
NI-DAQ™
DAQ 어시스턴트



DAQ

2008 1, 370467L-0129

DAQ , , .
NI LabVIEW 7.x , NI LabWindows™/CVI™ 7.x , NI
Measurement Studio 7.x , DAQ
NI-DAQmx . DAQ NI LabVIEW SignalExpress 2. x

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 , , .
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- *DAQ* — NI-DAQmx (DAQ)
- *LabVIEW* — LabVIEW , , , VI, LabVIEW LabVIEW
- *LabWindows/CVI Help*—LabWindows/CVI Help :
 - **Using LabWindows/CVI**— , , ,
 - **Library Reference**— LabWindows/CVI
 - **Programmer Reference**—LabWindows/CVI
 - **Example Programs**—LabWindows/CVI
 - **Tools Library**—LabWindows/CVI

LabWindows/CVI **Help>>Contents** .

- *NI-DAQmx Measurement & Automation Explorer* — NI-DAQmx Measurement & Automation Explorer (MAX) DAQ , SCXI , PXI , SCC , , RTSI OS . MAX **DAQmx** .
- *NI Measurement Studio Help*— Microsoft Visual C++, Visual Basic, .NET platform Measurement Studio . Visual Studio .NET **Help>>Contents** .
- *NI-DAQmx* — NI-DAQmx . NI-DAQmx NI . >> >>**National Instruments>>NI-DAQ** .
- *LabVIEW NI-DAQmx* — DAQ LabVIEW 7. x NI-DAQmx . DAQ , , . DAQ . *LabVIEW LabVIEW NI-DAQmx* .

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(Windows)

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- — .
- — .

(Windows)

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, (*) (?) . .
, "prog*" "program", "programmatically", "progress"
. . , "?ext" "next", "text"
.

, " AND (OR VI) " " " VI" .

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• **AND()**— .

• **OR**— .

• **NOT**— .

• **NEAR**— 8 .

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• — . ,

"program" "programs", "programming" .

• — .

(Windows)

- 0.
- 1. 0 .
- 2. .
- 3. .
- 4.  .
- 4. **OK** .

PDF

PDF . PDF , Adobe Acrobat Viewer

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DAQ , __, . LabVIEW, LabVIEW
SignalExpress, LabWindows/CVI, Measurement Studio
DAQ . MAX DAQ .

DAQ :

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- NI
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LabVIEW, LabWindows/CVI, Measurement Studio 7. x , LabVIEW
SignalExpress 2. x DAQ .

NI-DAQ
NI-DAQmx MAX NI DAQ
NI-DAQmx DAQ *Measurement & Automation Explorer*
NI-DAQmx API Traditional
NI-DAQ (Legacy) MAX

NI-DAQmx , , .

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NI-DAQmx .

. MAX

MAX . .

, .

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LabVIEW 8.0 , LabVIEW

DAQ

DAQ [_____](#) . NI

LabVIEW , *LabWindows/CVI Help* ,
Measurement Studio Help , [NI-DAQmx](#) .

DAQ

NI MAX DAQ . DAQ

. DAQ ,, , .

DAQ _____ .

DAQ :

- [LabVIEW](#)
- [LabWindows/CVI](#)
- [Measurement Studio](#)
- [MAX](#)

[LabVIEW SignalExpress](#) DAQ DAQ

.

LabVIEW DAQ

DAQ :

- DAQmx . **DAQmx**
- LabVIEW 8.0 MAX
- LabVIEW 7.x LabVIEW **Configure** **Create**
New Task (DAQ Assistant) .

- DAQ VI . VI VI .



DAQ VI
MAX .

DAQmx . DAQ VI .
LabVIEW DAQ VI

- LabVIEW 7.x >> **NI-DAQmx** .

LabVIEW LabVIEW *LabVIEW*
NI-DAQmx .

LabVIEW LabVIEW .

DAQ , .

