



ICR with daughter / mother board

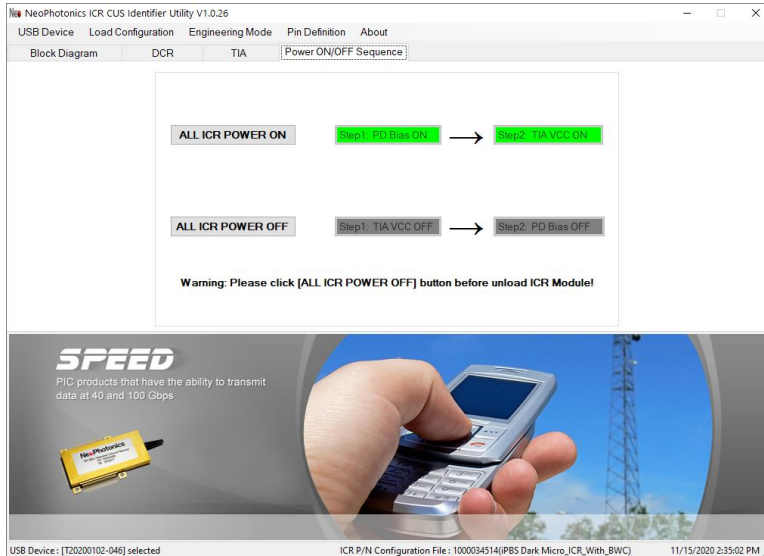
Application note: trouble shooting

The Neophotonics Integrated Coherent Receiver can be controlled by a convenient daughterboard / motherboard evaluation set. The motherboard contains all the generic and low-speed functionality and the daughterboard contains form-factor specific items as well as the high speed lines.

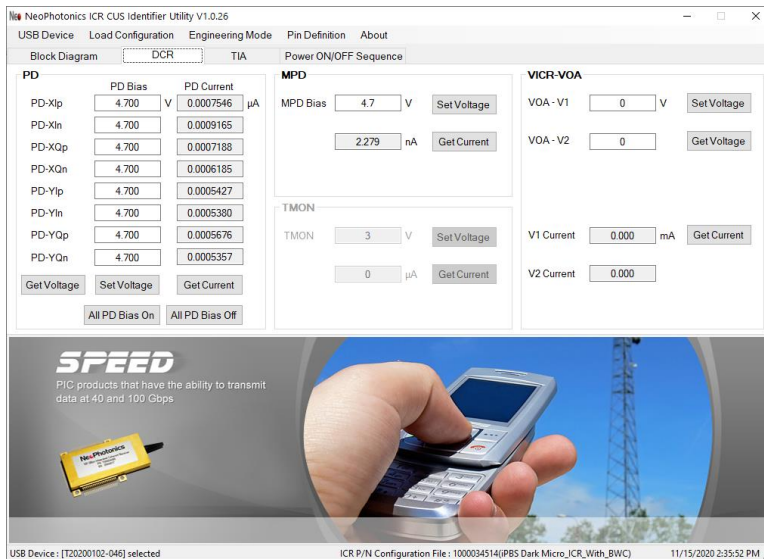
This application note describes some basic setup configurations and expected results.

1. Activate without light input

- Turn the board on
- Load the software
- Select the USB device
- Select the configuration (different ini files for different ICR types)
- On Tab Power ON/OFF sequence select ALL ICR POWER ON

