SuperCAT

User's Manual

Software EtherCAT Motion Controller

Manual Rev.: 1.0
Revision Date: April 26, 2023
Part Number: 50M-00132-1000

LEADING EDGE COMPUTING

Preface

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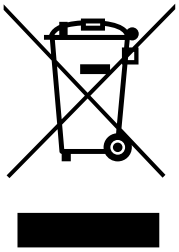
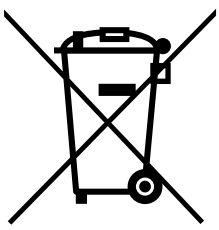


Battery Labels (for products with battery)



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Revision History

Revision	Description	Date	By
1.0	Initial release	2023-04-26	RA

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1 Introduction

ADLINK SuperCAT is a software defined EtherCAT motion controller able to support up to 128 synchronized axes and over 10,000 points simultaneously. SuperCAT fully supports the ADLINK ECAT-4XMO series for EtherCAT to pulse train conversion and diversified pulse control. SuperCAT also supports the ADLINK ECAT-TRG4 series with comparison triggers used for AOI/dispensing machines. Optimum jitter control is provided in minimal cycles of 125μs to optimize synchronous I/O performance for vertical automation applications in the semiconductor and electronics manufacturing industries, among others.

SuperCAT provides an out-of-shell application-ready (APS) function library to generate multi-dimensional, highly synchronized, time-deterministic event-triggered motion and I/O control. A wide range of compatible third-party slaves are easily controlled with ADLINK's APS function library. ADLINK's Motion Creator Pro 2 utility is fully compliant with the Microsoft Windows environment, allowing complete EtherCAT motion and I/O configuration and function evaluation as well as process download functions.

1.1 Product Nomenclature

EM -	n	x	0	0	y
	Supported Axes 2 = 16 axes 4 = 32 axes 8 = 64 axes F = 128 axes	P = P2P C = interpolation A = advance	Reserved	Specific application	NA = file license D = dongle license

- EM: product identifier, short for EtherCAT Motion controller
- n: number of supported axes
- x: product support functionality
- y: license type. If a file license is requested, the license code is stored in the OS and detected via hardware ID or OS information on the platform. If using a dongle license, the license code is stored on the dongle and any platform with the dongle can work with the specific version of SuperCAT.

1.2 Anti-virus Compatibility with Real-time SuperCAT Execution

ADLINK recommends careful consideration when using anti-virus programs.

In general, anti-virus programs are designed to be compatible with a wide range of computer systems and software configurations. Some compatibility issues may arise depending on the specific anti-virus program and the software or hardware installed on the computer.

Some anti-virus programs may conflict with other security software installed on the computer, such as firewalls or anti-spyware programs, that can cause performance issues or prevent programs from functioning properly. In some cases, anti-virus programs may also conflict with other software or drivers, causing system instability or crashes.

Windows Defender is pre-installed in Windows 10 as an anti-virus component.

During regular tests of Windows with Windows Defender in real-time examinations of SuperCAT and ADLINK IPCs, ADLINK has found no real-time violations of SuperCAT; however, no there is no guarantee that future updates will potentially destabilize the system. Tests with active Windows Defender and SuperCAT "real-time operation" can cause real-time violations of SuperCAT because it monitors and examines process sequences and their data by accessing the Windows system.

Third-party anti-virus programs interact in different ways with the Windows system following installation and activation. ADLINK cannot guarantee that systems will remain unaffected by third-party software and its influence on the real-time execution of SuperCAT.

1.3 Disclaimer

ADLINK makes no warranties, expressed or implied, for real-time performance of SuperCAT after installation or update of other software, including but not limited to anti-virus software.

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2 Features and Specifications

2.1 Highlights

- EtherCAT Master software combines the EtherCAT protocol, IO control, and motion control with a short lead time
- Supports 125μs EtherCAT control cycle, and up to 128 axes motion control with one PC
- Fast and stable application that runs in real-time
- Run Motion Creator Pro 2 and applications at the same time to fine tune m/c UPH

2.2 Key Features

- EtherCAT open standard protocol CIA402 compliance for motion control
- Supports 2D coordination bias compensation for high precision movement
- App management and execution in real-time via process download function and GUI
- 16D linear interpolation and 3D spiral
- Real-time processing and EtherCAT Master achieved by allocating one CPU core, memory and LAN port
- Supports APS SDK for machine automation, compatible with ADLINK motion controller products
- Lowest jitter <20μs by fine tuning CAT-PAC controller

2.3 Product Function Portfolio

Category	Sub-category	EM-xP00(D)	EM-xC00(D)	EM-xA00(D)
Single Axis motion	P2P	✓	✓	✓
	Pos/Vel Override	✓	✓	✓
	Blending mode	✓	✓	✓
	Homing	✓	✓	✓
	Motion IO Mapping	✓	✓	✓
Multi-Axes Motion	Linear Interpolation	✓	✓	✓
	2D circular interpolation		✓	✓
	3D Spiral/Helical		✓	✓
	3D Circular interpolation		✓	✓
	Interpolation Group		✓	✓
	Gantry/E-Gear		✓	✓
	Gantry/E-Gear Homing		✓	✓
	Blending mode support	✓	✓	✓
	Continuous Interpolation	Line Only	2D Line + 2D circular	✓
	PVT		✓	✓
Speed Profile	T curve	✓	✓	✓
	S curve		✓	✓
Compensation	Pitch Error Compensation		✓	✓
	Backlash compensation		✓	✓
	2D mesh compensation			✓

2.4 System Requirements

- Supported Operating Systems
  - Windows 10 32/64-bit
  - Windows 11 32/64-bit
- Hardware
  - Intel Atom (AHL)/Core-i/Xeon with processor clock speed of 1.8 GHz or faster; dual-core or better is recommended supporting x86 architecture
  - RAM:
    - 32-bit systems: 1 GB min., 4 GB recommended
    - 64-bit systems: 2 GB min., 8 GB recommended
  - Storage: 32 GB min. Solid State Disk (SSD) recommended (10 GB for operating system and 1 GB for RT system)
  - x2APIC mode is currently not supported. Windows can be prevented from using this mode by entering **bcdedit.exe /set {current} x2apicpolicy disable** during installation.

2.5 Supported Network Controllers

Link Layer Name	Controller / Device ID	Windows 10/11
emllPcap	OS driver	x86
emlII8254x Intel Pro/1000	82540EM / 0x100E	x86 x64
	82541EI / 0x1013	
	82541ER / 0x1078	
	82541GI / 0x1076	
	82541GI / 0x1077	
	82541PI / 0x107C	
	82545GM / 0x1026	
	82546EB / 0x1010	
	82546GB / 0x1079	
	82547EI / 0x1075	
	82547GI / 0x1019	
	82566DM / 0x1049	
	82566DM / 0x104A	
	82566L / 0x10BD	
	82566MC / 0x104D	
	82567V / 0x10CE	
	82567V / 0x1501	
	82567LM / 0x10DE	
	82567LM / 0x10F5	
	82571GB / 0x10A4	
	82571GB / 0x10BC	
	82572GI / 0x10B9	

Link Layer Name	Controller / Device ID	Windows 10/11
	82572PI / 0x107D	
	82573 / 0x108C	
	82573E / 0x108B	
	82573L / 0x109A	
	82574(L) / 0x10D3	
	82575 / 0x10A7	
	82577LM/0x10EA	
	82577LC / 0x10EB	
	82576 / 0x10C9	
	82576 ET2 / 0x1526	
	82576SN / 0x150A	
	82578DM / 0x10EF	
	82578DC / 0x10F0	
	82579LM / 0x1502	
	82579V / 0x1503	
	82580 / 0x150E	
	82580 QF / 0x1527	
	82583V / 0x150C	
	N1E5132 / 0x105E	
	I350 / 0x1521	
	I210AT / 0x1531	
	I210AT / 0x1532	
	I210 / 0x1533	
	I210 CFL / 0x157B	
	I211AT / 0x1539	
	I217LM / 0x153A	
	I217V / 0x153B	
	I218LM / 0x155A	
	I218V / 0x1559	
	I218V / 0x15A1	
	I218V / 0x15A3	
	I219LM / 0x156F	
	I219LM / 0x15B7	
	I219LM / 0x15BB	
	I219LM / 0x15D7	
	I219LM / 0x15E3	
	I219LM / 0x15B9	
	I219LM / 0x15BD	
	I219LM / 0x15BF	

Link Layer Name	Controller / Device ID	Windows 10/11
	I219LM / 0x15E1	
	I219V / 0x1570	
	I219V / 0x15B8	
	I219V / 0x15BC	
	I219V / 0x15BE	
	I219V / 0x15D8	
	I219V / 0x15D6	
	I219V / 0x15E0	
	I219V / 0x15E2	
emllRTL8169 Realtek Gigabit	RTL8110 / 0x8169	x86 x64
	RTL8111 / 0x8168	
	RTL8168 / 0x8168	
	RTL8169 / 0x8169	
	RTL8169SC/0x8167	
	RTL8169 / 0x4300	
	RTL8103 / 0x8136	
emllCCAT	Beckhoff CCAT	x86 x64
	CX2xxx, CX5xxx;	
	CX9020	

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3 System Configuration

3.1 Installation Guide

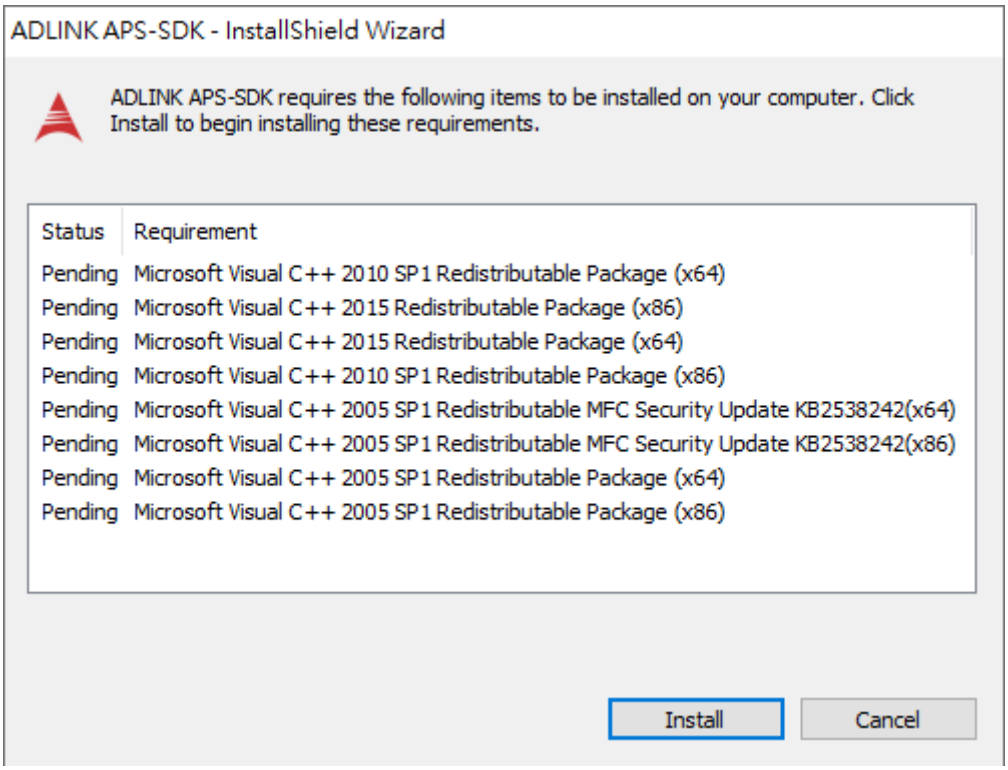
There are two SuperCAT packages:

- **APS SDK**: Includes all APIs for users to develop their own applications for ALDINK motion control products
- **EMA Core SDK**: Used for SuperCAT only. It provides the real-time environment for the EtherCAT master stack

