AD5436

Universal System Controller Maximum control cycle ※25μs
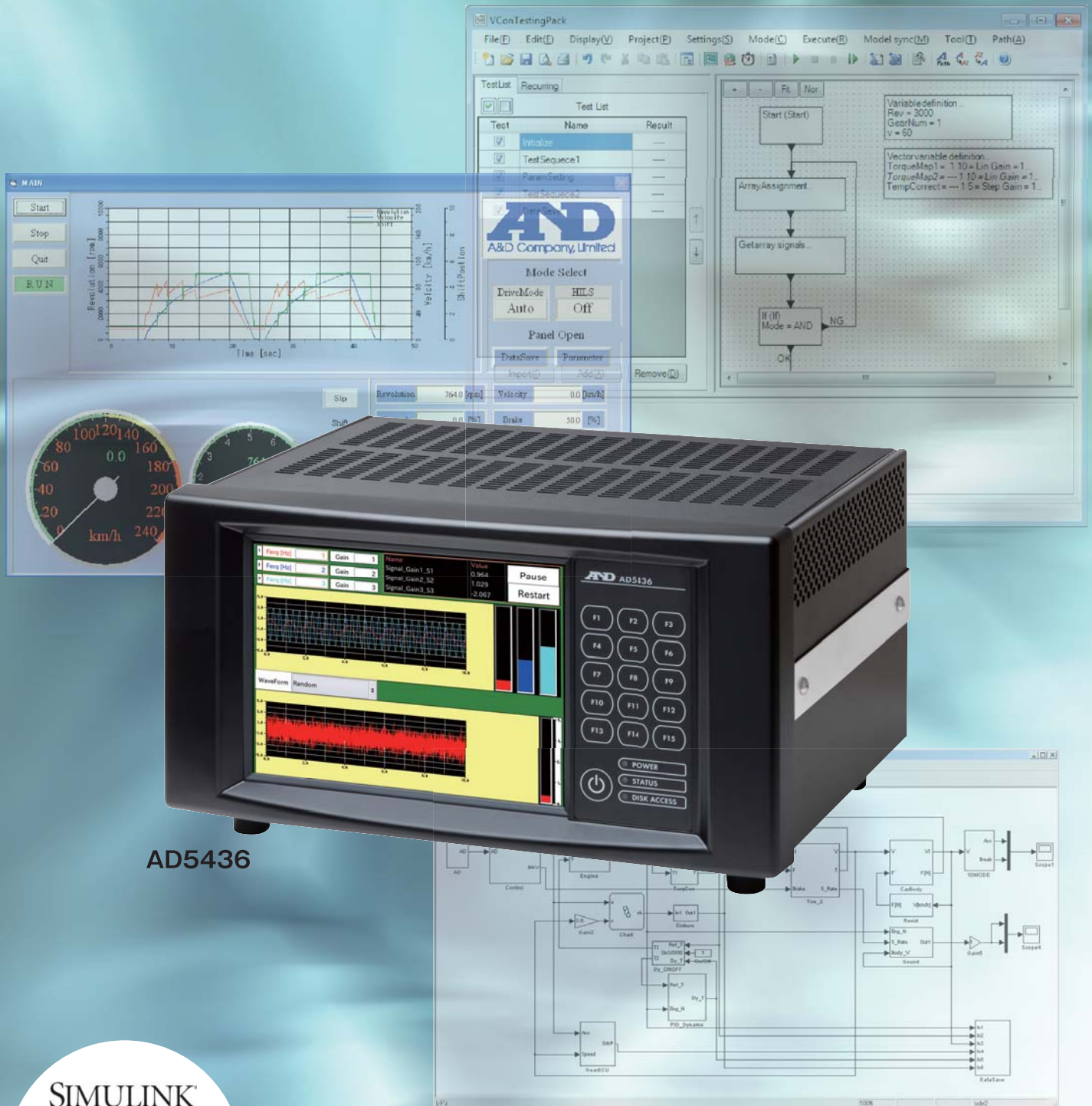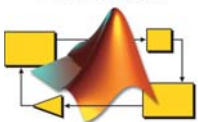
AD5436

A&D Company, Limited
...Clearly a Better Value
http://www.aandd.jp

AD5436

Universal System Controller

The AD5436 is a mid-range system controller that supports a variety of applications with highly customized measurement and control.

