

## A&D's Support System

### S-Function

A&D provides S-function hardware-driver blocks along with our hardware.

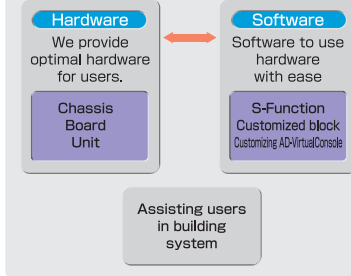
### Customize your measurement and control screens

Create a AD-VirtualConsole screen that is tailored to your requirements.

### Create customized blocks

Create a customized block of your own unique functions.

We provide a platform for high-speed measurement, control, simulation DSP.



### AD5435 Specifications

CPU	User interface CPU	SH4	200MHz
	Model execution CPU	Celeron M	1.5GHz
Memory	SDRAM	512MB	
	Compact Flash memory	128MB	
OS	RTOS		
Display	5.7inch color TFT LCD (with back light)		
Operation interface	Resistive touchscreen		
	Customizable function keys		
I/O slots	For AD5430 series I/O board	7 slots	
PMC interface	For A&D link or Flex Ray: 1	1 slot (option)	
Peripheral connections	Ethernet, 100base-T	100base-T	
	FTP server function		
Power specifications	AC power specification (AD5435A)	85~264V	
	DC power specification (AD5435)	12V (6~18Vpp) or 24V (16~36Vpp)	
Power consumption	100 VA (AC or DC power)		
Operation temperature range	5 to 40 °C		
Operation humidity range	5 to 90% R.H. non-condensing		
Dimensions	318 (W) x 230 (D) x 168 (H) mm		
Weight	About 6.5 kg (chassis only)		

Compliance with Council Directives  
 CE This device features radio interference suppression and safety regulation in compliance with the following Council Directives, Council directive 89/336/EEC EN61326 EMC directive  
 Council directive 73/23/EEC EN61010-1 Low voltage directive

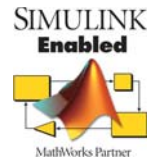
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A&D is an associate member of FlexRay Consortium.  
 A&D is a supplier member of ASAM.



Attention to Safety!

For proper use, read the instruction manuals carefully before use.



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●Appearances and/or specifications subject to change for improvement without notice.  
 ●Contents of this catalog last updated January 2011.

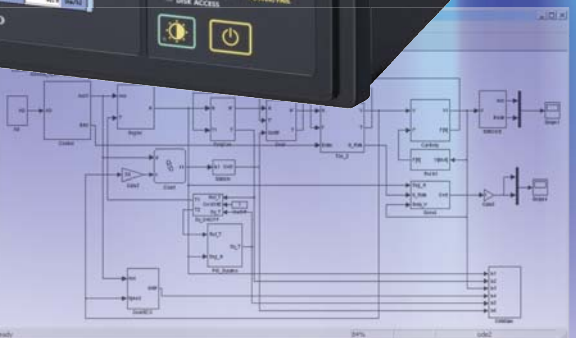
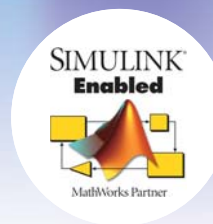
\*AD5435-ADCC-03-BP3-11102

# AD5435

Real-time Platform for Measurement, Simulation and Control Minimum control cycle: 50μs



AD5435



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The AD5435 system controller supports a variety of applications with highly customized measurement and control.