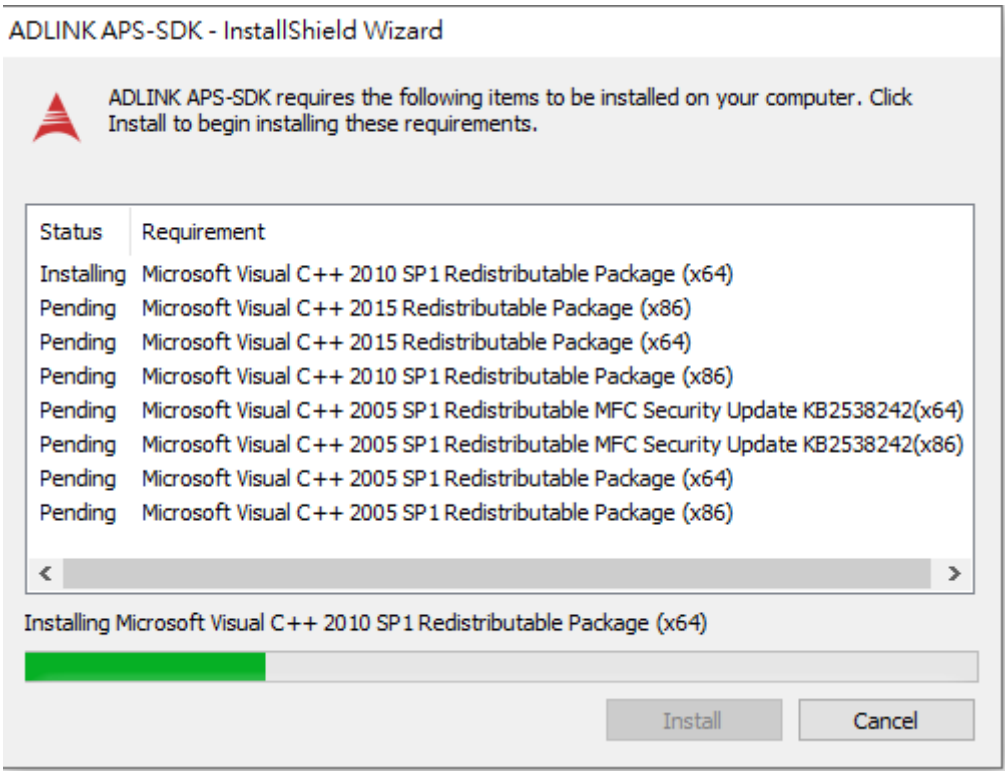
3.1.1 Installing EMA Core and APS SDK

The EMA Core SDK and APS SDK require the Microsoft Visual C++ 2022 Redistributable package pre-installed.

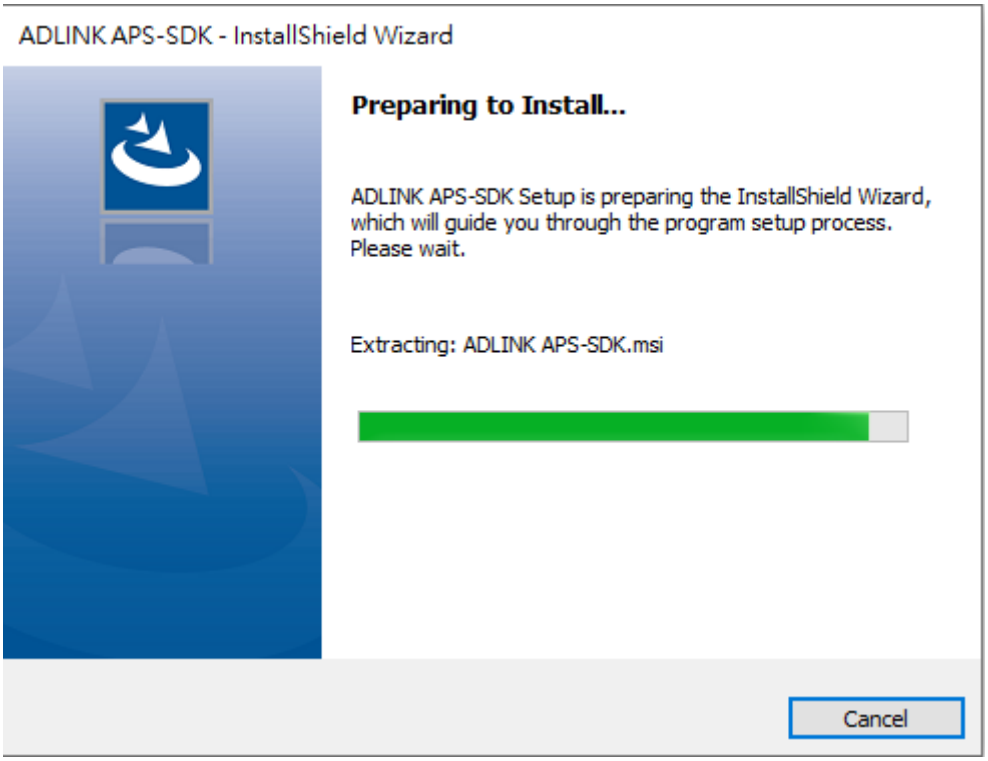
Step 1: Run the APS SDK executable, and then click **Install**.



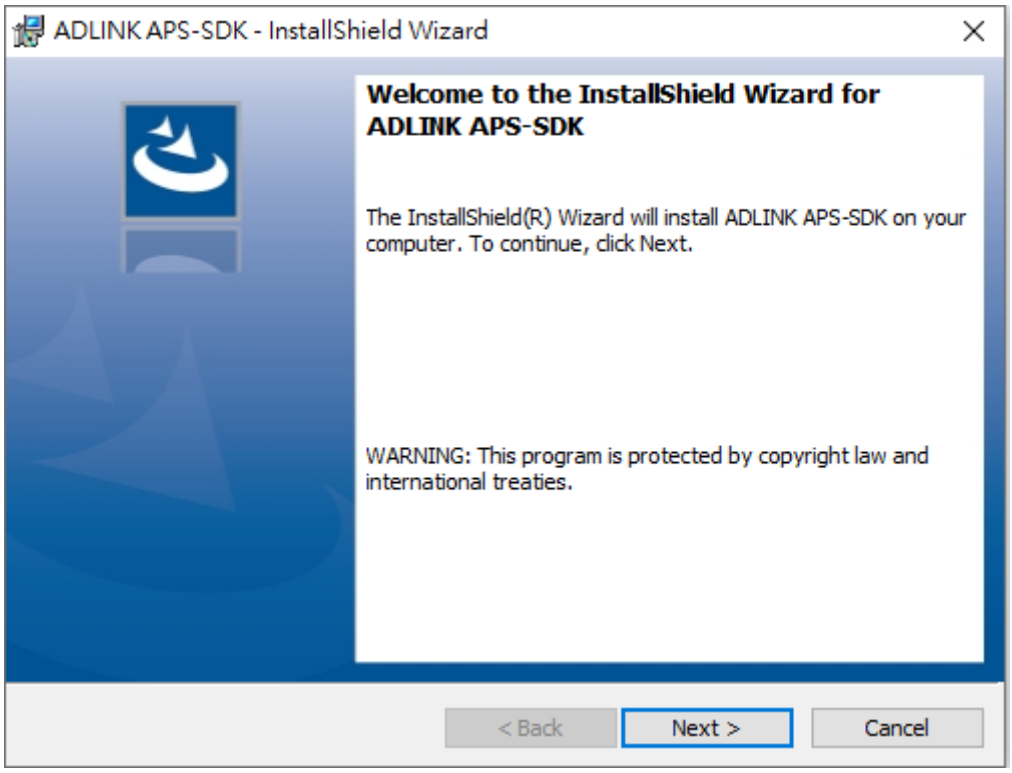
The Microsoft Visual C++ 2022 Redistributable package begins installing.



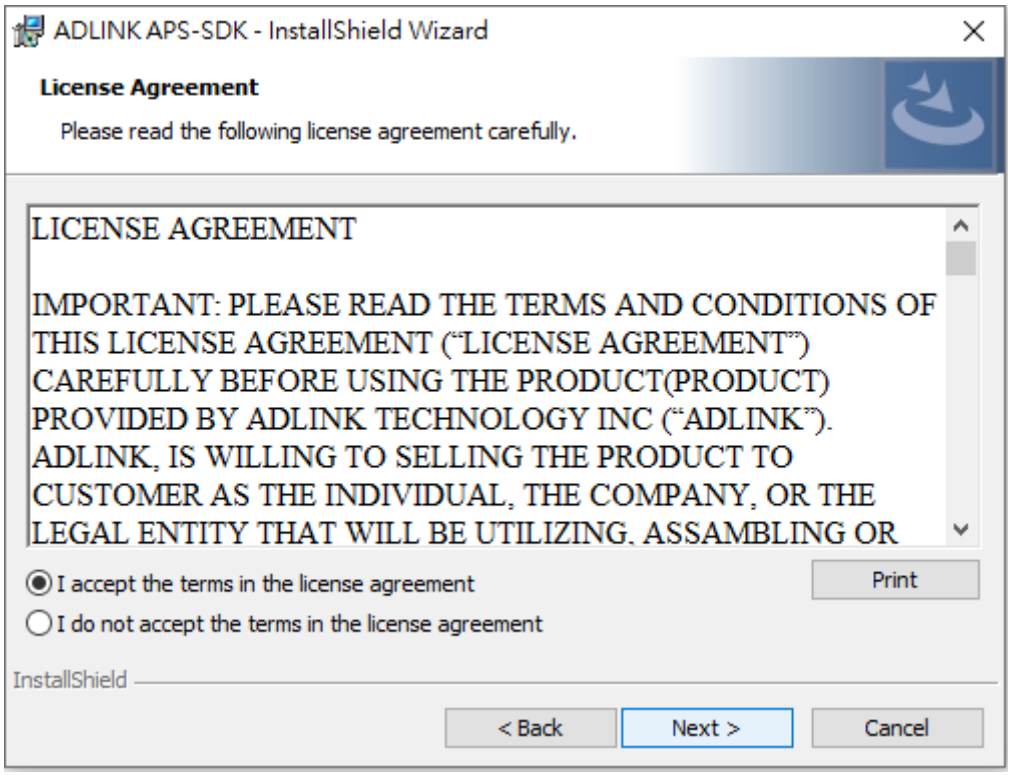
Step 2: After the Microsoft Visual C++ 2022 Redistributable package finishes installing, the APS SDK begins installing.