LabWindows/CVI DAQ

DAQ **Tools>>Create/Edit DAQmx Tasks .**

Create/Edit DAQmx Tasks MAX

LabWindows/CVI . LabWindows/CVI

_____ MAX . MAX

LabWindows/CVI Help .

 DAQmxLoadTask **Task Name** **New Task**

LabWindows/CVI MAX .

DAQ , .

MAX DAQ

DAQ :

1. LabVIEW Real-Time
2. NI-DAQmx
3. DAQ
- 4.
5. MAX



MAX
DAQ

Measurement Studio DAQ

Measurement Studio DAQmx DAQmx

. Measurement Studio _____ MAX .

DAQmx :

1. DAQmx .
2. **Project>>Add New Item** .
3. Categories **Measurement Studio>>Assistants** .
4. Templates **DAQmx Task** .
5. DAQmx **Open** . .
6. DAQmx MAX



MAX

7. . DAQ .

DAQ .mxib . .mxib DAQmx

. DAQ NI .

DAQ :



LabWindows/CVI Measurement Studio MAX

1. MAX

LabVIEW Real-Time

2. **NI-DAQmx** . DAQ .

LabVIEW, LabWindows/CVI, Measurement Studio 7. x
DAQ :

- LabVIEW LabVIEW Real-Time DAQmx
DAQ .
- LabVIEW 8.0 LabVIEW
MAX .



3. LabVIEW 7.x **Configure Create DAQmx Channel
(DAQ Assistant)** .

4. LabWindows/CVI Measurement Studio
. DAQ **DAQmx** .
MAX .

5. .

6. .

- LabVIEW LabWindows/CVI DAQ .
- Measurement Studio DAQ .>>
- MAX DAQ .



LabVIEW SignalExpress DAQ

DAQ LabVIEW SignalExpress DAQ .

LabVIEW SignalExpress DAQ :

1. **Add Step** .
2. **Acquire Signals**»**DAQmx Acquire** **Generate**
Signals»**DAQmx Generate** .
3. Analog Input I/O .
4. Voltage .
5. **Configuration** DAQ . . .

DAQ . . .

1. I/O .

2. . _____ ,

3. . .

3. , .

4. . .

5. . .

TESD , **TEDS** . . DAQ



5. . . _____ .

6. , , , . TEDS

, TEDS .

7. . .



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<Ctrl> .

<Shift> .

TEDS .

I/O .

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NI-DAQmx

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1. .
2. **NI-DAQmx** .
3. .
4. .
5. .
. DAQ ID ID
6. .

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I/O .
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- NI-DAQmx 7.4 , , .

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- , , _Dev1

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- 256 .

LabVIEW

DAQ LabVIEW MAX
. DAQ .
MAX .
, DAQ I/O MAX .

MAX LabVIE

NI MAX .

LabVIEW

MAX :

1. DAQmx DAQmx .
2. .
3. DAQmx DAQmx .
4. DAQ .
5. .

LabVIEW SignalExpress

LabVIEW SignalExpress 2.5 MAX MAX
DAQ . MAX , LabVIEW
SignalExpress MAX .
. , LabVIEW SignalExpress
.

LabWindows/CVI

MAX .

Tools>>Create/Edit DAQmx Tasks .
Neighborhood>>NI-DAQmx Tasks MAX MAX

Measurement Studio

MAX MAX .
 .mxb DAQ .

MAX

MAX DAQ :

1. .
2. **NI-DAQmx** **NI-DAQmx** .
3. .
4. DAQ .
5. .



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- :
- 1. .
- 2. .
- 3. .
- .
- .
- 4. .
- 5. .

DAQ _____

NI-DAQmx

NI-DAQmx .
(, RTD,)

NI-DAQmx

NI-DAQmx ,
NI-DAQmx .

NI-DAQmx .

NI-C

:

1. :
 - **DAQ** — .
 - **MAX**— .
 - **NI-DAQmx** .
 - **LabVIEW—DAQmx** .
 - **(DAQ)** .
2. .
3. .
4. **DAQ** .
5. **MAX** .