AD5436 features and overview

● Main changes from previous AD5435 model

Introducing a dual core CPU
Depending on your needs, the CPU is selectable from 2 options
Intel Celeron P4505 1.86GHz
Intel Core i7-610E　2.53GHz

Display screen widened
Operability has been enhanced with an 8-inch liquid-crystal color screen (touch panel), nearly as wide as the actual unit.

● Its usability follows in the footsteps of the AD5435

Stand alone operation
It can be detached from a PC and used as equipment by itself
(PC is required for compiling and sending execution codes)

General versatility and extendibility have been enhanced
With different combinations of I/O boards (up to a maximum of 7), a measurement and control system can be created to suit your particular needs
Each I/O is provided with a Blockset from MATLAB/Simulink for control

Features inherited from the AD5435
Almost all of the I/O boards used with the AD5435 can still be used with the AD5436
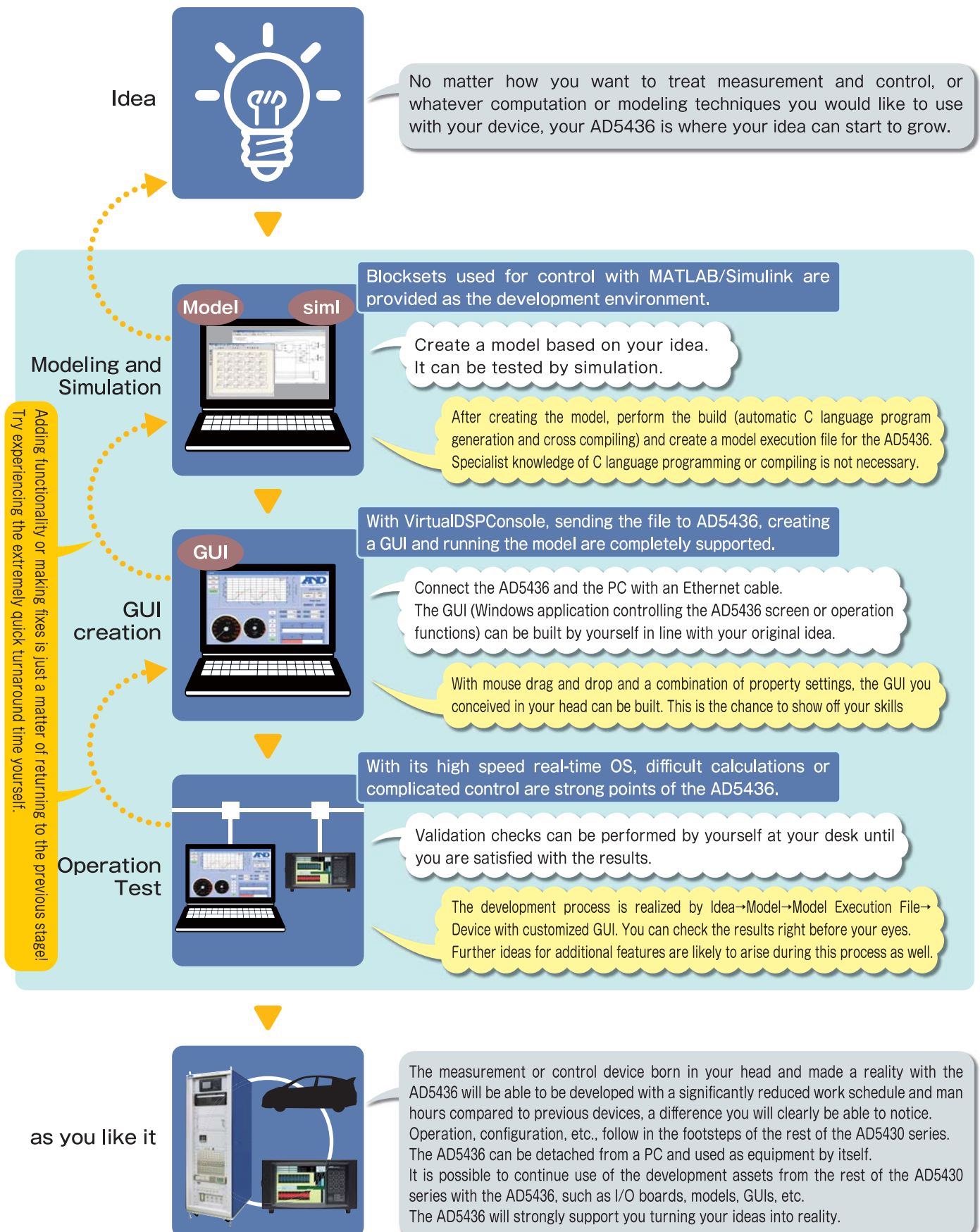The model assets of the AD5435 can be used again due to a fix in the build