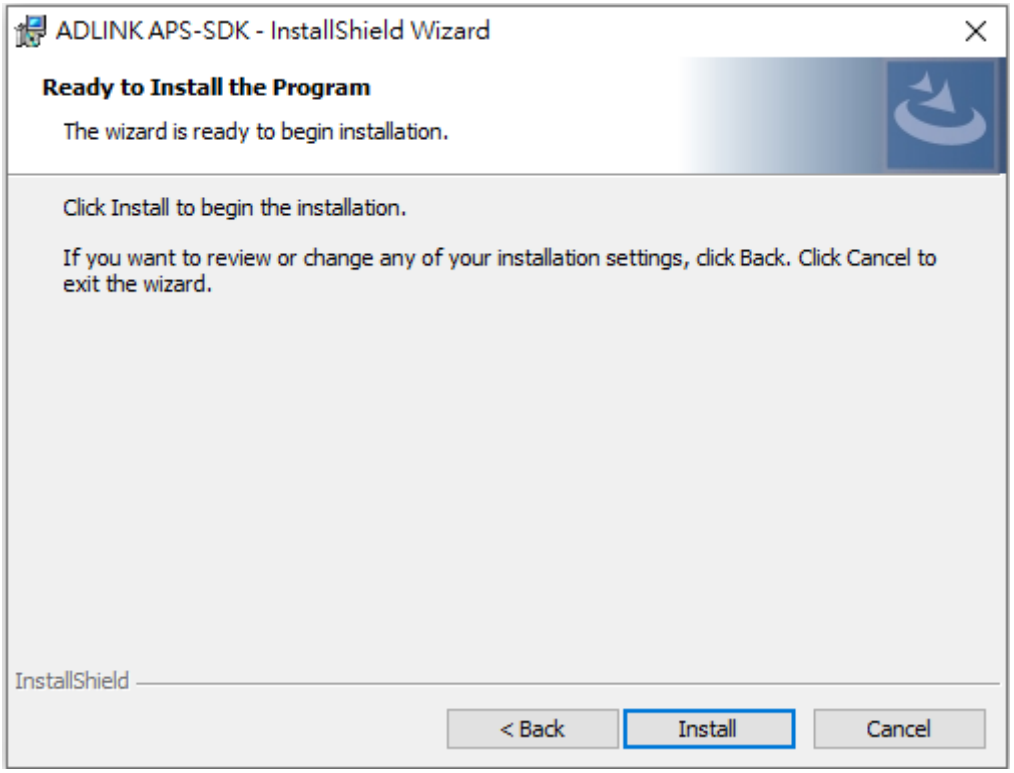
Step 3: After the installation file is extracted, the ADLINK APS-SDK installation dialog displays. Click **Next** to continue.



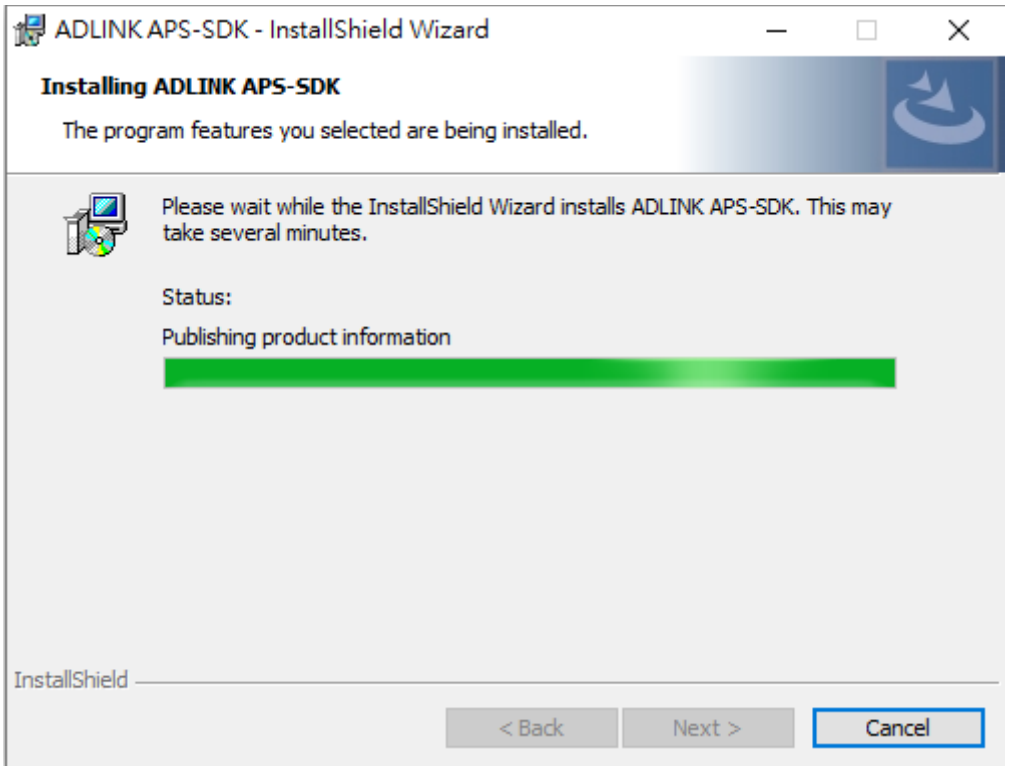
Step 4: Select **I accept the terms in the license agreement** and then click **Next**. (The installation process will be aborted if the terms in the license agreement are not accepted.)



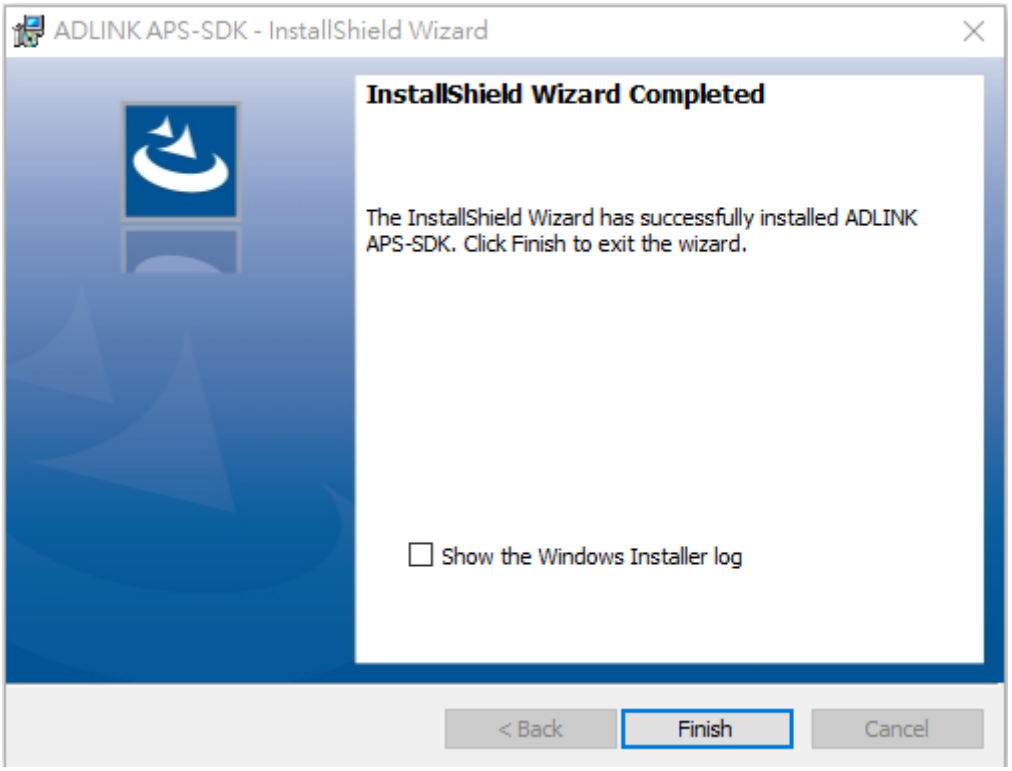
Step 5: Click **Install** to install the APS SDK.



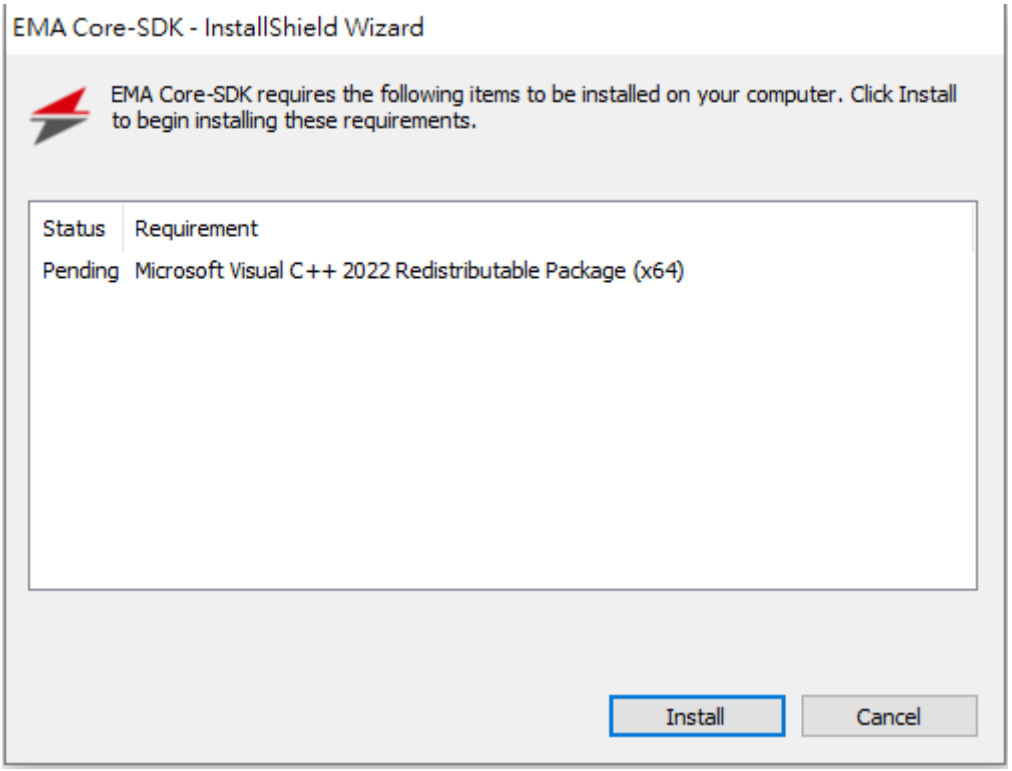
APS SDK begins installing.



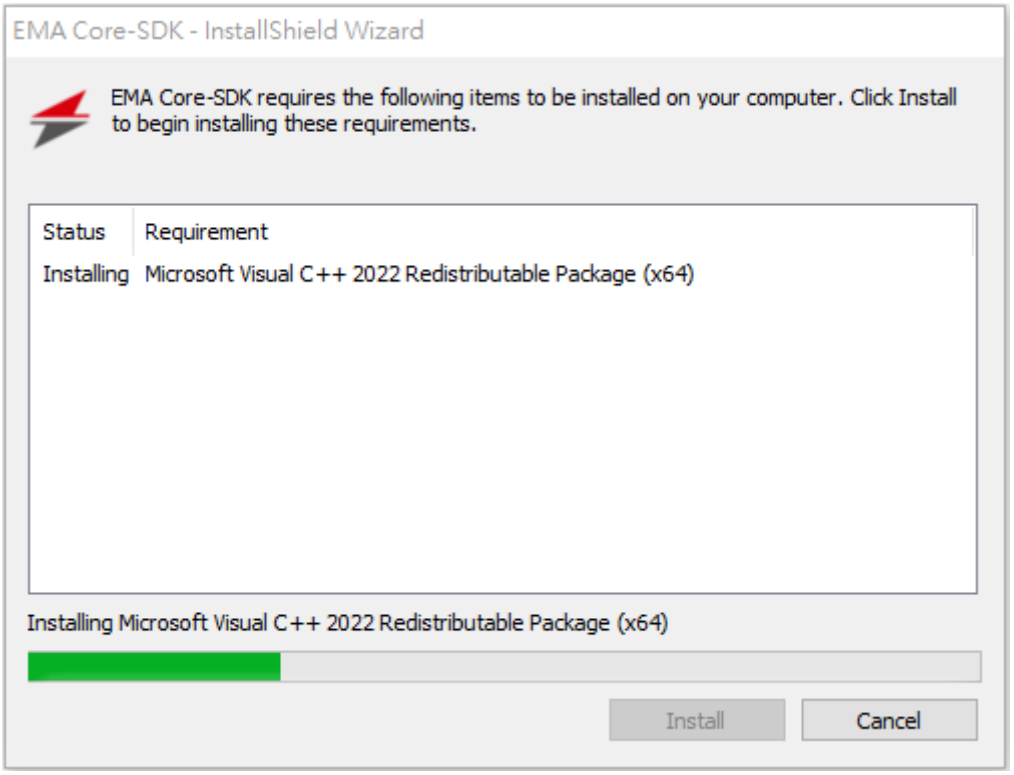
Step 6: Once the APS SDK installation is complete, click **Finish**.