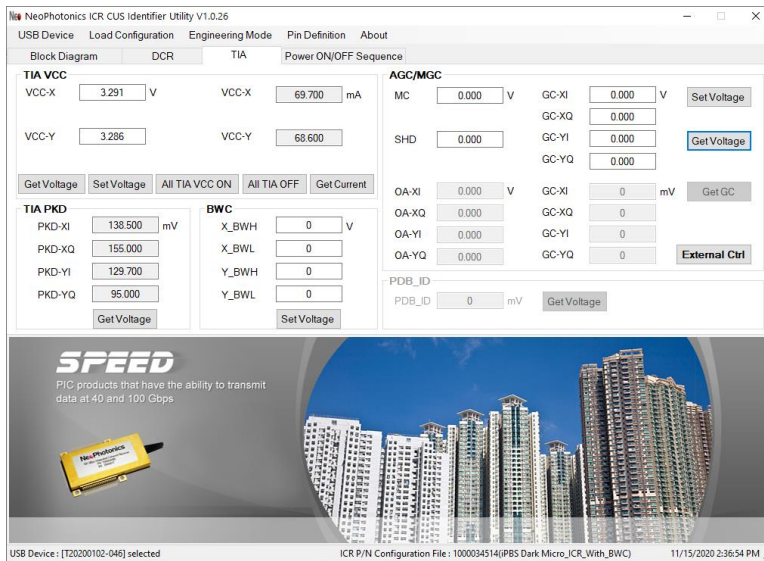


- On the DCR page, get all currents. For no light coming into the device the following results are expected (essentially no current):



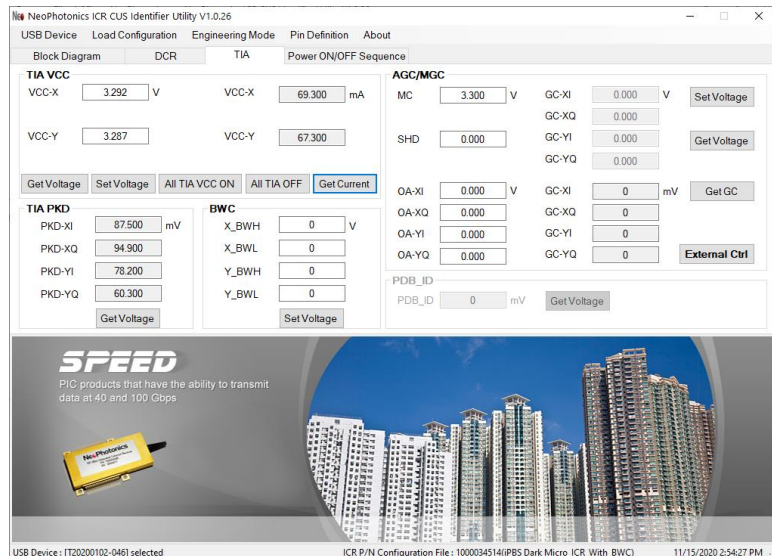
POINT OF ATTENTION. On this page you can set the VOA voltage. Typically, VOA-V2 is set to 0. VOA-V1 needs to be around 4V to be transparent. If no voltage is applied, all light on the signal input path is attenuated

- On the TIA page get all currents and voltages. The following is expected:



POINT OF ATTENTION. On this page you can set the AGC/MGC. With Automatic Gain Control (MC=0V), you can set the Output Amplitude. With Manual Gain Control (MC=3.3V) you can set the gain. Both settings are in a range of 0-3.3V. In the default, the voltages are set to 0V, which means that the TIA will target 0V output or 0 gain. Clearly these values need to be set to a higher value. Note that the MC is a digital input (so it should be 0V or 3.3V).

- See below image for set to MGC (3.3V), with OA settable and GC inputs disabled.



POINT OF ATTENTION. On this page you can set the SHD pin. With this digital pin high (SHD=3.3V) the TIAs are working. With 0V the TIAs are shutdown.

- See below image with the SHD voltage set to 3.3V.

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USB Device Load Configuration Engineering Mode Pin Definition About