LabVIEW— :


1. DAQmx .
2. .
3. (DAQ) .
4. DAQ .
5. .

MAX— :

1. .
2. .
3. DAQ .
4. .

DAQ MAX

. . . :

- **MAX**—
- **LabVIEW**— .
 DAQ VI
MAX . MAX
DAQ VI NI-DAQmx .
- **LabWindows/CVI**—OK .
- **Measurement Studio**—File»Save .

MAX NI .

 LabVIEW SignalExpress MAX

MAX _____ .

LabVIEW 7.x , LabWindows/CVI 7. x ,

Measurement Studio 7.x , _____

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LabVIEW , LabWindows/CVI Help,
Measurement Studio Help, NI-DAQmx . LabVIEW
SignalExpress DAQ *LabVIEW SignalE.*



LabWindows/CVI Measurement Studio

LabVIEW

:

1. DAQmx DAQmx .

2. .

.

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LabVIEW SignalExpress

MAX LabVIEW SignalExpress 2.5

Tools»Import Task from MAX .



LabVIEW SignalExpress

LabVIEW SignalExpress DAQ

1. **Virtual** . Virtual

2. . .

LabWindows/CVI

:

1. DAQmxLoadTask .
2. **Task Name** <Enter> . .
3. .

Measurement Studio

Project»Add New Item :

- MAX DAQmx Task Add New Item .
 - Visual C++ DAQmxUserCode MAX DAQmxUserCode Add New Item .
 - .NET DAQmxUserControl MAX DAQmxUserControl Add New Item .
- MAX .

DAQ VI NI-DAQmx

DAQ VI .

MAX DAQ VI NI-DAQmx



LabVIEW DAQ VI

DAQ VI NI-DAQmx .

1. DAQ VI

NI-DAQmx

2. DAQ , .

3. **OK** .

4. NI-DAQmx DAQ .

. , ,
.
DAQ Assistant .

1. .
2. DAQ .
3. . .
4. .

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.
. DAQ

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. .

/ .

NI 7.x , .
LabVIEW 7.x , LabVIEW SignalExpress 2. x ,
LabWindows/CVI 7.x , Measurement Studio 7.x
, MAX . LabVIEW 7.x
. .
DAQ .

NI

- — VI, VI, ,

NI-DAQmx .

- — .



»National Instruments DAQmx .

DAQ . DAQ .
DAQ .



NI-DAQmx .

- — LabVIEW .



DAQ VI

NI-DAQmx

DAQ

NI .

- [LabVIEW](#)
- [LabVIEW SignalExpress](#)
- [LabWindows/CVI](#)
- [Measurement Studio](#)

LabVIEW

LabVIEW DAQ

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LabVIEW .

_____ .

- — VI .
- —I/O / , ,
VI subVI .



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NI-DAQmx .

LabVIEW

:

1. DAQmx DAQmx .
2. .
3. , , >> .

DAQ VI LabVIEW

DAQ VI VI
. DAQ VI .



DAQ VI MAX .
VI NI-DAQmx MAX .

NI-DAQmx

DAQ

LabVIEW SignalExpress

LabVIEW SignalExpress , LabVIEW SignalExpress

LabVIEW . LabVIEW SignalExpress VI

LabVIEW SignalExpress Help .

LabVIEW SignalExpress DAQ , LabVIEW DAQ

VI .

LabVIEW SignalExpress VI :

- DAQ .
- DAQ .
- DAQ .
- DAQ .

, VI LabVIEW SignalExpress

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LabWindows/CVI

LabWindows/CVI DAQ

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LabWindows/CVI .

- **Example**— .
- **Configuration**—DAQmxLoadTask DAQ



NI-DAQmx .

LabWindows/CVI

LabWindows/CVI :

1. DAQmxLoadTask .
2. **Generate DAQ Example Code** .
3. .
4. **OK** .

. LabWindows/CVI

.

. DAQ

. 2
(.mxb) DAQ 2 . DAQ

.