### High-Speed Real-time Processing:

The two on-board processors perform separate functions to achieve high-speed, real-time processing:   
 ■ 1.5 GHz Celeron M CPU for model execution   
 ■ 200 MHz SH4 CPU for user interfaces like the touchscreen

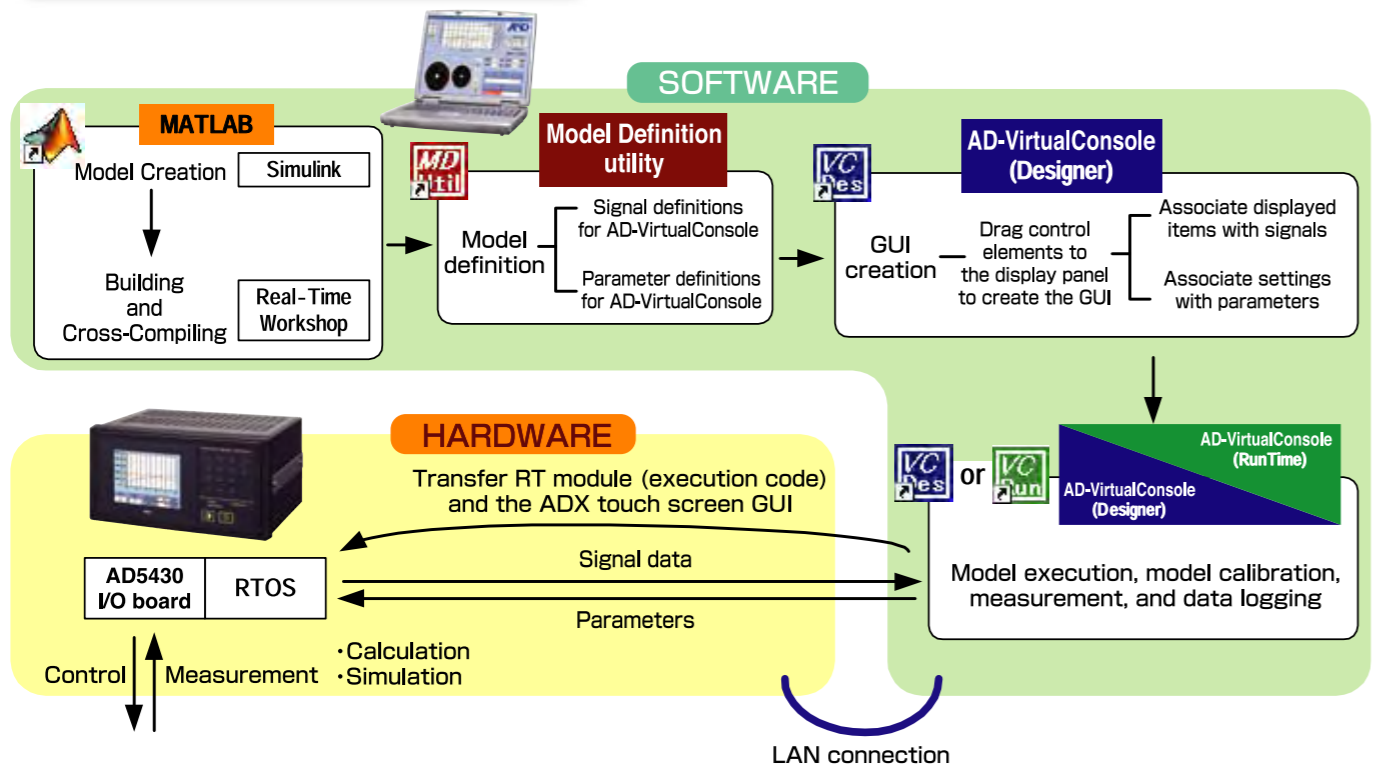
### Measurement, Control and Simulation:

Models made using MATLAB, Simulink and Stateflow are implemented on the AD5435, resulting in an optimal Rapid Prototyping environment.

Furthermore, the combination of multiple I/O and AD-VirtualConsole (graphical user interface (GUI) editing software) provides you with highly customizable measurement and control.

## Measurement and control with the AD5435

### Measurement and control from a host PC



**Standalone**  
 In the above process, the application file is transferred and saved to the AD5435. Model execution, measurement, and calibration can be performed using the touch screen and function keys on the AD5435. The AD5435 provides you with a measurement and control environment well suited for in-vehicle applications, with no need for an additional laptop PC.