Block Diagram DCR TIA Power ON/OFF Sequence

TIA VCC

VCC-X 3.292 V VCC-X 145.300 mA

VCC-Y 3.287 V VCC-Y 145.200 mA

Get Voltage Set Voltage All TIA VCC ON All TIA OFF Get Current

TIA PKD

PKD-XI 87.500 mV

PKD-XQ 94.900 mV

PKD-YI 78.200 mV

PKD-YQ 60.300 mV

Get Voltage

BWC

X_BWH 0 V

X_BWL 0

Y_BWH 0

Y_BWL 0

Set Voltage

AGC/MGC

MC 0.000 V GC-XI 0.000 V Set Voltage

GC-XQ 0.000

SHD 3.300 GC-YI 0.000 Get Voltage

GC-YQ 0.000

OA-XI 0.000 V GC-XI 0 mV Get GC

OA-XQ 0.000 GC-XQ 0

OA-YI 0.000 GC-YI 0

OA-YQ 0.000 GC-YQ 0 External Ctrl

PDB_ID

PDB_ID 0 mV Get Voltage

SPEED

PIC products that have the ability to transmit data at 40 and 100 Gbps

USB Device: [T20200102-046] selected ICR P/N Configuration File: 1000034514(PBS Dark_Micro_ICR_With_BWC) 11/15/2020 2:53:24 PM

NeoPhotonics ICR CUS Identifier Utility V1.0.26

USB Device Load Configuration Engineering Mode Pin Definition About

Block Diagram DCR TIA Power ON/OFF Sequence

TIA VCC

VCC-X 3.292 V VCC-X 144.400 mA

VCC-Y 3.287 V VCC-Y 144.400 mA

Get Voltage Set Voltage All TIA VCC ON All TIA OFF Get Current

TIA PKD

PKD-XI 85.900 mV

PKD-XQ 93.900 mV

PKD-YI 76.600 mV

PKD-YQ 59.400 mV

Get Voltage

BWC

X_BWH 0 V

X_BWL 0

Y_BWH 0

Y_BWL 0

Set Voltage

AGC/MGC

MC 0.000 V GC-XI 0.000 V Set Voltage

GC-XQ 0.000

SHD 3.3 GC-YI 0.000 Get Voltage

GC-YQ 0.000

OA-XI 0 V GC-XI 0 mV Get GC

OA-XQ 0 GC-XQ 0

OA-YI 0 GC-YI 0

OA-YQ 0 GC-YQ 0 External Ctrl

PDB_ID

PDB_ID 0 mV Get Voltage

SPEED

PIC products that have the ability to transmit data at 40 and 100 Gbps

USB Device: [T20200102-046] selected ICR P/N Configuration File: 1000034514(PBS Dark_Micro_ICR_With_BWC) 11/15/2020 2:52:37 PM

2. Inserting about 1mW into the signal line

- The readings are as below, with VOA voltage 0V (MPD reading is high and PD reading is increased but very low):

The screenshot shows the software interface with the following data:

PD	PD Bias (V)	PD Current (µA)
PD-Xlp	4.700	0.0204569
PD-Xln	4.700	0.0202040
PD-XQp	4.700	0.0193026
PD-XQn	4.700	0.0221189
PD-Ylp	4.700	0.0355848
PD-Yln	4.700	0.0366077
PD-YQp	4.700	0.0376848
PD-YQn	4.700	0.0295588

MPD	MPD Bias (V)	MPD Current (nA)
MPD Bias	4.7	20718.510

VICR-VOA	VOA - V1 (V)	VOA - V2 (V)
VOA - V1	0	0
VOA - V2	0	0

TMON	TMON (V)	TMON (µA)
TMON	3	0

V1 Current (mA)	V2 Current (mA)
V1 Current	0.100
V2 Current	0.100

- After setting the VOA to 4V (all the PDs show significant current):

The screenshot shows the software interface with the following data:

PD	PD Bias (V)	PD Current (µA)
PD-Xlp	4.700	150.5464000
PD-Xln	4.700	146.6311000
PD-XQp	4.700	146.7169000
PD-XQn	4.700	145.2179000
PD-Ylp	4.700	4.4284020
PD-Yln	4.700	4.2489860
PD-YQp	4.700	4.3144920
PD-YQn	4.700	4.2130180

MPD	MPD Bias (V)	MPD Current (nA)
MPD Bias	4.7	56739.160

VICR-VOA	VOA - V1 (V)	VOA - V2 (V)
VOA - V1	4	0
VOA - V2	0	0

TMON	TMON (V)	TMON (µA)
TMON	3	0

V1 Current (mA)	V2 Current (mA)
V1 Current	46.000
V2 Current	0.000

3. Inserting about 1mW into the LO line

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USB Device: [T20200102-046] selected