Copy DAQ Task To Project MAX

DAQmxLoadT

. :

-
- DAQmxLoadTask
- include .

Measurement Studio

Measurement Studio DAQ

.



Measurement Studio

- **Example**—
- **Configuration**—DAQmxLoadTask DAQ



NI-DAQmx

Measurement Studio

. . . .
.mx b
.
 . DAQ DAQmx .mx b .
 , .mx b . DAQ ,
 DAQmx . .mx b

NET DAQmx

DAQmx .cs .vb .
.mx b .
.cs .vb :

- 1. Solution Explorer **Show All Files** .
- 2. Solution Explorer .mx b .
- 3. .cs .vb **View Code** .
.mx b DAQ .mx b **CustomTool** .

💡 .mx b . Solution Explorer (**View>>Properties**
Window) .

Visual C++ DAQmx

DAQmx .h .cpp . .mx b

Measurement Studio Add-In .mx b . Visual C++
.mx b add-in DAQ .mx b .
Measurement Studio *NI Measurement*
Studio Help .

DAQ HTML .

MAX NI-DAQmx .

DAQ

HTML .

DAQ .

. .

HTML HTML .

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-
-
-
-

HTML HTML .

. Microsoft Internet Explorer HTML .

MIO SCXI :

- CB-11
- CB-27
- CB-37FH
- CB-37FV
- CB-50
- CB-68LP
- CB-68LPR
- CB-C68
- DAQPad-6015/6016
- PXI-4204
- PXI-4220
- SCB-100
- SCB-68
- SCXI-1300, 1303, 1304, 1308, 1313, 1314, 1314T, 1315, 1317, 1320, 1321, 1322, 1327, 1328, 1338
- TB-2705
- TB-2706
- TB-2725
- TBX-68

MAX

DAQ _____, MAX NI-DAQmx

. :

- , , , ,

- , , ,

-

-

MAX .

:

- **DC** — ,

- — AC . ,

:

1. .
2. . () .



SCXI-1124 .
. , SUPPLY ISINK . , ISINK GND

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.
.
.
.
(CSA, charge-sensitive
amplifier) .
(CSA) .
.
AC DC .
AC .


)

—

,

, .

AC .
(-) .

 SCXI-1126 (-) -0.5 4.48

.
.
.
DC .
DC .

RVDT

transformer (RVDT) _____ .
RVDT LVDT $\pm 30^\circ \sim 70^\circ$.
360° .
RVDT .
10ms .
, RVDT .

Rotary varia

(ser

RVDT

70°

(Ohm's Law) :

$$I_{(A)} = V_{(V)} / R_{(\Omega)}$$

I , V , R .

4–20 mA

4 mA 20 mA

— .

, (load cells), NI-DAQmx
. SCXI
, .
NI-DAQmx , .
NI-DAQmx , , AI
DAQmx .

LVDT

Linear-voltage differential transf

(LVDT) LVDT
LVDT

(demodulate)

DC

LVDT 4 () 5 ()
4 5

. 1 ohm

1 V 1 ampere .

$$\frac{2}{2} \frac{4}{100 \Omega} .$$

:

$$R = V/I$$

$$R = , \quad V = , \quad I = .$$

(Pa) .

0 dB , 60 70 dB ,
110 dB , 150 dB .

(SPL LP) :

$$\text{SPL} = 20 \log_{10} (p/p_{\text{ref}})$$

$$p \text{ Pa} \quad p_{\text{ref}} 20 \mu\text{Pa} .$$

.

_____ .

AC DC .
AC .

. .
0 0 . .
($\mu\epsilon$) .

, .
.
— Wheatston .

- 1. .
- 2. . :
- ▶
- ▶
- 3. .
- 4. . .
- ▶
- ▶ — .
- ▶ — :
- 5. :
-
-
- / . .
- 6. . .
-



SCXI-1314 SCXI-1520, PXI-4220, SCXI-1321 SCXI-1121, SCXI-1322 SCXI-1122 ,

_____ .

SCXI-1520 (SCXI-1314), PXI-4220

—
AI.Bridge.Balance.CoarsePot AI.Bridge.Balance.FinePot .