＊The maximum control cycle value of 25 μs was achieved with the AD5436-I7, as well as the AD5436A-I7. The control cycle will differ with the model size or other factors.

Straight from your imagination, into use as an actual machine

The AD5436 can be turned into exactly the type of high accuracy measurement and control device that you have conceived in your mind.

With functionality that forms the core of model base development, the AD5436, with improved I/O and utility software, is a strong and adaptable partner for your business.

Idea

No matter how you want to treat measurement and control, or whatever computation or modeling techniques you would like to use with your device, your AD5436 is where your idea can start to grow.

Modeling and Simulation

Model **siml**

Blocksets used for control with MATLAB/Simulink are provided as the development environment.

Create a model based on your idea.
It can be tested by simulation.

After creating the model, perform the build (automatic C language program generation and cross compiling) and create a model execution file for the AD5436. Specialist knowledge of C language programming or compiling is not necessary.

GUI creation

GUI

With VirtualDSPConsole, sending the file to AD5436, creating a GUI and running the model are completely supported.

Connect the AD5436 and the PC with an Ethernet cable.
The GUI (Windows application controlling the AD5436 screen or operation functions) can be built by yourself in line with your original idea.

With mouse drag and drop and a combination of property settings, the GUI you conceived in your head can be built. This is the chance to show off your skills

Operation Test

With its high speed real-time OS, difficult calculations or complicated control are strong points of the AD5436.

Validation checks can be performed by yourself at your desk until you are satisfied with the results.

The development process is realized by Idea→Model→Model Execution File→ Device with customized GUI. You can check the results right before your eyes. Further ideas for additional features are likely to arise during this process as well.

Adding functionality or making fixes is just a matter of returning to the previous stage! Try experiencing the extremely quick turnaround time yourself.

as you like it

The measurement or control device born in your head and made a reality with the AD5436 will be able to be developed with a significantly reduced work schedule and man hours compared to previous devices, a difference you will clearly be able to notice.
Operation, configuration, etc., follow in the footsteps of the rest of the AD5430 series.
The AD5436 can be detached from a PC and used as equipment by itself.
It is possible to continue use of the development assets from the rest of the AD5430 series with the AD5436, such as I/O boards, models, GUIs, etc.
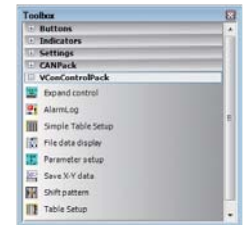The AD5436 will strongly support you turning your ideas into reality.