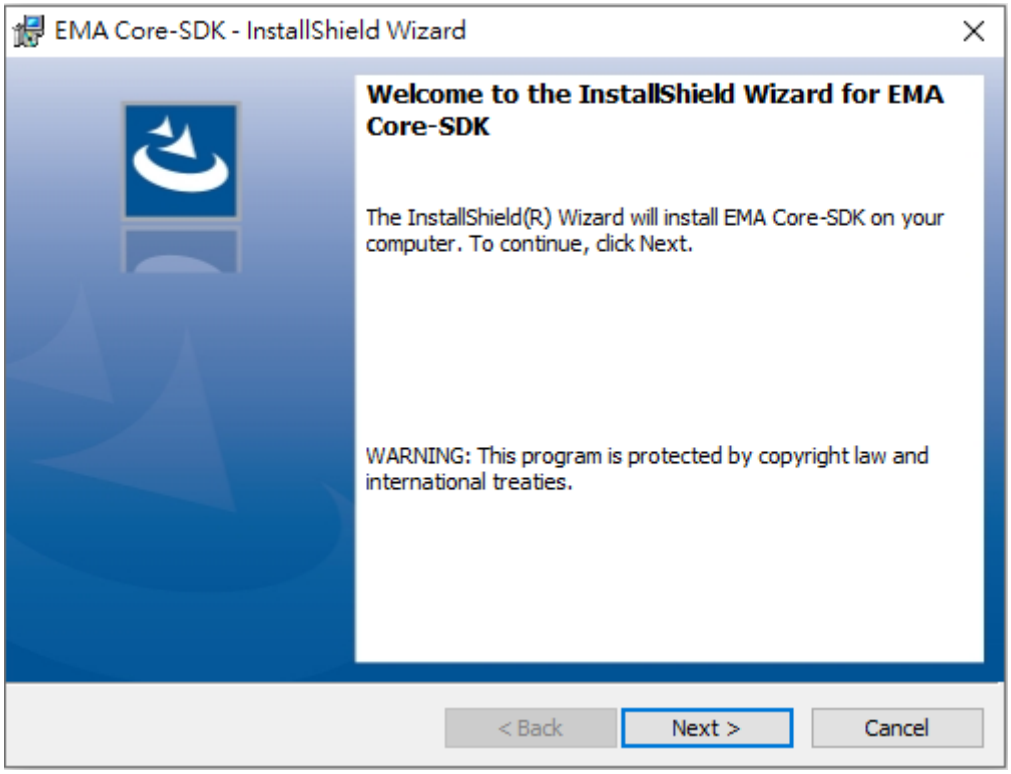
Step 7: After the APS SDK installation has completed, execute the EMA Core SDK installation file and then click **Install** to continue installing the Visual C++ 2022 Redistributable package.



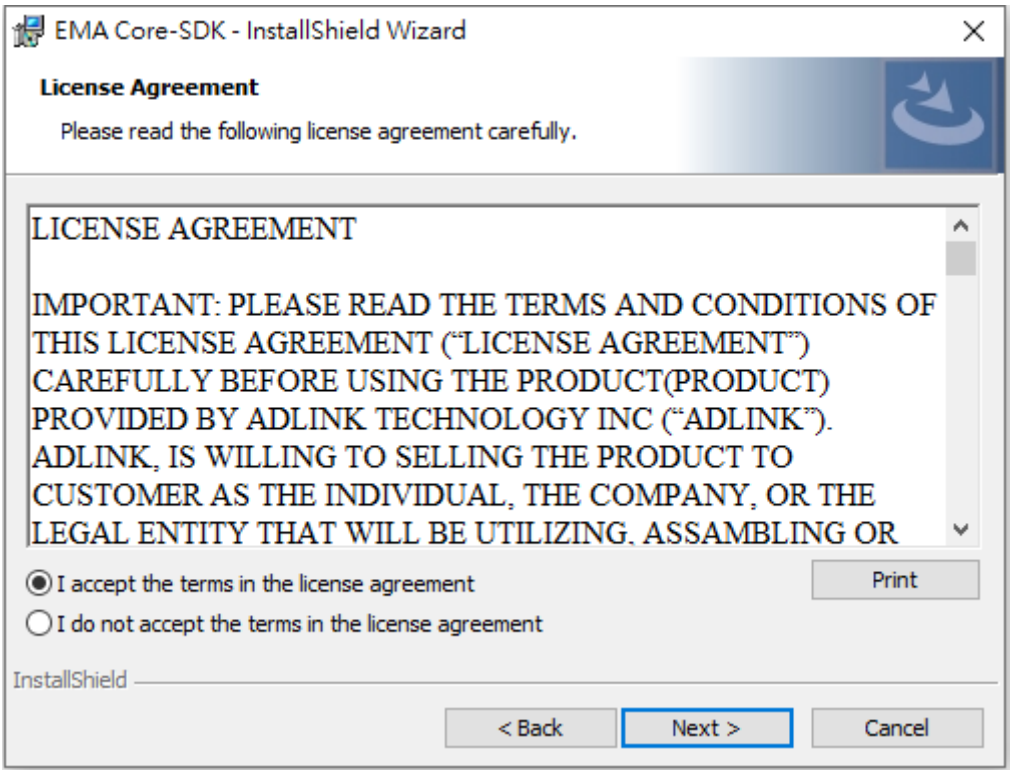
The Visual C++ 2022 Redistributable package starts installing.



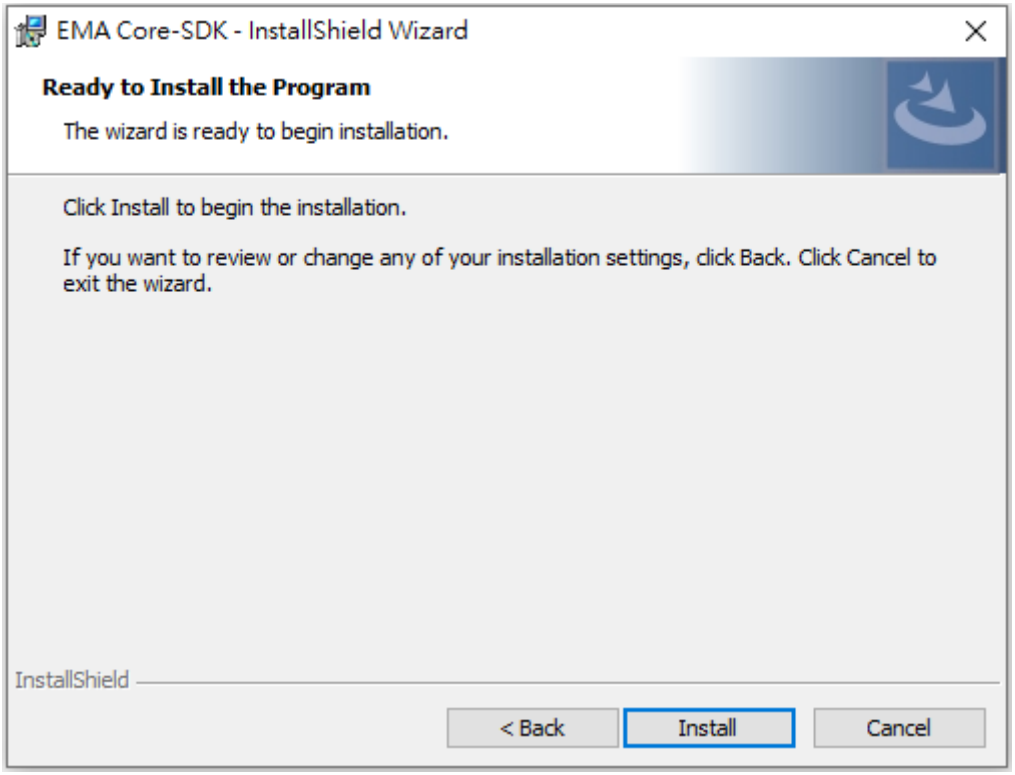
Step 8: After the Visual C++ 2022 Redistributable package installation is completed, the EMA Core SDK begins installing. Click **Next** to install the EMA Core SDK.



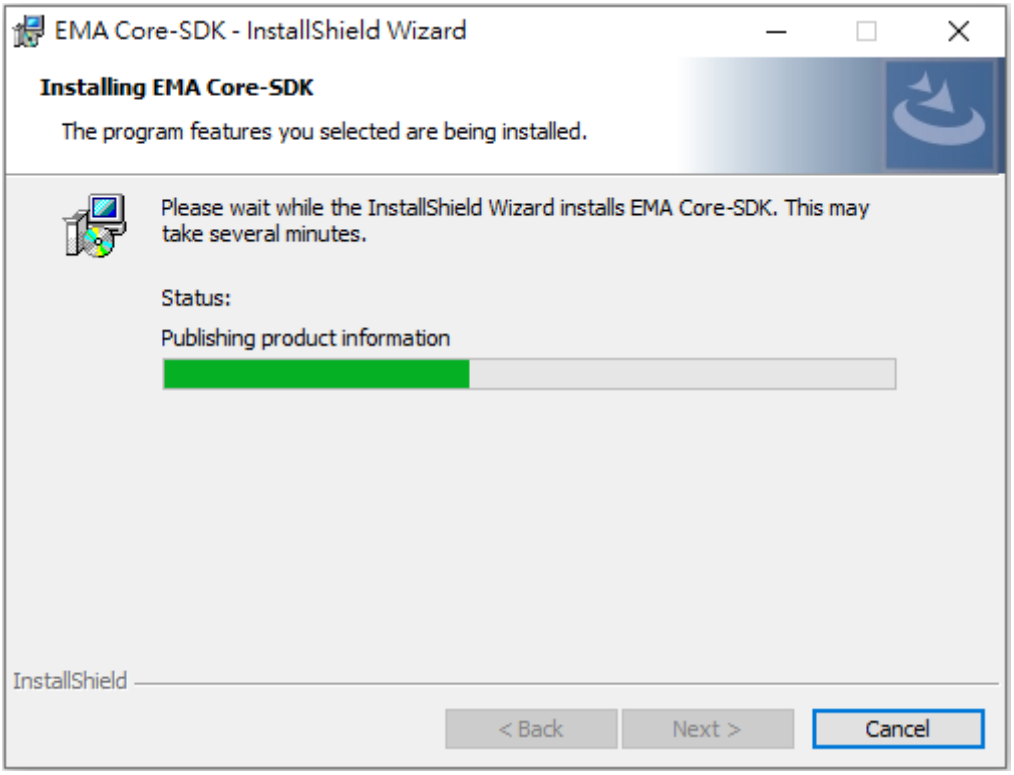
Step 9: Select **I accept the terms in the license agreement** and then click **Next**. (The installation process will be aborted if the terms in the license agreement are not accepted.)