AI.Bridge.Initi

SCXI-1121 (SCXI-1321)

—SCXI-1321 .

AI.Bridge.InitialVoltage .

SCXI-1122 (SCXI-1322)

—
AI.Bridge.InitialVoltage .

- () .
- .
- . . .
- , .
- . . .
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- , (
-).
- , .
- .
- .

	<ul style="list-style-type: none">
	<ul style="list-style-type: none"> . (). . .
	<ul style="list-style-type: none"> . . .
	<ul style="list-style-type: none"> . ().

RTD , RTD
(2,000 10,000 Ω), (~200 Ω/°C). 300° C

RTD 2 .

NI-DAQmx - :

$$\frac{1}{T} = A + B(\ln(R)) + C(\ln(R))^3$$

T Kelvins , R , A, B, C .

•
•
•
•

— •

RTD . RTD
(2,000 10,000 Ω), (~200 Ω/°C). 300° C

. RTD 2 .

NI-DAQmx - :

$$\frac{1}{T} = A + B(\ln(R)) + C(\ln(R))^3$$

T Kelvins , R , A, B, C .

RTD

RTD .

RTD . RTD

. RTD ,

. RTD DAQ .

. — DC AC.

DC ,, .

AC ,, . AC .

DAQ . :

0

0

0

0

0

DAQ

.

NI-DAQmx

E M TTL(-)- .TTL

:

- = 0 V +0.8 V
- = +2 V +5 V

.

0

DAQ

NI-DAQmx

E M TTL(-)- .TTL

:

- = 0 V +0.8 V
- = +2 V +5 V

0

DAQ

E M TTL(-)- . TTL

= 0 V +0.8 V

= +2 V +5 V

LED .

0

DAQ

E M TTL(-)- . TTL

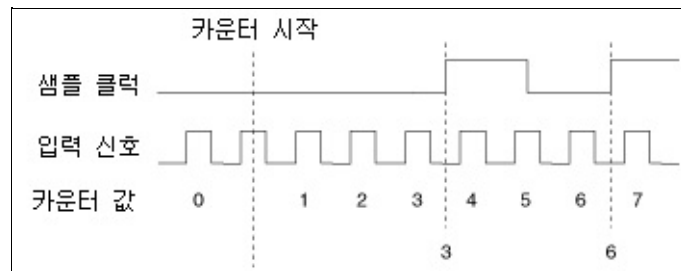
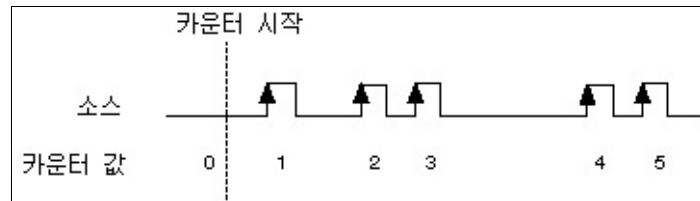
:

- = 0 V +0.8 V
- = +2 V +5 V

LED .

— ()
()

,
/M



. /TTL .
() ().

, , .

:

- — .
- — (5 V) .
- — (0 V) .

DAQ

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NI-DAQmx

$$(Hz) = \quad /$$

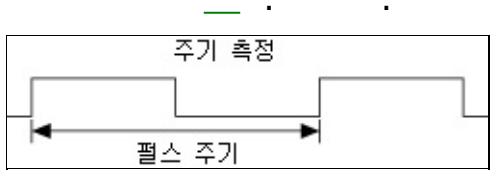
100 MHz 500
200kHz.

(20 MHz 100 kHz)

NI-DAQmx

$$\frac{\quad}{\quad} - 2 () \quad 2 ()$$

NI-DAQmx



:

$$0 = 1$$

ticks .

(20 MHz 100 kHz) .