A&D Utility Software

A&D VirtualConsole ControlPack

Utility to expand the functions of VirtualDSPConsole.
With DLL execution and user-defined control of simplified table configurations
we have been able to further enhance the functionality of VirtualDSPConsole.
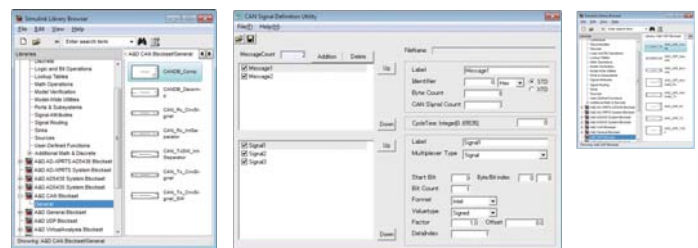

A&D UDPPack

Utility to enable UDP (User Datagram Protocol)

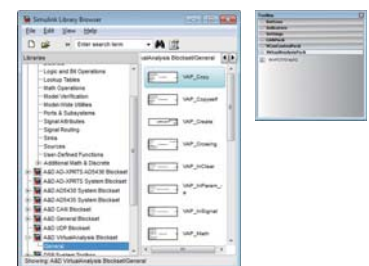## A&D CANPack

This utility converts CAN signal data
- Can be used to combine and analyze sent
  and received data. It also supports CANdb
  and CANdb++

A&D VirtualAnalisysPack

This utility provides several memory area functions
for the AD5436, such as
- Partitioning
- Signal/parameter writing
- Specified range output function, etc···

A&D VConTestingPack

- An automatic test environment is provided
- Test sequence can be replayed
- Coordination with MATLAB (m-file) or Python can be easily performed
- A&D AD-VirtualDSPconsole parameter operation can be recorded
  and replayed
- Possible to capture values or set parameters in synchronization
  with model
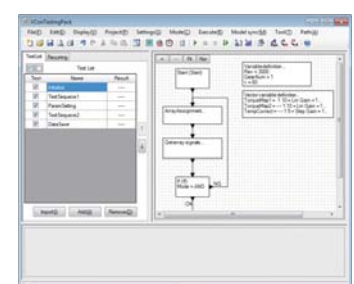
AD5436 MAIN UNIT

POWER UNIT　　SBC　　CONTROL BOARD　　I/O SLOTS

■POWER UNIT　　: Supplies power to the device. AC input and DC input types are available.
■SBC　　　　　　: Board holding all the different functions of the device, such as CPU, memory, interface, etc.
■CONTROL BOARD : Board outputting system status; remote control for power
■I/O SLOTS　　　: Slots additional boards. A maximum 7 further boards can be added.

I/O Boards for the Highly Scalable AD5430 Series

▶ I/O slot boards

Analog functions

●Input

AD5430-01 Universal A/D　CE

This single-ended input, 16-bit resolution board has a 256 KB buffer memory and can sample serial data

■Number of channels	:	16
■Sampling frequency	:	5 kHz to 100 kHz (if 1 channel only)
■Input range	:	0~1V, 0~6V, 0~12V, ±1V, ±6V, ±12V
■Input impedance	:	1 MΩ or greater
■Isolation	:	No isolation between channels; isolation between CPU bus
■Accuracy	:	Each range ±0.1% of F.S

AD5430-20 100kHz,8ch A/D　CE

A high speed A/D board capable of 100 kHz and 8-channel simultaneous sampling.
It can sample analog signals synchronized to rotary encoder pulses.

【Analog input】
■Number of channels	:	8
■Input range	:	±2V, ±10V
■Resolution	:	16 bit
■Sampling frequency	:	1 kHz to 100 kHz (resolution: 1 kHz)
■DC accuracy	:	±0.1% of Range

【Rotary encoder, external trigger and external clock gate pulse input】
■Number of channels	:	3
■Software switching	:	Z phase, external trigger, A phase, external clock pulse, B phase, gate measurement pulse
■Input type	:	Single ended
■Input voltage	:	3.5 to 5V (High level), 0 to 1.25V (Low level)

●Output

AD5430-02A Universal D/A　CE

A 12 bit resolution, single-ended board

■Number of channels	:	8
■Arbitrary waveform output (WG function)	:	Serial analog output (4 channels) of recorded data from internal memory
■Resistance-simulating voltage output	:	Output voltage compliant with resistance-variable sensors, such as thermistors
■Conversion speed	:	10μs per channel
■Output range	:	0~1V, 0~5V, 0~10V, ±1V, ±5V, ±10V
■Accuracy	:	Each range ±0.1% of F.S

