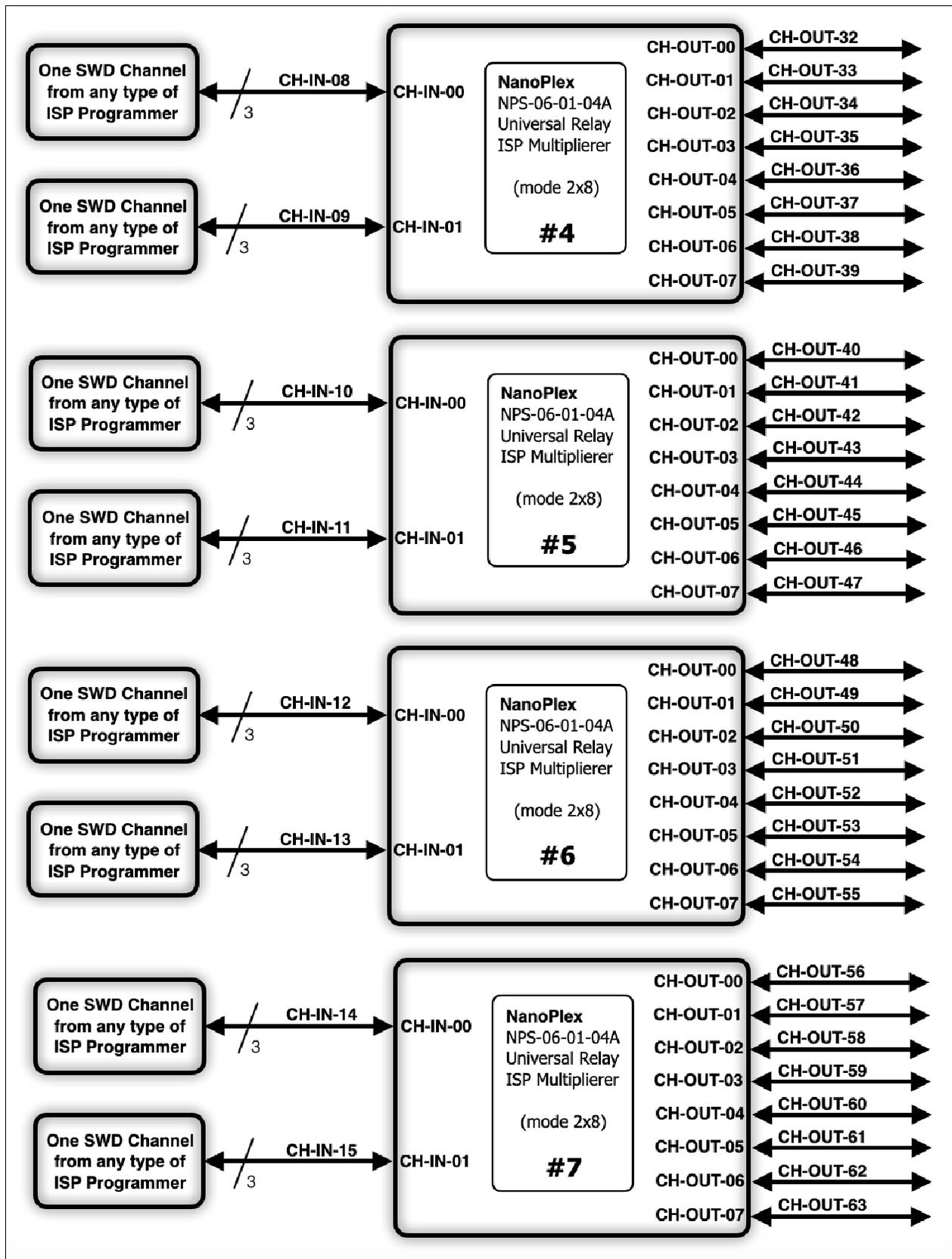
Using 8 NanoPlex NPS-06-01-04A units for a 64-channel system

The following diagram shows how 8 NanoPlex NPS-06-01-04A units can be used to create a massive, 64-channel ISP Programming multiplier. In this example, 16 input channels are coming from any brand or type of ISP Programming tool.