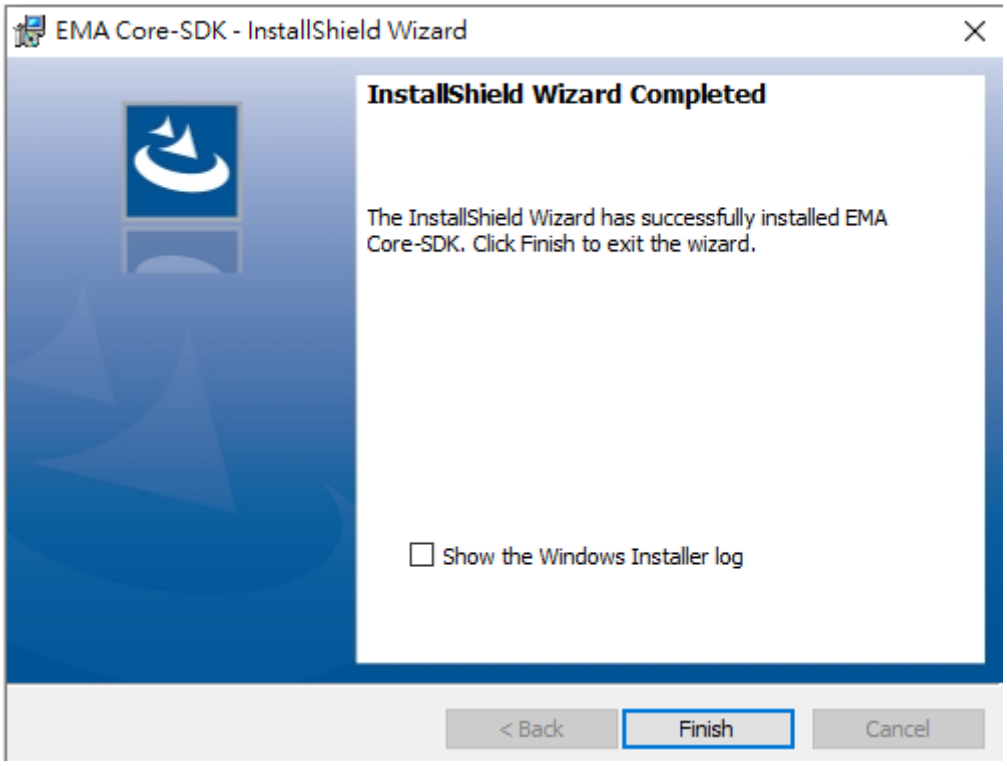
Step 10: Click **Install** to continue installing the EMA Core SDK.



The EMA Core SDK begins installing.



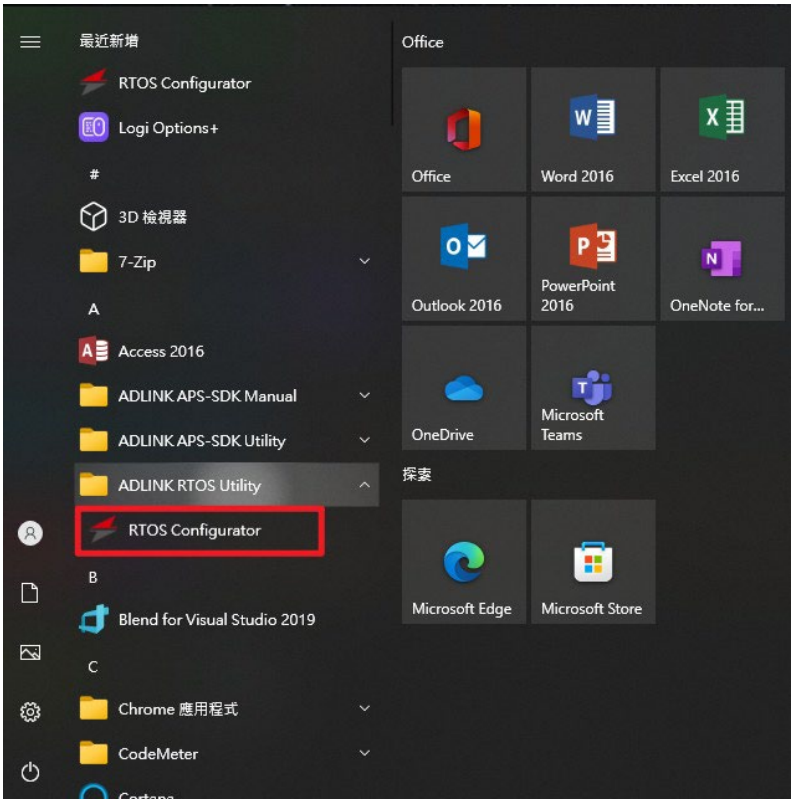
Step 11: When the EMA Core SDK installation is completed, click **Finish**.



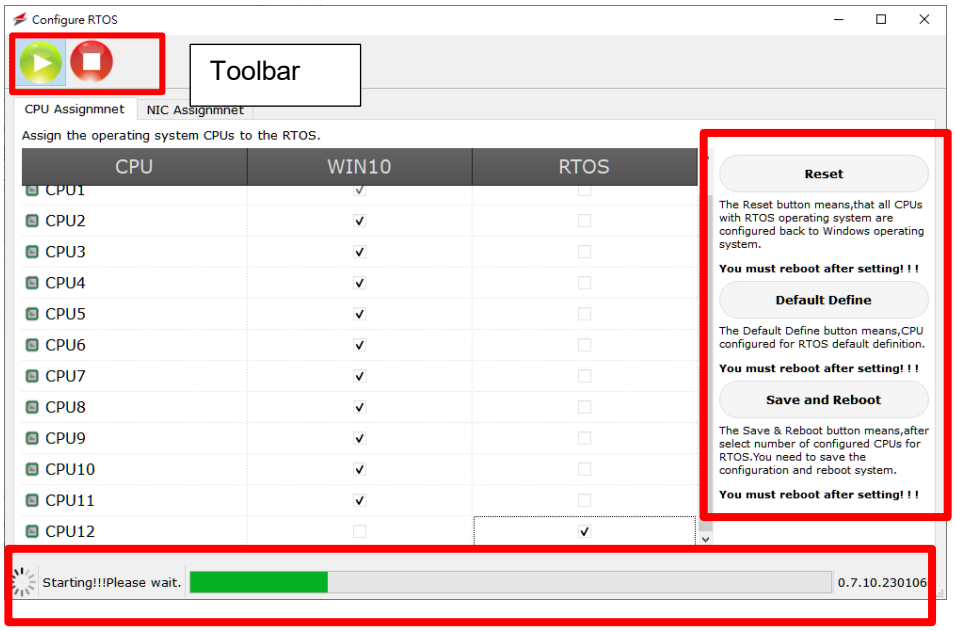
3.2 RTOS Configurator Tool

3.2.1 Start RTOS Configurator

Select RTOS Configurator from the Start menu.



3.2.2 CPU Assignment for RTOS



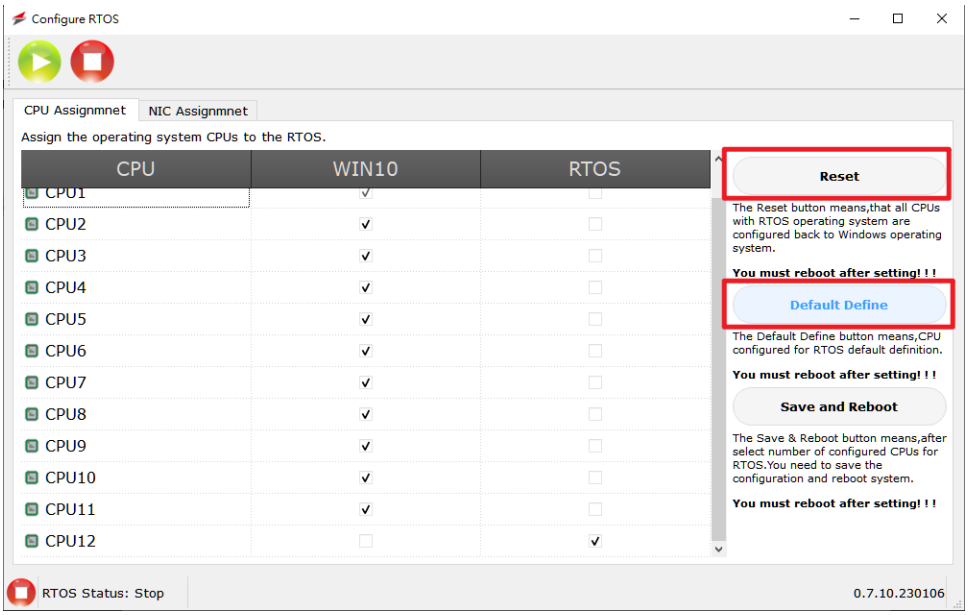
Control Zone

Configure button and function description

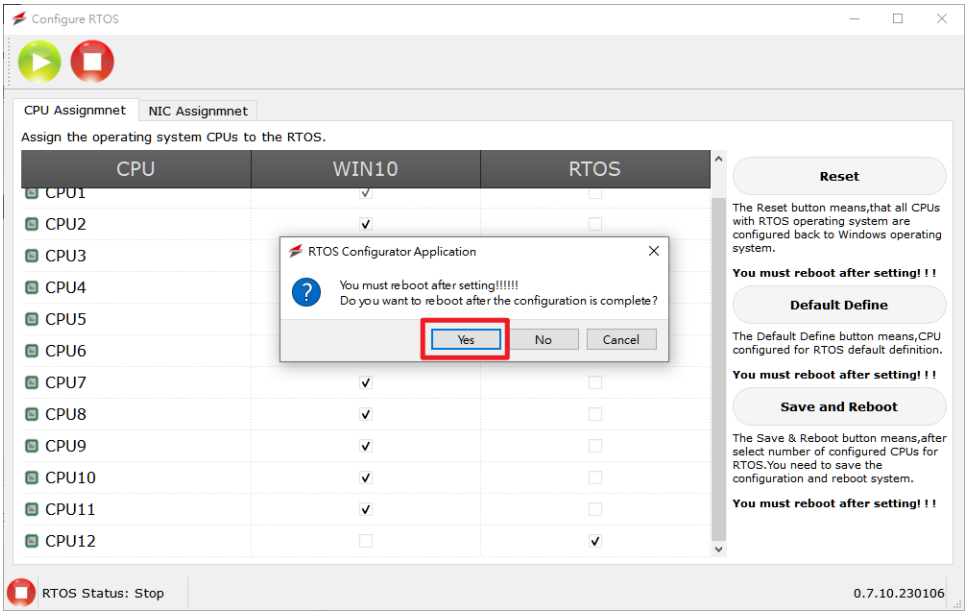
Message bar and Status

Reset: All CPU cores with the RTOS operating system are configured back to the Windows operating system. The system must be rebooted after selecting this setting.

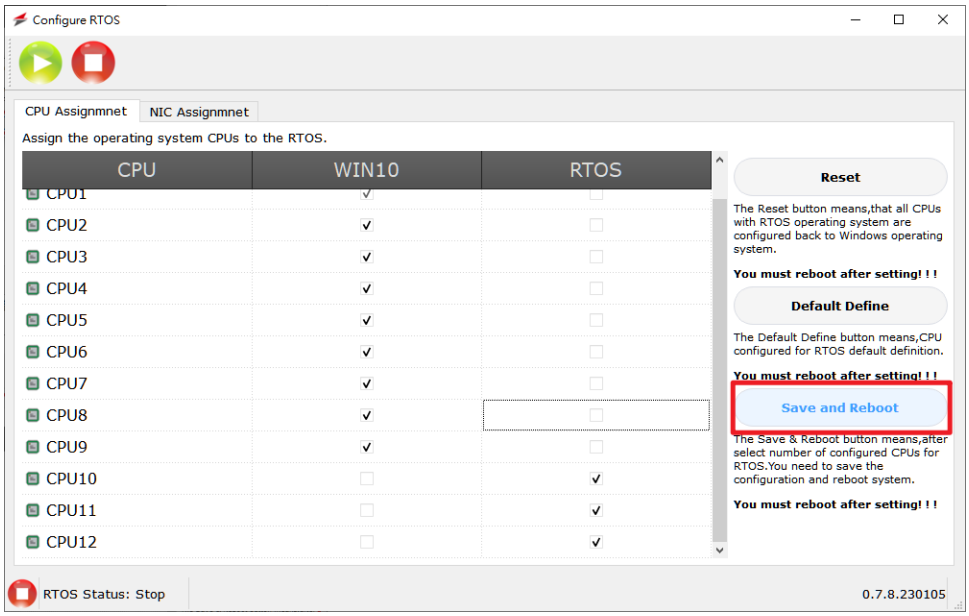
Default Define: CPU cores are configured for RTOS default definition. The system must be rebooted after selecting this setting.