AD5430-02B Universal D/A　CE

A 16-bit resolution, single-ended board

■Number of channels	:	8
■Arbitrary waveform output (WG function)	:	Serial analog output (4 channels) of recorded data from internal memory
■Resistance-simulating voltage output	:	Output voltage compliant with resistance-variable sensors, such as thermistors
■Conversion speed	:	10μs per channel
■Output range	:	±1V, ±5V, ±10V
■Accuracy	:	Each range ±0.1% of F.S

Digital input/output

AD5430-03 Digital I/O　CE

This board features photocoupler-isolated input and photocoupler-isolated open collector output

■Number of input channels	:	32
■Number of output channels	:	32
■Input format	:	Current driven input by photocoupler isolation (sink type)
■Maximum load current	:	100mA (for each point)
■Response time	:	Within 1 ms

Pulse input/output

AD5430-11 6-axis Encoder Input and Pulse Output ⦿CE

This board is compliant with pulse output and encoder input and enables positioning of stepping motors and servomotors

- ■Number of channels : 6
- ■Response frequency : Response frequency: 1.25MHz (max: in-phase), 5MHz (max: quadrature)
- ■Output speed range : Output speed range: 0~2,000,000PPS
- ■Output logic : Output logic: Positive and negative logic (switchable)

AD5430-13 PWM Input and Output ⦿CE

PWM Input : 19 channels
(TTL: 14 channels, comparator: 5 channels)
PWM Output : 14 channels

- ■Number of input/output channels : 14 each (PWM), 5 (comparator)
- ■Input/output level : TTL
- ■Input/output frequency range : 0.1~20kHz
- ■Measurement : Frequency, Duty, ON/OFF time, and Edge Count

HILS

AD5430-27 Motor Simulation

This board is able to run inverter models and motor models in FGPA. It comes ready with a JMAG-RT motor model.

- ■Number of models that can be inserted: 1 : 1
- ■Number of channels : 6 (digital output), 3 (analog output)
- ■Motor model cycle : 1 μsec approximately (FPGA)
- ■Digital input : TTL signal level
- ■Analog output : Differential
- ■Resolver carrier wave signal input : 1 point
- ■Resolver signal output : 2 points

Synchronization of multiple units

AD5430-21 Multi-unit synchronization

This board can synchronize model step and sampling between multiple units

Model step synchronization : Synchronizing models steps between multiple units
Sampling synchronization : Synchronizing sampling between multiple units

Specialized interfaces

●For engines

AD5430-12A Timing Detector

This board generates ignition and injection pulses based on engine and rotation angle and can drive models with the generated timing signals

【Input】
- ■Crank angle sensor, encoder signal, missing cog pulse train, additional cog pulse train, Z pulse Cylinder distinction pulse, TDC phase pulse train, phase difference measurement

【Output】
- ■Function pulse : 16 points
- ■Timing pulse : 1 point
- ■Measurement gate pulse : 1 point

●ECU Interface

AD5430-19 NEXUS I/F

The interface enables the reading and writing of address values specified in the RAM of a Nexus-compliant PowerPC (MPC5554) via a Nexus connection

AD5430-22 NBD I/F

Via NBD:
- ■This interface enables the reading and writing of address values specified in the RAM of CPUs that support NBD, such as the V850 series
- ■Supports external output of match-detection trigger by resistor match-detection

AD5430-71 AUD I/F

This interface is equipped with the Advanced User Debugger (AUD) for SH-2 CPU and a RAM value monitor

●Device Controllers

AD5430-18 Three-phase PWM Motor Controller ⦿CE

Equipped with a three-phase PWM motor control function with resolver input

【Resolver input】
- ■R/D converter : AU6802NI (made by Tamagawa Seiki)
- ■Transformation ratio : 0.286/0.5
- ■Output impedance : 10Ω or less
- ■Output excitation signal : 10kHz / 20kH
- ■Maximum angle speed (electrical angle) : 240,000 rpm
  Note: As the transformation ratio, output impedance and output excitation signal are dependent on the resolver, please confirm the specifications of your resolver.