Example diagram 1/2



Example diagram 2/2



As shown on the diagram above, signal names transition for this systems formed by eight NanoPlex NPS-06-01-04A units is straightforward.

Channels and aliases

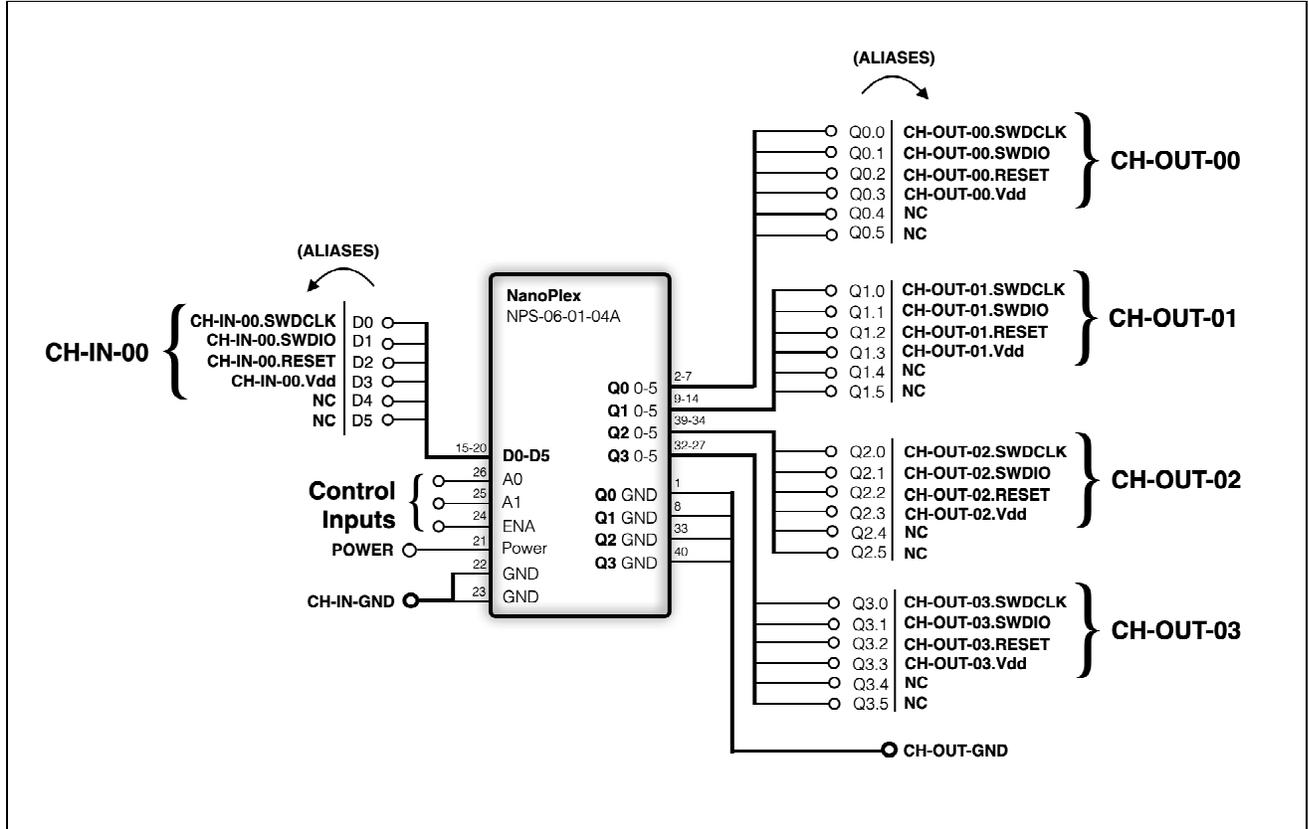
NanoPlex Unit	Input Channels	Input Aliases	Output Channels	Output Aliases
#0	CH-IN-00	▶ CH-IN-00	CH-OUT-00	▶ CH-OUT-00
#0			CH-OUT-01	▶ CH-OUT-01
#0			CH-OUT-02	▶ CH-OUT-02
#0			CH-OUT-03	▶ CH-OUT-03
#0	CH-IN-01	▶ CH-IN-01	CH-OUT-04	▶ CH-OUT-04
#0			CH-OUT-05	▶ CH-OUT-05
#0			CH-OUT-06	▶ CH-OUT-06
#0			CH-OUT-07	▶ CH-OUT-07
#1	CH-IN-00	▶ CH-IN-02	CH-OUT-00	▶ CH-OUT-08
#1			CH-OUT-01	▶ CH-OUT-09
#1			CH-OUT-02	▶ CH-OUT-10
#1			CH-OUT-03	▶ CH-OUT-11
#1	CH-IN-01	▶ CH-IN-03	CH-OUT-04	▶ CH-OUT-12
#1			CH-OUT-05	▶ CH-OUT-13
#1			CH-OUT-06	▶ CH-OUT-14
#1			CH-OUT-07	▶ CH-OUT-15
...
...
...
#7	CH-IN-00	▶ CH-IN-14	CH-OUT-00	▶ CH-OUT-56
#7			CH-OUT-01	▶ CH-OUT-57
#7			CH-OUT-02	▶ CH-OUT-58
#7			CH-OUT-03	▶ CH-OUT-59
#7	CH-IN-00	▶ CH-IN-15	CH-OUT-04	▶ CH-OUT-60
#7			CH-OUT-05	▶ CH-OUT-61
#7			CH-OUT-06	▶ CH-OUT-62
#7			CH-OUT-07	▶ CH-OUT-63