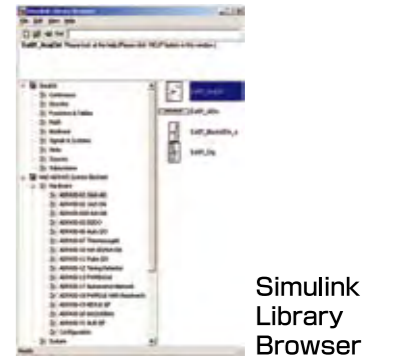
## Our State-of-the-art GUI Editing Software Ensures Ease of Use

### Model-based design

The AD5435's measurement, control and simulation algorithms are created with MATLAB, Simulink and Stateflow to provide you with model-based design and a coding-free environment. Building logic in a block diagram and state chart environment removes the need to scan each line of the source program and saves you important development time. MATLAB and Simulink ensure a familiar programming environment.

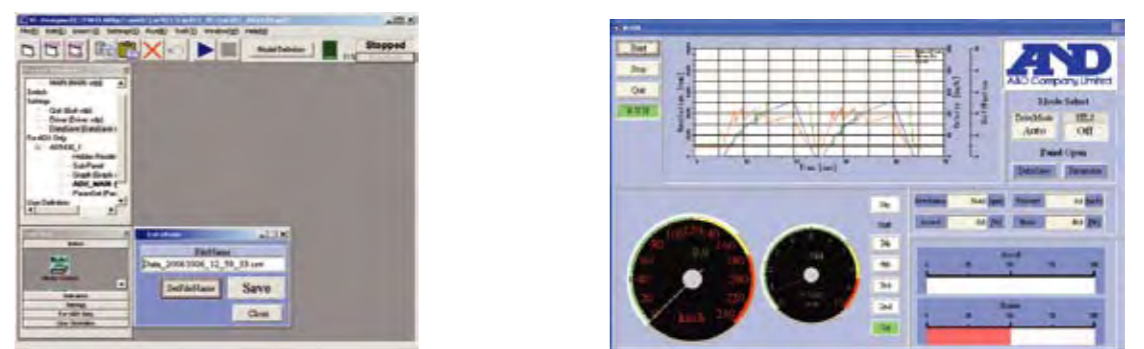


**AD5435 System Blockset**  
 A&D provides various system, input and output functions of the AD5435 to the AD5435 System Blockset in the Simulink Library Browser as S-functions. The combination of the System Blockset and the logic created by MATLAB and Simulink makes it easy for you to design models with a high degree of freedom.



### AD-VirtualConsole : Graphical User Interface Editing Software

The combination of models made by MATLAB, Simulink and Stateflow and AD-VirtualConsole, a GUI editing and execution application, provides an environment to create and execute measurement and control applications. Building the GUI is as simple as dragging control items to a window and setting their signal parameters via menus; no coding necessary! AD-VirtualConsole has diversified configuration functions, such as linking commands to button controls, graphical display of signals, and incrementing parameters. This offers you highly flexible and easy-to-use GUI editing.



## A&D Utility Software (Options)

### AD-VirtualConsole ControlPack

This utility enhances the functions of AD-VirtualConsole through DLL execution and user-defined control of simplified table configurations.



### CANPack

This utility converts CAN signal data. It can combine and resolve transmitted and received data. Furthermore, it is also supports CANdb and CANdb++.



### VirtualAnalysisPack

The utility provides many memory area functions for the AD5435:

- Partitioning
- Signal/parameter writing
- Specified-range output function
- And...



### ASAMPack

This utility provides compliance with ASAM communication standards. It can extend existing infrastructures, making it easy to build systems suitable for your needs.



### UDPPack

This utility enables UDP (User Datagram Protocol) communication.