【Analog input section】
- ■Number of channels : 4
- ■Signal format : Actuation signal
- ■Sampling frequency : 40kHz (maximum)　Can synchronize with PWM carrier wave
- ■Input range : ±5V
- ■Resolution : 16 bit

【PWM output】
- ■Number of control axes : 6
- ■Output format : Differential (UH, VH, WH, UL, VL, WL)
- ■Output voltage : 0~5V
- ■Carrier wave : Triangle wave 20kHz (MAX)

6

Specialized interfaces

AD5430-28 Servo Controller

This optional board is equipped with an input and output function to build a single-channel servo control system. Occupies 2 slots.

■Sampling synchronized with model cycle
■Analog input (LC)   : 1 channel
■Analog input (voltage)   : 1 channel
■Analog output   : 1 channel
  (current/voltage)
■Digital input (universal)   : 8 channels
■Digital output   : 4 channels
■Digital input (control box) : 5 channels
■Digital output (control box) : 2 channels

Communication

AD5430-17B In-vehicle Network C E

This communication board supports several types of networks (CAN, Serial, K-LINE and LIN)

【CAN】
■Number of channels   : 4
■Baud rate   : 5 kbps to 1Mbps (configurable for each channel)
■Options at time of order : Selection from High speed or Single Wire

【CCP transmission】
■Number of channels   : 1
■Baudrate   : 5 kbps to 1 Mbps
                         Note: This function can be used after installing the "CCPPack"
                          (an optional programming package)

【Serial】
■Number of channels   : 4
■Baudrate   : 5 kbps to 1Mbps (configurable for each channel)
■Tranceiver/receiver   : RS232C / RS422/485 (Half/Full Duplex) / TT ＊Selectable via software

【K-LINE】
■Number of channels   : 1
■Baudrate   : 5 to 10.4kbps

【LIN】
■Number of channels   : 4
■Baudrate   : 5 to 20 kbps (configurable for each channel)
■Master/slave   : Master/slave: Selected via software

AD5430-23 CC-Link (Master/Local station) Interface

This device controls devices connected by CC-Link and is set as a master or local station.

■Number of channels   : 1
■CC-Link version   : Version 1.1 or 2.00
■Maximum number of   : Remote I/O stations: 64 units
  connections   Remote device stations: 42 units
  (when used as a master station) Local or intelligent device stations: 26 units
■Maximum number of links : Bit: 2048 points (Version 1), 8192 points (Version 2)
                           Word: 512 points (Version 1), 4096 points (Version 2)
■Number of stations occupied : 1 to 4

AD5430-26 Field I/O I/F

This interface was designed for low-speed measurement and control. This reasonably priced system meets your needs through its diverse I/O modules.

【Board specifications】
■Number of channels   : 4
■Physical layer for communication : RS485
■Baud rate   : 1.5 Mbps
■Protocol   : Modbus
■Indicators   : LED indicators for communication and electrical current

【Modules】
■AD7313-11   : 8-channel differential analog input
■AD7313-12   : 8-channel thermocouple
■AD7313-21   : 8-channel analog voltage output
■AD7313-31   : 8-channel DIO
■AD7313-32   : 8-channel semiconductor relay output
■AD7313-41   : 4-channel PWM input and 4-channel PWM output
■AD7313-42   : Built-in VRS sensor amplifier frequency input

●PMC I/F

AD5435-02 A&D Link

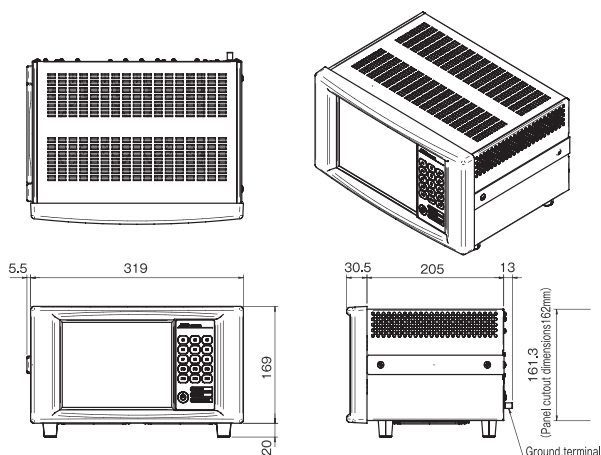This link uses StarFabric (2.5 Gbps) as its physical layer to provide high-speed inter-unit communication