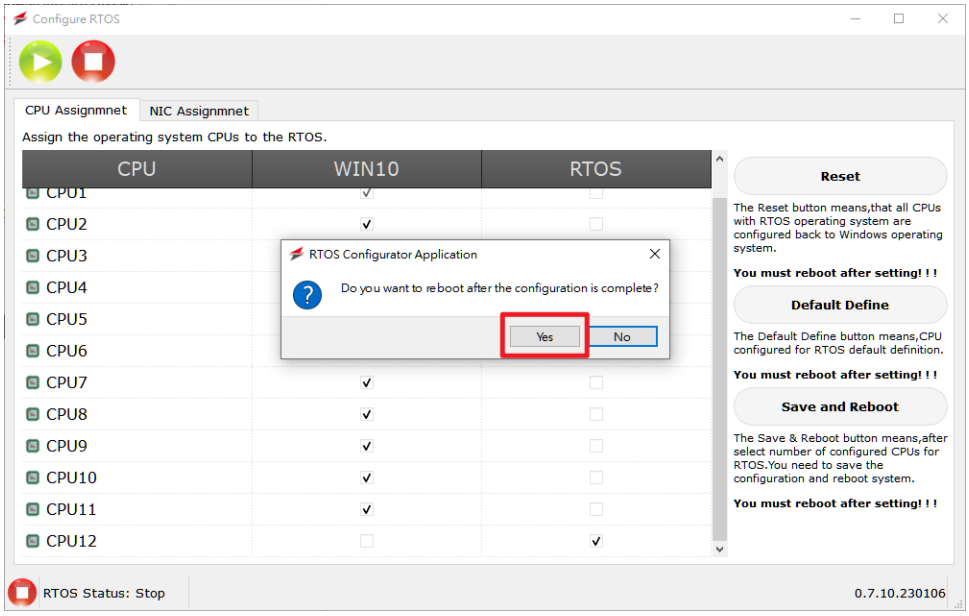
When prompted to reboot the system, click **Yes**.



Save and Reboot: After selecting the number of configured cores for RTOS, you need to save the changes and reboot system.



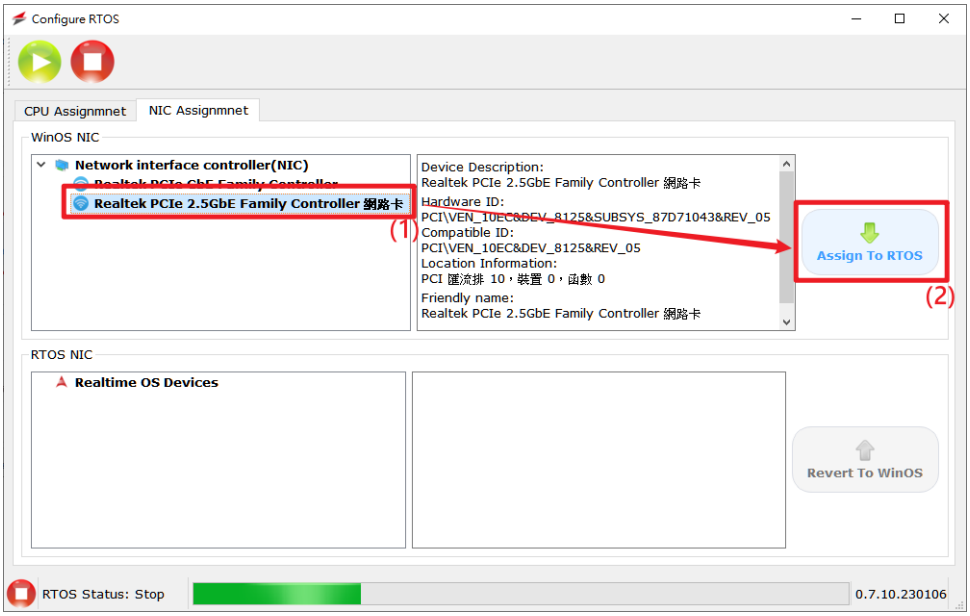
When prompted to reboot the system, click **Yes**.



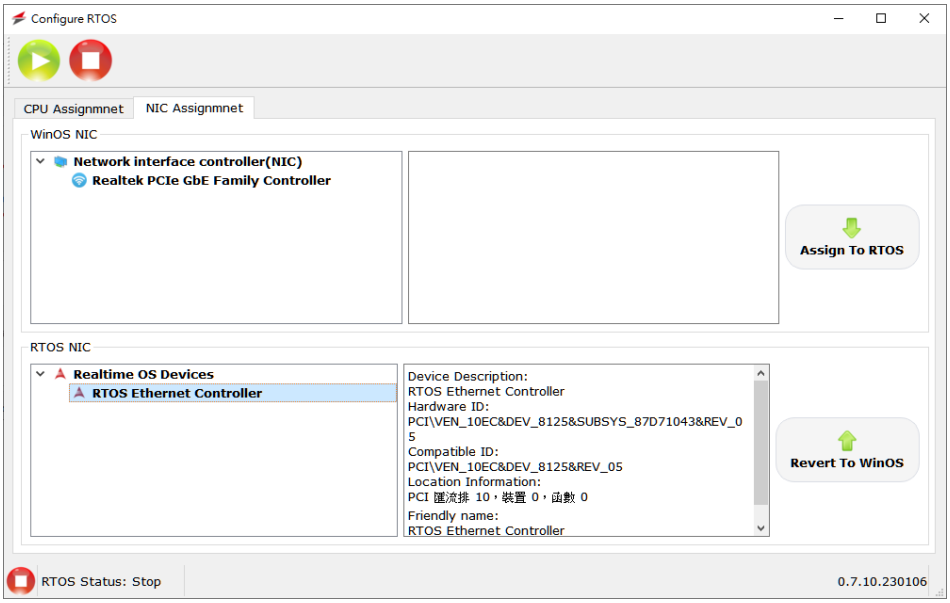
3.2.1 NIC Assignment for RTOS

Assign To RTOS:

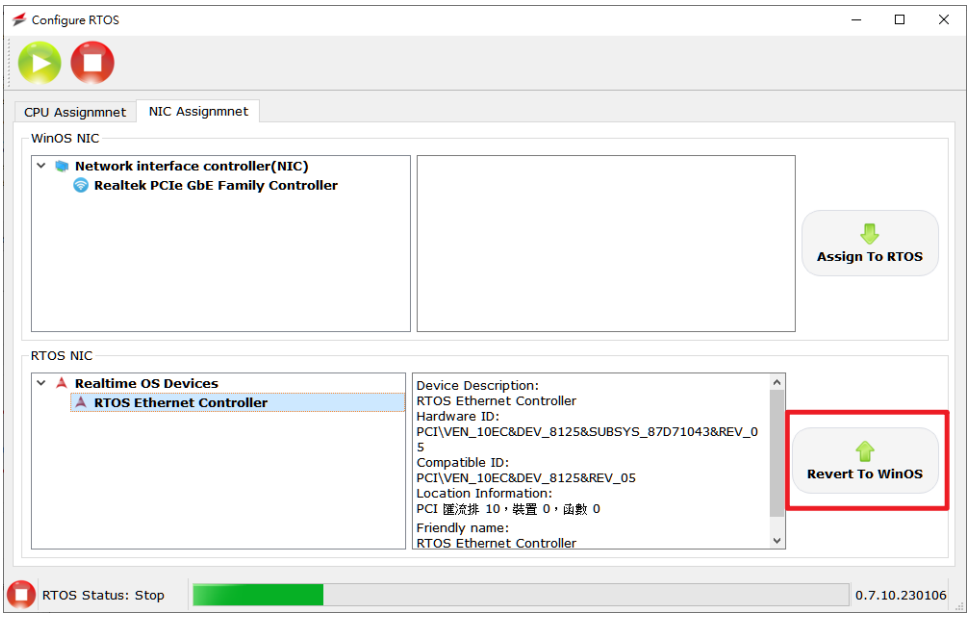
1. Select the NIC from the Supported Network Controllers.
2. Click **Assign to RTOS** to select the NIC as EtherCAT LAN.



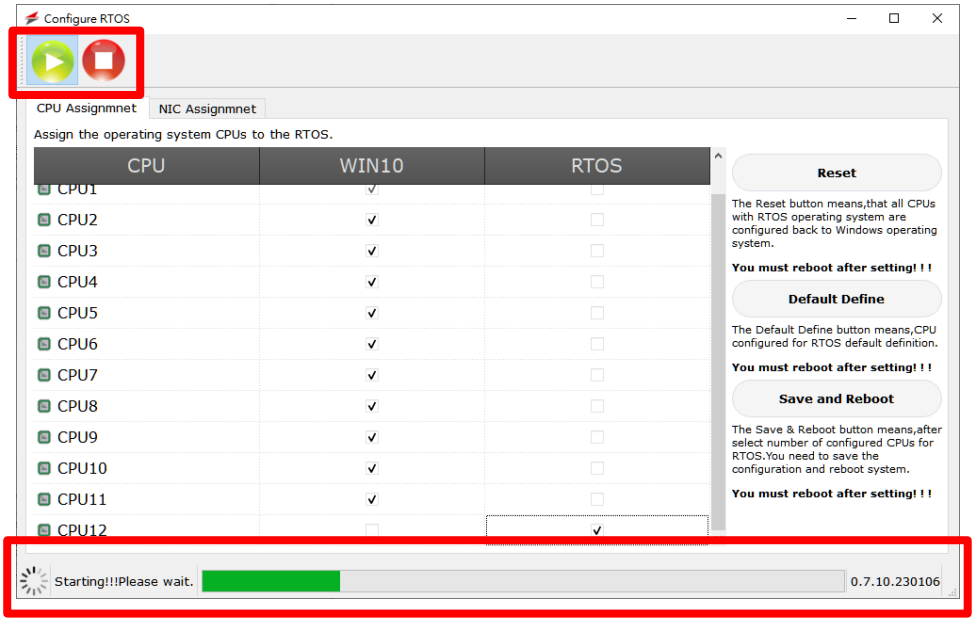
After configuration is finished, the settings will be shown as below.



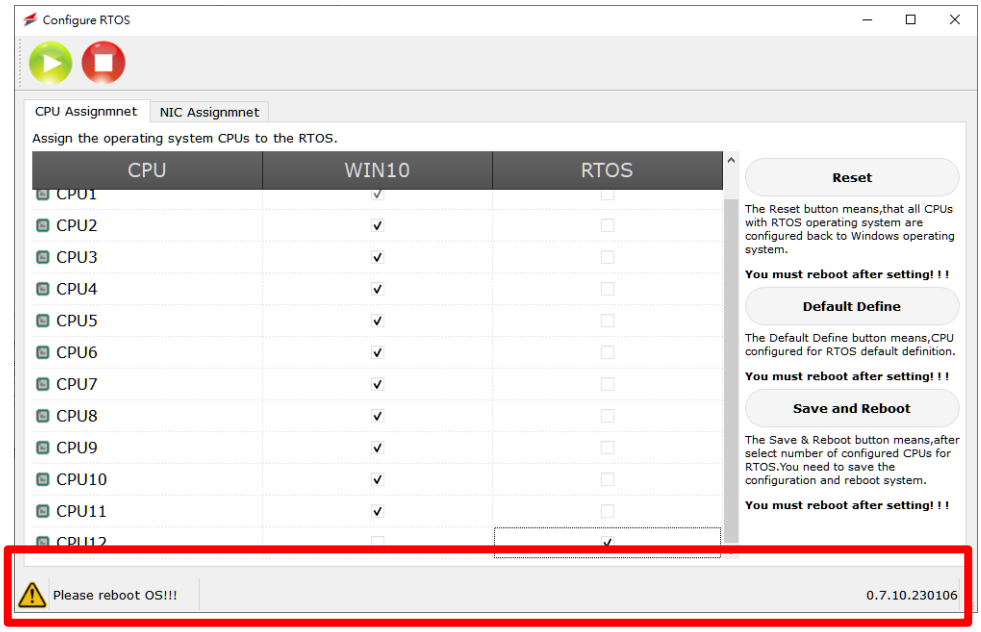
Revert To WinOS: Clicking this item returns all NICs to the Windows configuration.