NI-DAQmx

—2 ()
 . NI-DAQmx

2 () .

NI-TIO



() .

90° A B .

/ .
Z / .
Z Z Z / .
VI/ .
/VI .

NI-TIO

Z A B

NI-TIO



X1, X2, X4

()

90° A B

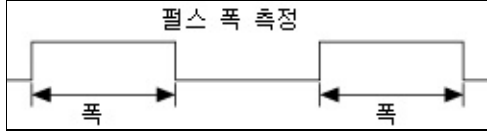
NI-TIO

Z /
Z Z Z /

Z A B

VI/

VI



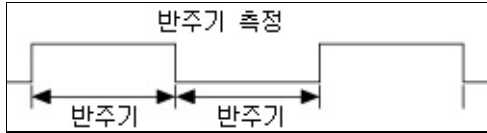
:

$$() = /$$

ticks .

(20 MHz 100 kHz) .

NI-DAQmx



:

$$f = \frac{1}{T} \text{ (Hz)}$$

ticks .

(20 MHz 100 kHz) .

. NI-DAQmx

.

, .

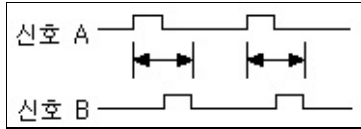
. , , ,

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(B) .

_____ (A)



:

$0 = 1 \text{ (Hz)}$
ticks .

NI-DAQmx .

TTL .

.

TTL

/ NI-DAQmx

0

/VI

() = /

(Hz) = /



0

TTL

NI-DAQmx

0
24 100 kHz , 0.006
Hz 50 kHz. 4 0.024 Hz 200 kHz .

:

= /

= /



0

/ A-Z

n	nano	10^{-9}
μ	micro	10^{-6}
m	milli	10^{-3}
k	kilo	10^3
M	mega	10^6

%	
+	
-	
Ω	
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RVDT

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I/O

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I/O .

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FIFO .

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(, 0 +10 V).

(DAQ) 1. , , .
2. .

1. — .
2. — VI .

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1. I/O .
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2. DAQ — .

TTL. ..

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· , 8 8 ·
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DAQ SCXI
SCXI . .

4 KB . .
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SCXI PXI . .
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. I/O . PC ISA PCI .

LabVIEW .

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ADC / .

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ADC .

SCXI .

. . .

1. — .

2. — VI .

() (FSR) .

ADC DAQ . ADC DAQ ,
ADC DAQ .

. 20 1 .

NI-DAQmx . /VI .

10% 90% .

. , .
. , 10 S/s .

. , M ADC
. ADC
. S ().

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MAX .
(, , , , ,) .

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() () .

. NI-DAQmx OS .

VI .

TEDS EEPROM .

TEDS

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I/O . , . I/O , 2 3

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. .
. , (TTL) .
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(, -5 V +5 V).

I/O I/O .

TTL . , , .

OS .

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LabVIEW .

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AO

I/O

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I/O .
I/O I/O .
() .
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1. — . 8
2. — , , , , . () ()
 NI-DAQmx . Traditional NI-DAQ (Legacy)
 , NI-DAQmx . Traditional NI-DAQ (Legacy) MAX .
 NI-DAQmx , MAX .
3. — . (1, 2, 4) .
 . NI-DAQmx VI .

M I/O (MIO) , SCXI , DAQ .

/ . 16 48() . 2

, .
DAQ .

N. N .

NI-DAQmx , , ,

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() () DAQ .

, $N-2$ $N-1$. $N-0$

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I/O — I/O .

() () .

. 8 32 . E 8

. , E 8 ,
8.

I/O

DIP . .