■Number of links   : 2
■Communication speed   : 2.5Gbps

●AD5436 Specifications

Item	AD5436	AD5436A	AD5436-I7	AD5436A-I7
CPU※1	Intel Celeron P4505 1.86GHz 2Core Cache2MB		Intel Core i7-610E 2.53GHz 2Core Cache4MB	
Chipset	Intel QM57 Mobile Chipset			
Memory	RAM:4GB DDR3 SO-DIMM SATA Disk Chip:1GB OS, application			
OS	RTOS（Xenomai)			
Display	8inch Color TFT LCD (LED backlight) resolution 800 x 600 dots			
Operation panel	Touch panel Function keys (15 customizable keys)			
I/O slots	7 slots (for AD5430 series I/O board)			
Power specifications	DC8～36V	AC90～264V（50Hz or 60Hz)	DC8～36V	AC90～264V（50Hz or 60Hz)
PMC I/F slot	1 slot (separate option)			
Data transmission	Gigabit Ethernet (1000Base-T, 100Base-TX), for Auto MDI/MDI-X			
Data storage	USB2.0×2※2			
Power consumption	Max 200VA			
Cooling	DC fan x 3 (2 units 120mm x 25mm, 1 unit 80mm x 15mm)			
Dimensions	324.5 (W) x 169 (H) (not including feet) x 235.5 (L) mm			
Weight	About 7kg (main unit)			
Operation temperature range	0～40℃			
Operation humidity range	20～90%RH (non-condensing)			
Conditions of use	Altitude below 2000m			
	Contamination Level 2			
	IEC CAT II, for indoor use			
Accessories	AC power cable (when purchasing AD5436A, AD5436A-I7)			
	DC power cable (when purchasing AD5436, AD5436-I7)			
	D-Sub15 male pin connector and connector hood (for REMOTE IN/STATUS OUT use)			

※1）Inside 2Core the user interface is processed by 1Core
※2）Both cannot be used at the same time. The first USB inserted will be used.

5.5   319
169
20

30.5   205   13
161.3
(Panel cutout dimensions (62mm))
Ground terminal

●Regarding usage
When using the DSP device of this company, usage in such a manner that will not cause a significant accident even in the case of breakdown or defect of the device, and ensuring systematic external backup and failsafe operation in the event of breakdown or defect are stipulated conditions of use.

●Regarding range of application
The DSP device of this company has been designed and manufactured as general-purpose product for standard industrial use. Use in nuclear or other electrical generation plants with a high public impact, or cases where special quality assurance standards are required, are considered beyond the standard applications of this product. However, even in such cases of use, if the customer acknowledges the stipulated limits of use and does not seek particular quality standards, application of the device is considered possible. Further, for application in aviation, medical or rail industries, in combustion or fuels systems, manned transport systems, entertainment devices, safety devices, or other applications where a potential high impact on human life or property can be expected, or in cases where there is a possible need for a high level of reliability for safety purposes or system control, please contact this company for advice and necessary specification documents.
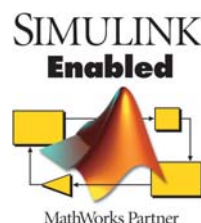
Compliance with Council Directives
CE This device features radio interference suppression and safety regulation in compliance with the following Council Directives.
Council directive 2004/108/EC EN61326 EMC directive
Council directive 2006/95/EC EN61010-1 Low voltage directive

SIMULINK
Enabled
MathWorks Partner

| ⚠ Safety Warning! | ●Please read the instruction manuals carefully before use. |

●Appearances and/or specifications subject to improvement without notice.
●Contents of this catalog last updated August 2013.

＊AD5436-ADCC-01-BP1-13802