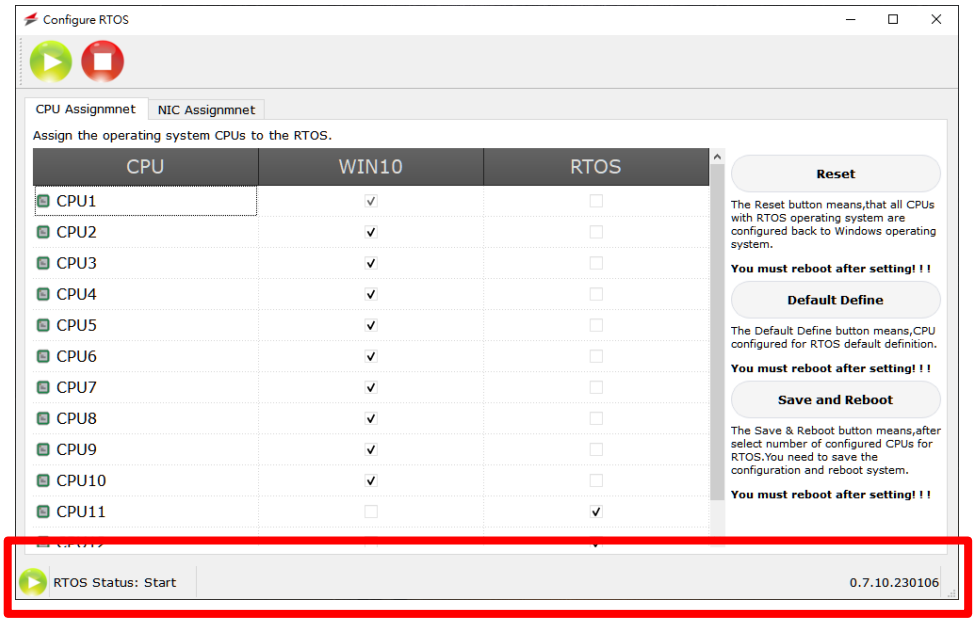
Start / Stop RTOS: Click the Run or Stop buttons to affect SuperCAT operations in real-time.



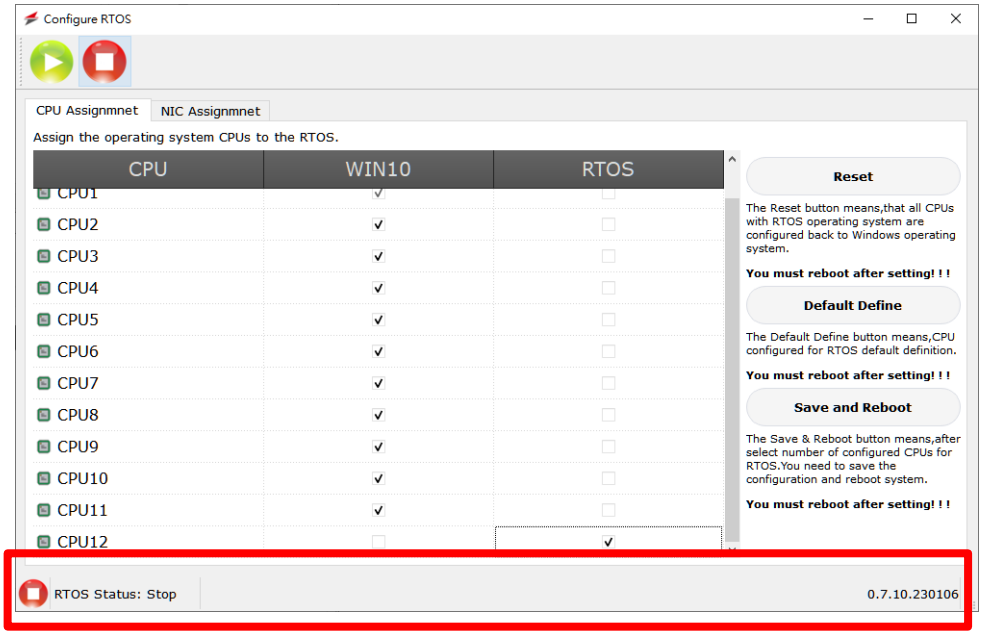
If SuperCAT cannot work normally, a message will display indicating **Please reboot OS!!!**. Reboot the system and try again.



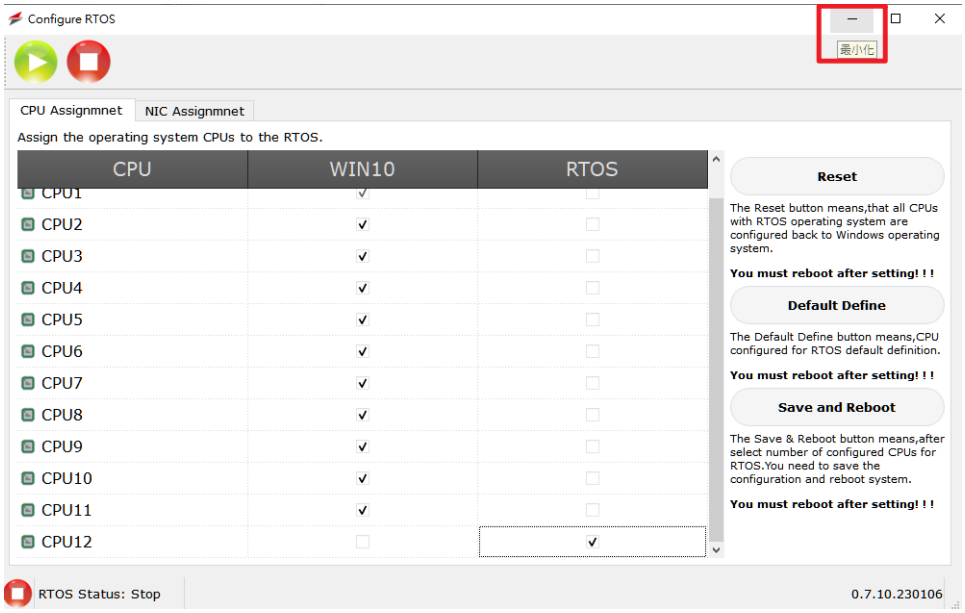
When the message bar displays **RTOS Status: Start**, the SuperCAT run-time operation is working.



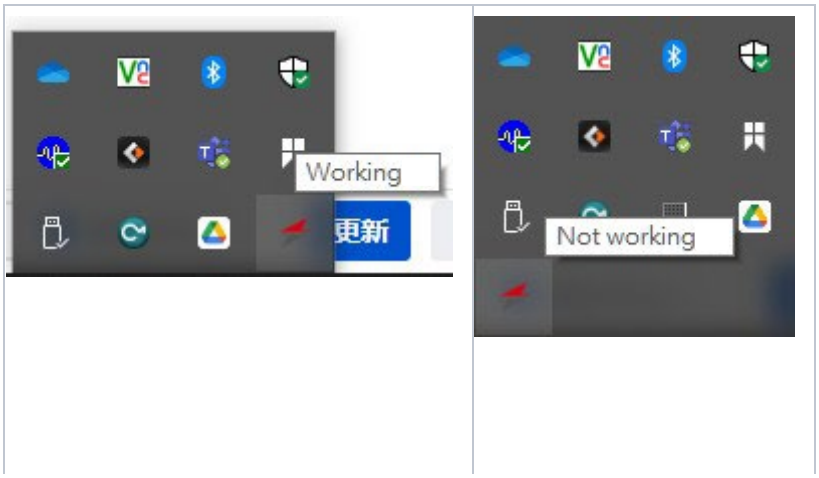
Clicking the **Stop** button during SuperCAT run-time will display **RTOS Status: STOP** in the message bar.



Click the minimize button to have the GUI minimize to the system tray.



Hovering over the SuperCAT icon in system tray indicates the current run-time status. **Working** means the SuperCAT run-time is running, while **Not working** means the SuperCAT run-time has stopped.



4 Appendix

4.1 SuperCAT Function Support List

Function name	Description	EM-xP00	EM-xC00	EM-xA00
System & Initialization				
APS_initial	Device initialization	✓	✓	✓
APS_close	Device close	✓	✓	✓
APS_version	Get the version of the library	✓	✓	✓
APS_device_driver_version	Get the device driver version	✓	✓	✓
APS_get_axis_info	Get the information of the specified axis	✓	✓	✓
APS_get_card_name	Get card index	✓	✓	✓
APS_disable_device	Disable cards	✓	✓	✓
APS_set_board_param	Set board parameter	✓	✓	✓
APS_get_board_param	Get board parameter	✓	✓	✓
APS_set_axis_param	Set axis parameter	✓	✓	✓
APS_get_axis_param	Get axis parameter	✓	✓	✓
APS_set_axis_param_f	Set axis parameter by double	✓	✓	✓
APS_get_axis_param_f	Get axis parameter by double	✓	✓	✓
APS_get_system_timer	Get system timer counter	✓	✓	✓
APS_get_device_info	Get device information	✓	✓	✓
APS_get_first_axisId		✓	✓	✓
APS_save_parameter_to_flash	Save system & axes parameters to flash	✓	✓	✓
APS_load_parameter_from_flash	Load system & axes parameters from flash	✓	✓	✓
APS_load_parameter_from_default	Load system & axes parameters by default value.	✓	✓	✓
APS_set_security_key	Set security password	X	X	X
APS_check_security_key	Verify security password	X	X	X
APS_reset_security_key	Reset security password	X	X	X
APS_save_param_to_file	Save parameters to file	X	X	X
APS_load_param_from_file	Load parameters from file	✓	✓	✓
APS_load_config_from_file	Load configure file to card. Each card would have different function with option argument.	✓	✓	✓
Motion IO and motion status				
APS_motion_status	Return motion status	✓	✓	✓
APS_motion_status_async	Return motion status while async mode enable	✓	✓	✓
APS_motion_io_status	Return motion IO status	✓	✓	✓
APS_motion_io_status_async	Return motion IO status while async mode enable	✓	✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_set_servo_on	Set servo ON/OFF	✓	✓	✓
APS_get_position_f	Get feedback position by double	✓	✓	✓
APS_get_position_f_async	Get feedback position by double while async mode enable	✓	✓	✓
APS_set_position_f	Set feedback position by double	✓	✓	✓
APS_get_command_f	Get command position by double	✓	✓	✓
APS_get_command_f_async	Get command position by double while async mode enable	✓	✓	✓
APS_set_command_f	Set command position by double	✓	✓	✓
APS_get_error_position_f	Get error position by double	✓	✓	✓
APS_get_target_position_f	Get target position by double	✓	✓	✓
APS_get_command_velocity_f	Get command velocity by double	✓	✓	✓
APS_get_feedback_velocity_f	Get feedback velocity by double	✓	✓	✓
APS_get_mq_free_space	Get free space of motion queue	✓	✓	✓
APS_get_mq_usage	Get usage of motion queue	✓	✓	✓
APS_get_stop_code	Get stop code	✓	✓	✓
APS_get_encoder	Get raw feedback counter	✓	✓	✓
APS_get_command_counter	Get raw command counter	✓	✓	✓
APS_reset_command_counter	Reset raw command counter	✓	✓	✓
Single axis motion				
APS_home_move	Begin a home move	✓	✓	✓
APS_stop_move	Stop move	✓	✓	✓
APS_emg_stop	Emergency stop	✓	✓	✓
Multi-axes move trigger & stop				
APS_move_trigger	Send a trigger to sync all waiting moves		✓	✓
APS_stop_move_multi	Multi-axes stop move		✓	✓
APS_emg_stop_multi	Multi-axes emg stop move		✓	✓
Jog move				
APS_jog_start	Start / stop jog move		✓	✓
Advanced single move & interpolation				
APS_ptp	Begin a single move	✓	✓	✓
APS_ptp_v	Begin a single move with Vm profile	✓	✓	✓
APS_ptp_all	Begin a single move with all profile	✓	✓	✓
APS_vel	Begin a velocity move	✓	✓	✓
APS_vel_all	Begin a velocity move with all profile	✓	✓	✓
APS_line	Begin a line move	✓	✓	✓
APS_line_v	Begin a line move with Vm profile	✓	✓	✓
APS_line_all	Begin a line move with all profile	✓	✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_arc2_ca	Begin an Arc2 move of angle type		✓	✓
APS_arc2_ca_v	Begin an Arc2 move of angle type with Vm profile		✓	✓
APS_arc2_ca_all	Begin an Arc2 move of angle type with all profile		✓	✓
APS_arc2_ce	Begin an Arc2 move of end position		✓	✓
APS_arc2_ce_v	Begin an Arc2 move of end position with Vm profile		✓	✓
APS_arc2_ce_all	Begin an Arc2 move of end position with all profile		✓	✓
APS_arc3_ca	Begin an Arc3 move of angle type		✓	✓
APS_arc3_ca_v	Begin an Arc3 move of angle type with Vm profile		✓	✓
APS_arc3_ca_all	Begin an Arc3 move of angle type with all profile		✓	✓
APS_arc3_ce	Begin an Arc3 move of end position		✓	✓
APS_arc3_ce_v	Begin an Arc3 move of end position with Vm profile		✓	✓
APS_arc3_ce_all	Begin an Arc3 move of end position with all profile		✓	✓
APS_spiral_ca	Begin a 3D spiral-helix move of angle type		✓	✓
APS_spiral_ca_v	Begin a 3D spiral-helix move of angle type with Vm profile		✓	✓
APS_spiral_ca_all	Begin a 3D spiral-helix move of angle type with all profile		✓	✓
APS_spiral_ce	Begin a 3D spiral-helix move of end position		✓	✓
APS_spiral_ce_v	Begin a 3D spiral-helix move of end position with Vm profile		✓	✓
APS_spiral_ce_all	Begin a 3D spiral-helix move of end position with all profile		✓	✓
Interrupt				
APS_int_enable	Interrupt main switch	✓	✓	✓
APS_set_int_factor	Enable/Disable interrupt factor and get interrupt handle.	✓	✓	✓
APS_get_int_factor	Get interrupt factor enable or disable	✓	✓	✓
APS_wait_single_int	Wait single interrupt event	✓	✓	✓
APS_wait_multiple_int	Wait multiple interrupt events	✓	✓	✓
APS_wait_error_int	Wait error interrupts(Non-mask) (HW function)			
APS_reset_int	Reset interrupt event to non-signaled state.	✓	✓	✓
APS_set_int	Set interrupt event to signaled state.	✓	✓	✓
APS_set_int_factorH	Enable/Disable interrupt factor and get interrupt handle.(Win32)	✓	✓	✓
APS_int_no_to_handle	Convert interrupt event number to interrupt handle.(Win32)			