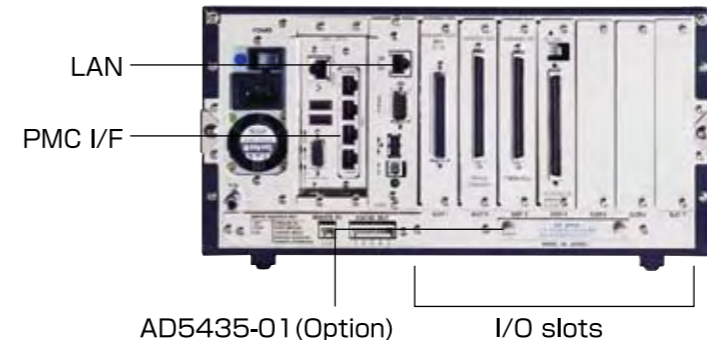
### RemovableStorePack

With installation of a CompactFlash memory slot (AD5435-01) on the AD5435, this utility allows you to save data to CompactFlash memory at high speed.



## AD5435 Main Unit

### ● Configuration example



- Number of I/O slots : 7
- Control cycle : 50μsec (20 kHz)
- Power : Selectable from three types of power modules
  - AC power module : 85-264V AC
  - DC 12V power module: 8-18V DC
  - DC 24V power module: 18-36V DC
- Power consumption : 100 W

AD5435-01 (Option)

I/O slots

## I/O Boards for the Highly Scalable AD5430 Series

### ▶ I/O slot boards

#### ● Input

#### AD5430-01 Universal A/D

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 (in case of 1 channel only)
- Input Range : 0-1 V, 0-6 V, 0-12 V, ±1 V, ±6 V, ±12 V
- Input Impedance : 1MΩ or greater
- Isolation : No isolation between channels, isolation between CPU bus
- Accuracy : Each range ±0.1% of F.S.

#### AD5430-07 Thermocouple

This board offers thermocouple input, thermocouple measurement with cold junction compensation, and a measurement speed of 250 ms with 8 channels. Occupies two slots.

- Number of channels : 8
- Input : Thermocouple (K, J, T) or voltage (0-200 mV, 0-2 V and 0-20 V)
- Measurement Range : Thermocouple : K: -200.0 to 1370.0°C, J: -200.0 to 1100.0°C, T: -200.0 to 800.0°C  
Voltage : ±200 mV (resolution: 0.1 mV), ±2 V (resolution: 1 mV), ±20 V (resolution: 10 mV)

#### AD5430-20 100kHz, 8-channel A/D

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

- [Analog input]
- Number of channels : 8
- Input range : ±2 V, ±10 V
- Resolution : 16 bit
- Sampling frequency : 1 to 100kHz (resolution: 1Hz)
- 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, and gate measurement pulse
- Input type : Single ended
- Input voltage : 3.5 to 5 V (High level) and 0 to 1.25 V (Low level)

#### ● Output

#### AD5430-02A Universal D/A

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 to 1 V, 0 to 5 V, 0 to 10 V, ±1 V, ±5 V, ±10 V
- Accuracy : Each range ±0.1% of FS

#### AD5430-02B Universal D/A

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 : ±1 V, ±5 V, ±10 V
- Accuracy : Each range ±0.1% of FS

#### ● Input/Output

#### AD5430-10 4-channel A/D·D/A

4-ch A/D and 4-ch D/A installed on a single board with output in user-defined waveforms

- Number of input/output channels : 4 each
- Sampling frequency : 5k to 100 kHz (in case of 1 channel)
- Input output range : ±1 V, ±5 V, ±10 V
- Input Impedance : 1MΩ or greater
- Filter : Through 1 kHz (Third-order butterworth)
- Trigger detection : Internal and external triggers
- Conversion speed : 50μs per channel
- Resolution : 16 bit (A/D), 12 bit (D/A)
- Accuracy : Each range ±0.1% of FS

Digital input/output

## AD5430-03 Digital I/O



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 : 100 mA (for each point)
- Response time : 1 ms or less

Pulse input/output

## AD5430-11 6-axis Encoder Input and Pulse Output



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

- Number of channels : 6
- Response frequency : 1.25 MHz, 5 MHz (quadrature)
- Output speed range : 0 to 2,000,000 pps
- Output logic : Positive and negative logic (switchable)

## AD5430-13 PWM I/O



This board has 19 channels for PWM input (TTL:14; comparator:5) and 14 channels for PWM output.