ICR P/N Configuration File: 1000034514(PBS Dark Micro_ICR_With_BWC)

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PD	PD Bias	PD Current
PD-Xlp	4.700	96.8694500 μ A
PD-Xln	4.700	99.3025400
PD-XQp	4.700	100.8922000
PD-XQn	4.700	100.2553000
PD-Ylp	4.700	92.5155900
PD-Yln	4.700	94.2358000
PD-YOp	4.700	96.1589000
PD-YQn	4.700	96.4206700

MPD Bias: 4.7 V, 7.532 nA

VICR-VOA: VOA-V1: 0 V, VOA-V2: 0 V

V1 Current: 0.100 mA, V2 Current: 0.000

TMON: 3 V, 0 μ A

- And with the VOA on (no impact on power levels):

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USB Device: [T20200102-046] selected

ICR P/N Configuration File: 1000034514(PBS Dark Micro_ICR_With_BWC)

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PD	PD Bias	PD Current
PD-Xlp	4.700	96.8694500 μ A
PD-Xln	4.700	99.7829100
PD-XQp	4.700	101.2500000
PD-XQn	4.700	100.3580000
PD-Ylp	4.700	92.4926500
PD-Yln	4.700	94.2014500
PD-YOp	4.700	96.2163900
PD-YQn	4.700	96.5803900

MPD Bias: 4.7 V, 7.272 nA

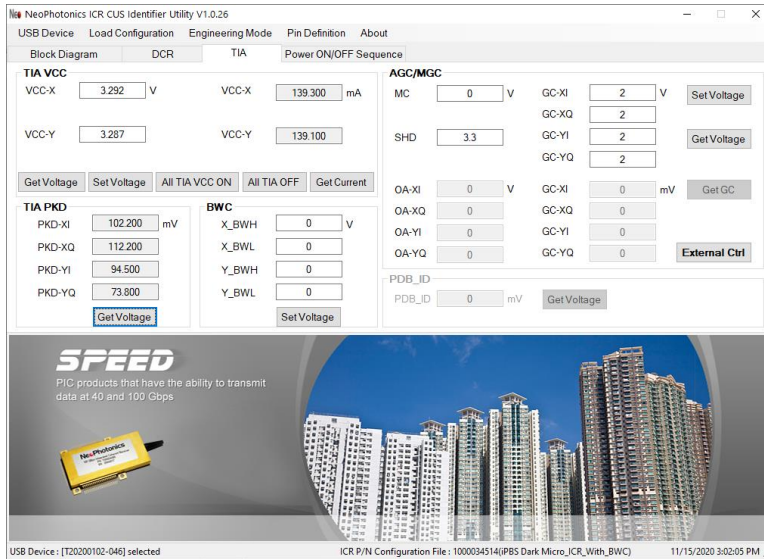
VICR-VOA: VOA-V1: 4 V, VOA-V2: 0 V

V1 Current: 46.100 mA, V2 Current: 0.000

TMON: 3 V, 0 μ A

4. Examples

Below is an example how a functional TIA page could look like (see the gain control setting not equal to 0 and the SHD set to 3.3V).