TEDS . TEDS TEDS TEDS

(floating)

A-Z

ADC	— (Analog-to-digital Converter)— .
ADE	(Application Development Environment)— LabVIEW LabWindows/CVI.
AI	— .
AO	— .
API	(Application Programming Interface)— , VI, , .
BIOS	(Basic Input/Output System)—BIOS PC . BIOS .
C	, , , / . C CompactDAQ, CompactRIO, USB-9 xxx .
cDAQ	NI cDAQ-9172 CompactDAQ .
CH	.
CMRR	(Common-mode Rejection Ratio)— , (dB) .
CompactDAQ C	.
DAC	- (Digital-to-analog Converter)— .
DAQ	— .
DAQ	. DAQ , PCMCIA , USB 1394(FireWire) DAQPad . SCXI DAQ .
DAQ	, , .
dB	— : $\text{dB}=20\log_{10} V_1/V_2$
DC	.
DIO	/
DMA	(Direct Memory Access)— .
DSUB	D- (D-subminiature Connector)
DUT	(Device Under Test)— .
E	, .
FIFO	(First In First Out) . FIFO ADC DAC .
hex	16— 16 .
Hz	— .
I/O	/— , , , .
IEEE P1451	IEEE . TEDS .
IEEE P1451.4	IEEE . TEDS , EEPROM .
IRQ	.
ISA	Industry Standard Architecture— PC .
LED	(Light-emitting Diode)— .

LSB (Least Significant Bit)— A/D D/A
 LVDT Linear-voltage Differential Transformer— LVDT
 AC
 0
 M
 MAX Measurement & Automation Explorer— National Instruments
 MIO I/O(Multifunction I/O)— , I/O , , ()
 MIO
 MIO
 NI-DAQ NI NI-DAQ NI
 LabVIEW (ADE) VI
 NI-DAQ 7.x NI-DAQ NI-DAQmx Traditional NI-DAQ (Legacy) API,
 NI-DAQmx VI, , NI-DAQ NI-DAQ NI-DAQmx
 LabVIEW, LabWindows/CVI, Measurement Studio
 DAQ ; I/O ; API NI-DAQ
 VI DAQ
 NI-DAQmx MAX **NI-DAQmx** NI-
 DAQmx
 NRSE (Nonreferenced Single-ended Mode)—(NRSE)
 PCI Peripheral Component Interconnect—ISA EISA PCI
 PC , 132 Mbytes/s
 PCMCIA PCMCIA Personal Computer Memory Card
 International Association
 PFI Programmable Function Interface— ,
 I/O
 PID Proportional Integral Derivative— , , ,
 PWM
 PXI PCI eXtensions for Instrumentation— , , CompactPCI
 PXI 1997 National Instruments PXI Systems Alliance
 PXI PXI PXI DAQ PCI DAQ
 RTSI
 RSE (Referenced Single-ended Mode)—
 RTD (Resistance Temperature Detector)—
 RTSI Real-Time System Integration — DAQ National
 Instruments PCI DAQ PXI
 RVDT Rotary Variable Differential Transformer—
 (s)
 S

S/s — .

SCC Signal Conditioning Component— DAQ I/O .

SCXI Signal Conditioning eXtensions for Instrumentation—
PC National Instruments . SCXI .

STC

TCR (Temperature Coefficient of Resistance)—0 °C 100 °C (°C)

TEDS Transducer Electronic Data Sheet— IEEE 1451.4 .
 . , TEDS ID, , .
 TEDS . IEEE 1451.4- TEDS
www.ni.com/png .

TEDS I TEDS . I
 TEDS . (1 2)
 Maxim/Dallas Semiconductor 1-Wire .

TEDS II TEDS TEDS .
 , TEDS , RTD, . (1 2)
 Maxim/Dallas Semiconductor 1-Wire .

Tick .

Traditional NI-DAQ . Traditional NI-DAQ (Legacy) NI-DAQ 6.9. x VI
 . Traditional NI-DAQ (Legacy) NI-DAQmx .

TTL - (Transistor-transistor Logic)— , .

USB DAQ , , / USB . NI USB-9201, NI USB-
 9211, NI USB-9215, NI USB-9221, NI USB-9233, NI USB-9237 .
 USB DAQ .

V

VI — .

VISA (Virtual Instrumentation Software Architecture).

WDT — .

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