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

Synchronization of multiple units

## AD5430-21 Multi-unit Synchronization

This board synchronizes model steps and sampling among multiple units.

- Model step synchronization : Synchronizing model steps among multiple units
- Sampling synchronization : Synchronizing sampling among multiple units

Specialized interfaces

● For Engines

## AD5430-12A Timing Detector



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

- [Input]
  - Crank angle sensor (encoder, missing teeth, additional teeth patterns), Cylinder identification/TDC (Z pulse), Cam position, Cam phasing
- [Output]
  - Injection/ignition : 16 channels
  - Synchronization : 1 channel
  - Measurement gate : 1 channel

● ECU Interface

## AD5430-19 NEXUS I/F

This interface enables the reading and writing of address values specified in the RAM of a Nexus-compliant Power PC (MPC5554) via a Nexus connection.

## AD5430-22 NBD I/F

- 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. The above-mentioned functions are via NBD.

## 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



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 : 10 kHz/20 kHz
  - Maximum angle speed : 240,000 rpm
  - (electrical angle) Note: The transformation ratio, output impedance and output excitation signal depend on the resolver. Please confirm specifications of your resolver.
- [Analog input section]
  - Number of channels : 4
  - Signal format : Differential signal
  - Sampling frequency : 40 kHz (maximum) Can synchronize with PWM carrier wave.
  - Input range : ±5 V
  - Resolution : 16 bit
- [PWM output section]
  - Number of control axis : 6
  - Output format : Differential (UH, VH, WH, UL, VL, WL)
  - Output voltage : 0-5V
  - Carrier wave : Triangular wave, 20 kHz (maximum)

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  
Note: Only available for AD5435 AC models with serial number Q4300661 and higher.

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

## AD5430-29 Fiber Optic Communication for Dynamometer Control

This interface is compliant with UNICO 2400 series drives and transmits command values at high speed via an optical connection.

Communication

## AD5430-17B In-vehicle Network



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

- [CAN]
  - Number of channels : 4
  - Baud rate : 5 kbps to 1 Mbps (configurable for each channel)
  - Selectable option at time of order : High speed or Single wire
- [CCP transmission]
  - Number of channels : 1
  - Baud rate : 5 kbps to 1 Mbps
  - Note: This function can be used after installing the "CCPPack" (an optional programming package).
- [Serial]
  - Number of channel : 4
  - Baud rate : 5k to 1Mbps (Configurable for each channel)
  - Transceiver/receiver : RS232C, RS422, RS485 (Half and Full Duplex), TTL (Selectable via software)
- [K-LINE]
  - Number of channels : 1
  - Baud rate : 5 to 10.4 kbps
- [LIN]
  - Number of channels : 4
  - Baud rate : 5 to 20 kbps (configurable for each channel)
  - Master/slave : Selected via software

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

This interface 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 Version 2.00
- Maximum number of connections : Remote I/O stations:64 units  
Remote device stations:42 units  
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 : LEDs 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 Interface

## 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 : 2.5 Gbps

## AD5435-04 FlexRay

This communication module is for in-vehicle networks.

- Number of nodes : 2
- Number of node channels : 1 to 2
- Communication speed : 2.5 Mbps, 5 Mbps, and 10 Mbps (bandwidth)



Storage Device Options

## AD5435-01 RemovableStorePack

The RemovableStorePack is an optional interface that can save measured data onto a compact flash memory. The user can read saved data on a Windows PC from a compact flash memory.

- Compatible with CF (compact flash memory) Type1, Type2
- Easily detachable from the rear panel of the AD5435
- Save in binary format, including a utility application software which converts the binary format into CSV format
- Duration for continuous data collection : More than 8 minutes (using 1GB compact flash memory, sampling 50kHz, input 4ch)
- The user should provide a compact flash memory device separately.

A&D recommends SanDisk's Extreme III's compact flash memory or a similar product. This is an optional product at time of shipment from factory. Please contact our sales person if you would like to add this to your purchased AD5435 controller.