How to use NanoPlex NPS-06-01-04A for 4-signal SWD interface

Four-signal SWD: 1x4 Operating mode

The ISP programming of multiple STMicroelectronics STM32 Series Microcontrollers (SWD 4-signal interface) through NanoPlex is accomplished by using this model in 1x4 operating mode. One NanoPlex input channel is multiplied to four different, galvanic isolated output channels.

On the following mode examples diagram, for a better explanation, signal names are assigned with aliases (texts are in **bold**).



Truth table

(the symbol ► stands for "connected to")

ENA	A1	A0	CH-IN-	00.SWDCLK ►	00.SWDIO ►	00.RESET ►	00.Vdd ►
1	0	0	CH-OUT-	00.SWDCLK	00.SWDIO	00.RESET	00.Vdd
1	0	1	CH-OUT-	01.SWDCLK	01.SWDIO	01.RESET	01.Vdd
1	1	0	CH-OUT-	02.SWDCLK	02.SWDIO	02.RESET	02.Vdd
1	1	1	CH-OUT-	03.SWDCLK	03.SWDIO	03.RESET	03.Vdd
0	X	X	CH-OUT-	HI-Z	HI-Z	HI-Z	HI-Z

Operating sequence

```

ENA = 1;
A1-A0 = "00"
    CH-IN-00.SWDCLK ▶ CH-OUT-00.SWDCLK
    CH-IN-00.SWDIO  ▶ CH-OUT-00.SWDIO
    CH-IN-00.RESET  ▶ CH-OUT-00.RESET
    CH-IN-00.Vdd    ▶ CH-OUT-00.Vdd
A1-A0 = "01"
    CH-IN-00.SWDCLK ▶ CH-OUT-01.SWDCLK
    CH-IN-00.SWDIO  ▶ CH-OUT-01.SWDIO
    CH-IN-00.RESET  ▶ CH-OUT-01.RESET
    CH-IN-00.Vdd    ▶ CH-OUT-01.Vdd
A1-A0 = "10"
    CH-IN-00.SWDCLK ▶ CH-OUT-02.SWDCLK
    CH-IN-00.SWDIO  ▶ CH-OUT-02.SWDIO
    CH-IN-00.RESET  ▶ CH-OUT-02.RESET
    CH-IN-00.Vdd    ▶ CH-OUT-02.Vdd
A1-A0 = "11"
    CH-IN-00.SWDCLK ▶ CH-OUT-03.SWDCLK
    CH-IN-00.SWDIO  ▶ CH-OUT-03.SWDIO
    CH-IN-00.RESET  ▶ CH-OUT-03.RESET
    CH-IN-00.Vdd    ▶ CH-OUT-03.Vdd