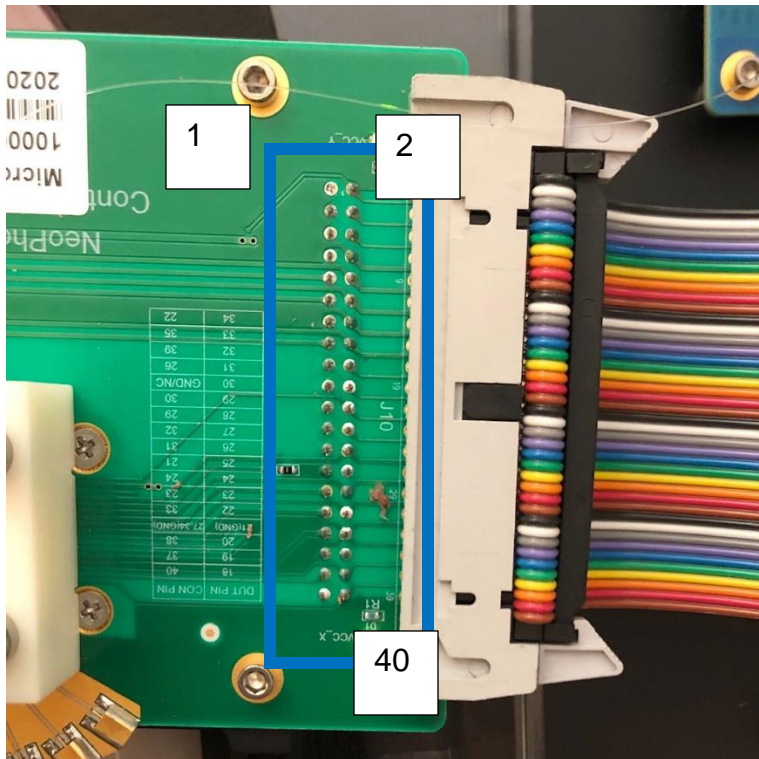
5. Trouble Shooting

In normal operation:

Micro-ICR:

Use pin 8 on the daughterboard as the GND reference. Voltage on pin 7 is 0, Voltage on pin 13 is 3.3V, Voltage on pin 28 is 0V, Voltage on pin 33 is 3.3V. As the micro-ICR does not have a separate supply for I and Q direction, pin 7 and pin 28 is not used and the associated voltage supplies are de-activated.

Probepoints are the in the below picture. Upper left is pin 1, Lower right is pin 40



Below some different settings:

- MC set to 2V; OA set to different values; Picture both with SHD ON and OFF.

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USB Device Load Configuration Engineering Mode Pin Definition About

Block Diagram DCR TIA Power ON/OFF Sequence

TIA VCC

VCC-X 3.292 V VCC-X 139.600 mA

VCC-Y 3.287 V VCC-Y 139.200 mA

Get Voltage Set Voltage All TIA VCC ON All TIA OFF Get Current

TIA PKD

PKD-XI 128.200 mV

PKD-XQ 139.100 mV

PKD-YI 119.700 mV

PKD-YQ 98.600 mV

Get Voltage

BWC

X_BWH 0 V

X_BWL 0

Y_BWH 0

Y_BWL 0

Set Voltage

AGC/MGC

MC 2.0 V GC-XI 0 V Set Voltage

GC-XQ 0

SHD 3.3 GC-YI 0 Get Voltage

GC-YQ 0

OA-XI 1 V GC-XI 3176.100 mV Get GC

OA-XQ 0 GC-XQ 3181.600

OA-YI 1 GC-YI 3173.700

OA-YQ 0 GC-YQ 3168.600 External Ctrl

PDB_ID

PDB_ID 0 mV Get Voltage

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NeoPhotonics ICR CUS Identifier Utility V1.0.26

USB Device Load Configuration Engineering Mode Pin Definition About

Block Diagram DCR TIA Power ON/OFF Sequence

TIA VCC

VCC-X 3.292 V VCC-X 69.700 mA

VCC-Y 3.287 V VCC-Y 67.700 mA

Get Voltage Set Voltage All TIA VCC ON All TIA OFF Get Current

TIA PKD

PKD-XI 152.500 mV

PKD-XQ 168.200 mV

PKD-YI 146.300 mV

PKD-YQ 110.400 mV

Get Voltage

BWC

X_BWH 0 V

X_BWL 0

Y_BWH 0

Y_BWL 0

Set Voltage

AGC/MGC

MC 2.0 V GC-XI 0 V Set Voltage

GC-XQ 0

SHD 0 GC-YI 0 Get Voltage

GC-YQ 0

OA-XI 1 V GC-XI 3207.800 mV Get GC

OA-XQ 0 GC-XQ 21.100

OA-YI 1 GC-YI 3205.600

OA-YQ 0 GC-YQ 3204.100 External Ctrl

PDB_ID

PDB_ID 0 mV Get Voltage

USB Device: [T20200102-046] selected ICR P/N Configuration File: 1000034514(PBS Dark Micro_ICR_With_BWC) 11/15/2020 3:16:06 PM