```

Connector pinout (aliases signals, top view)

Pin	Signal
01	CH-OUT-GND
02	CH-OUT-00.SWDCLK
03	CH-OUT-00.SWDIO
04	CH-OUT-00.RESET
05	CH-OUT-00.Vdd
06	NC
07	NC
08	CH-OUT-GND
09	CH-OUT-01.SWDCLK
10	CH-OUT-01.SWDIO
11	CH-OUT-01.RESET
12	CH-OUT-01.Vdd
13	NC
14	NC
15	CH-IN-00.SWDCLK
16	CH-IN-00.SWDIO
17	CH-IN-00.RESET
18	CH-IN-00.Vdd
19	NC
20	NC

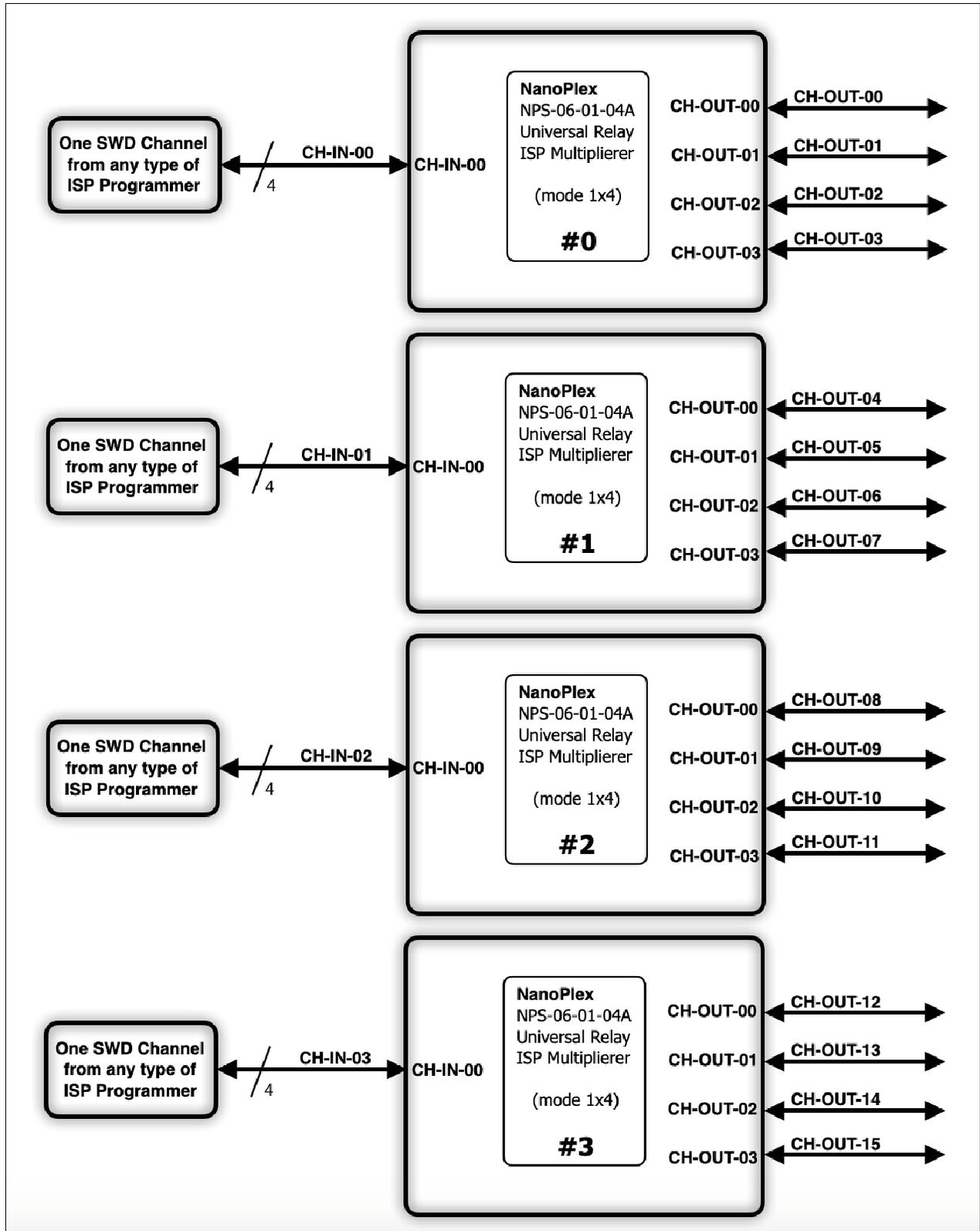
Signal	Pin
CH-OUT-GND	40
CH-OUT-02.SWDCLK	39
CH-OUT-02.SWDIO	38
CH-OUT-02.RESET	37
CH-OUT-02.Vdd	36
NC	35
NC	34
CH-OUT-GND	33
CH-OUT-03.SWDCLK	32
CH-OUT-03.SWDIO	31
CH-OUT-03.RESET	30
CH-OUT-03.Vdd	29
NC	28
NC	27
A0	26
A1	25
ENA	24
GND (*)	23
GND (*)	22
Power	21

(*) GND at pins 22/23 is used for both Power GND and CH-IN-GND.

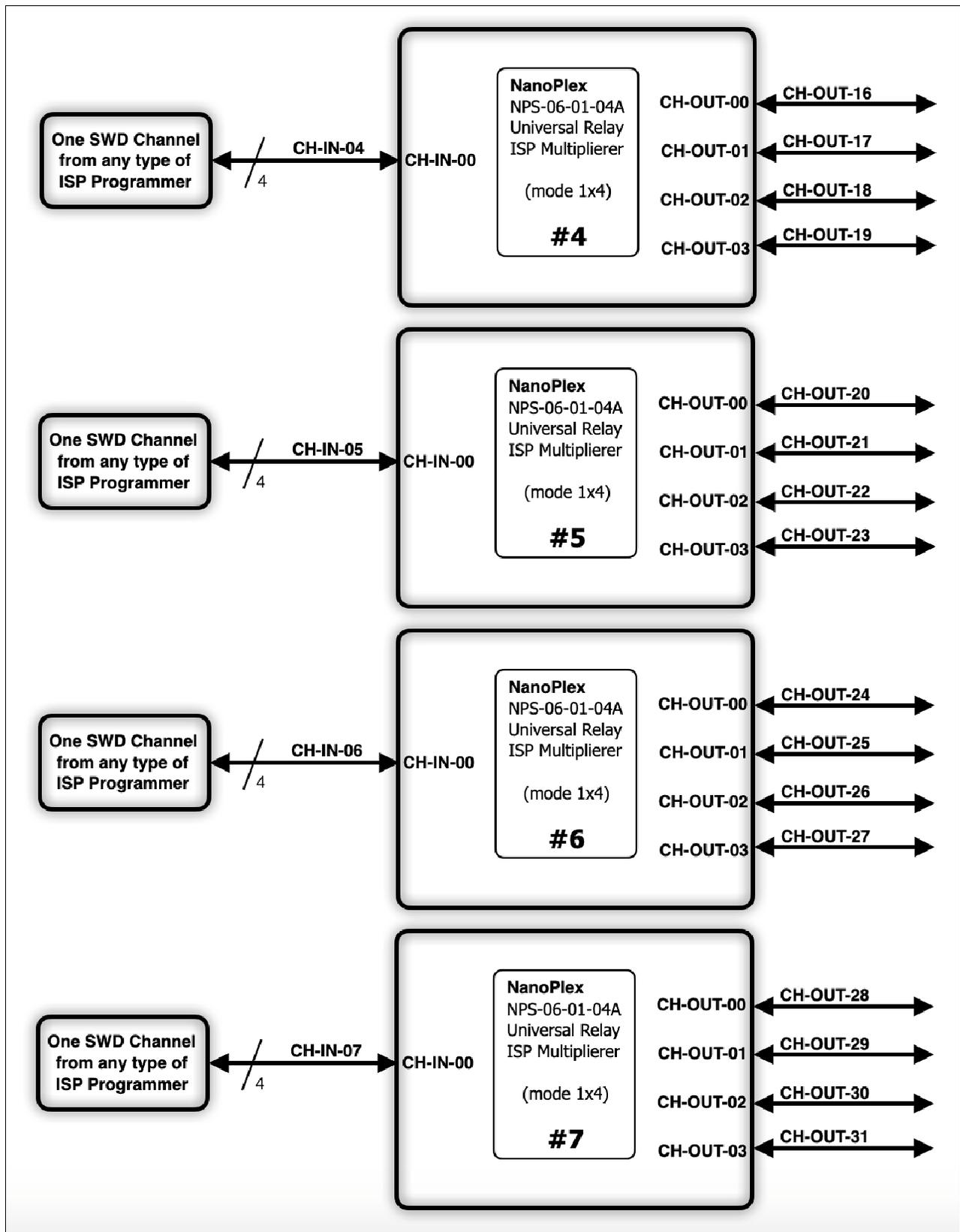
Using eight NanoPlex NPS-06-01-04A units for a 32-channel system

The following diagram shows how 8 NanoPlex NPS-06-01-04A units can be used to create a massive, 32-channel ISP Programming multiplier. In this example, 16 input channels are coming from any brand or type of ISP Programming tool.

Example diagram 1/2



Example diagram 2/2



As shown on the diagrams above, signal names transition for this systems formed by eight NanoPlex NPS-06-01-04A units is straightforward.

Channels and aliases

NanoPlex Unit	Input Channels	Input Aliases	Output Channels	Output Aliases
#0	CH-IN-00	▶ CH-IN-00	CH-OUT-00	▶ CH-OUT-00
#0			CH-OUT-01	▶ CH-OUT-01
#0			CH-OUT-02	▶ CH-OUT-02
#0			CH-OUT-03	▶ CH-OUT-03
#1	CH-IN-00	▶ CH-IN-01	CH-OUT-00	▶ CH-OUT-04
#1			CH-OUT-01	▶ CH-OUT-05
#1			CH-OUT-02	▶ CH-OUT-06
#1			CH-OUT-03	▶ CH-OUT-07
...
...
...
#7	CH-IN-00	▶ CH-IN-07	CH-OUT-00	▶ CH-OUT-28
#7			CH-OUT-01	▶ CH-OUT-29
#7			CH-OUT-02	▶ CH-OUT-30
#7			CH-OUT-03	▶ CH-OUT-31

Recommended Readings / Further Documentation

- ▶ *DC04023 NanoPlex NPS-06-01-04A Data Sheet*
- ▶ *DC04016 Flexibility of NanoPlex NPS-06-01-04A Application Note*

About Manta Systems

Manta Systems is a hi-tech company, global leader in hi-density signal switching for In-System Programming (ISP) and Testing Systems. The company targets the electronic boards assembly market, where a high number of connections is required. Manta Systems flagship product is NanoPlex™, a series of Channels Multipliers for In-System Programming (ISP) and Testing instruments. NanoPlex™ is the **world's first universal tool** providing end-user with the possibility of having compact, easy-to-use, professional, reliable In-System Programming (ISP) and Testing Channel Multiplication functionality.

Orders

All NanoPlex™ Series products are generally off-the-shelf.
Shipping within 24 hours from order reception.
Free shipping & 30-day money back guarantee.

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