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_register_int_callback	Register callback function while interrupt occurred	✓	✓	✓
Sampling				
APS_set_sampling_param	Set sampling parameter.	✓	✓	✓
APS_get_sampling_param	Get sampling parameter.	✓	✓	✓
APS_wait_trigger_sampling	Waiting for sample data.	✓	✓	✓
APS_wait_trigger_sampling_async	Waiting for sample data asynchronously	✓	✓	✓
APS_get_sampling_count	Get sampled data count.	✓	✓	✓
APS_stop_wait_sampling	Force stop wait sampling	✓	✓	✓
APS_auto_sampling	Start/Stop auto sampling	✓	✓	✓
APS_get_sampling_data	Get sampling data in auto sampling mode by 4 Channels.	✓	✓	✓
APS_set_sampling_param_ex	Set sampling parameter by structure. It is an extension to 8 channels.	✓	✓	✓
APS_get_sampling_param_ex	Get sampling parameter by structure. It is an extension to 8 channels.	✓	✓	✓
APS_wait_trigger_sampling_ex	Waiting for sample data. It is an extension to 8 channels.	✓	✓	✓
APS_wait_trigger_sampling_async_ex	Waiting for sample data asynchronously. It is an extension to 8 channels.	✓	✓	✓
APS_get_sampling_data_ex	Get sampling data in auto sampling mode. It is an extension to 8 channels.	✓	✓	✓
APS_set_sampling_param_advanced	Set 16 channel sampling parameter	✓	✓	✓
APS_get_sampling_param_ advanced	Get 16 channel sampling parameter	✓	✓	✓
APS_wait_trigger_sampling_advanced	Waiting for 16 channel sample data.	✓	✓	✓
APS_wait_trigger_sampling_async_advanced	Waiting for 16 channel sample data asynchronously	✓	✓	✓
APS_get_sampling_data_advanced	Get sampling data in auto sampling mode by 16 Channels.	✓	✓	✓
DIO & AIO				
APS_set_field_bus_d_channel_output	Set field bus digital output by channel	✓	✓	✓
APS_get_field_bus_d_channel_output	Get field bus digital output by channel	✓	✓	✓
APS_get_field_bus_d_channel_input	Get field bus digital input by channel	✓	✓	✓
APS_set_field_bus_d_port_output	Set field bus digital output by port	✓	✓	✓
APS_get_field_bus_d_port_input	Get field bus digital input by port	✓	✓	✓
APS_get_field_bus_d_port_output	Get field bus digital output by port	✓	✓	✓
Advanced Point table				
APS_pt_enable	Enable point table.	✓	✓	✓
APS_pt_disable	Disable point table.	✓	✓	✓
APS_get_pt_info	Get information of point table.	✓	✓	✓
APS_pt_set_vs	Set configuration of Vs to point table	✓	✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_pt_get_vs	Get configuration of Vs in the point table	✓	✓	✓
APS_pt_start	Set control command to point table	✓	✓	✓
APS_pt_stop	Stop point table	✓	✓	✓
APS_get_pt_status	Get status of point table	✓	✓	✓
APS_reset_pt_buffer	Reset buffer of point table	✓	✓	✓
APS_pt_roll_back	Rollback to previous point		✓	✓
APS_get_pt_error	Get error code of point table		✓	✓
APS_pt_dwell	Push a dwell move into point buffer of point table.		✓	✓
APS_pt_line	Push a line move into point buffer of point table.	✓	✓	✓
APS_pt_arc2_ca	Push a 2D arc move into point buffer of point table.		✓	✓
APS_pt_arc2_ce	Push a 2D arc move into point buffer of point table.		✓	✓
APS_pt_arc3_ca	Push a 3D arc move into point buffer of point table.			✓
APS_pt_arc3_ce	Push a 3D arc move into point buffer of point table.			✓
APS_pt_spiral_ca	Push a helical move into point buffer of point table.			✓
APS_pt_spiral_ce	Push a helical move into point buffer of point table.			✓
APS_pt_ext_set_do_ch	Set Do extension command into command buffer. Command buffer is active when pushing a move into point table.			✓
APS_pt_set_absolute	Set absolute profile into profile buffer.	✓	✓	✓
APS_pt_set_relative	Set relative profile into profile buffer.	✓	✓	✓
APS_pt_set_trans_buffered	Set transition to buffer mode in profile buffer.		✓	✓
APS_pt_set_trans_inp	Set transition to in-position mode in profile buffer.		✓	✓
APS_pt_set_trans_blend_dec	Set transition to blending mode with deceleration in profile buffer.		✓	✓
APS_pt_set_trans_blend_dist	Set transition to blending mode with residue distant in profile buffer.		✓	✓
APS_pt_set_trans_blend_pcnt	Set transition to blending mode with residue distant percentage in profile buffer.		✓	✓
APS_pt_set_acc	Set acceleration profile into profile buffer.	✓	✓	✓
APS_pt_set_dec	Set deceleration profile into profile buffer.	✓	✓	✓
APS_pt_set_acc_dec	Set acceleration / deceleration profile into profile buffer	✓	✓	✓
APS_pt_set_s	Set S-factor profile into profile buffer.		✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_pt_set_vm	Set maximum velocity profile into profile buffer.	✓	✓	✓
APS_pt_set_ve	Set end velocity profile into profile buffer.	✓	✓	✓
Field bus functions				
APS_scan_field_bus	Scan field bus and generate ENI file	✓	✓	✓
APS_start_field_bus	Start the network of specified field bus	✓	✓	✓
APS_stop_field_bus	Stop the network of specified field bus	✓	✓	✓
APS_set_field_bus_a_output	Set field bus analog output	✓	✓	✓
APS_get_field_bus_a_output	Get field bus analog output	✓	✓	✓
APS_get_field_bus_a_input	Get field bus analog input	✓	✓	✓
APS_get_slave_online_status	Get the online status of slave	✓	✓	✓
APS_get_field_bus_master_status	Get field bus master status	✓	✓	✓
APS_get_field_bus_last_scan_info	Get fieldbus info after system scanning.	✓	✓	✓
APS_get_field_bus_module_info	Get slave information	✓	✓	✓
APS_reset_field_bus_alarm	Reset the alarm signal of slave	✓	✓	✓
APS_get_field_bus_alarm	Get alarm code of slave	✓	✓	✓
APS_get_field_bus_pdo	Get value from PDO memory	✓	✓	✓
APS_set_field_bus_pdo	Set value to PDO memory	✓	✓	✓
APS_get_field_bus_pdo_offset	Get PDO information	✓	✓	✓
APS_get_field_bus_sdo	Get SDO data from slave	✓	✓	✓
APS_set_field_bus_sdo	Set SDO data to slave	✓	✓	✓
APS_set_field_bus_od_data	Set EtherCAT OD raw data	✓	✓	✓
APS_get_field_bus_od_data	Get EtherCAT OD raw data	✓	✓	✓
APS_get_field_bus_od_module_info	Get EtherCAT slave information	✓	✓	✓
APS_get_field_bus_module_map	Get mapped slave ID in manual ID mode	✓	✓	✓
APS_set_field_bus_module_map	Set mapped slave ID in manual ID mode	✓	✓	✓
APS_get_field_bus_slave_state	Get the status of slave's state machine	✓	✓	✓
APS_set_field_bus_slave_state	Set the status of slave's state machine	✓	✓	✓
APS_get_field_bus_ESC_register	Get EtherCAT Slave Controller register	✓	✓	✓
APS_set_field_bus_ESC_register	Set EtherCAT Slave Controller register	✓	✓	✓
APS_get_system_loading	Get system loop loading	✓	✓	✓
APS_get_field_bus_analysis_topology	Get current and past topology then analysis	✓	✓	✓
APS_get_field_bus_loss_package	Get the loss of EtherCAT frame count on receive bus direction.	✓	✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_set_drive_input_mapping	send the configuration CSV file of drive input mapping			
APS_set_trigger_output_mapping	send the configuration CSV file of trigger output mapping,			
Gear / Gantry functions				
APS_start_gear	Enable/Disable a specified gear mode		✓	✓
APS_get_gear_status	Get gear status		✓	✓
APS_get_gantry_number	Get number of this master's corresponding slaves		✓	✓
APS_get_gantry_info	Get slave axis ID array		✓	✓
APS_get_gantry_deviation	Get position deviation between master and slaves		✓	✓
Pitch error compensation functions				
APS_set_pitch_table	Set configurations and data of pitch error compensation table		✓	✓
APS_get_pitch_table	Get configurations and data of pitch error compensation table		✓	✓
APS_start_pitch_comp	Start pitch error compensation		✓	✓
Field bus Compare trigger				
APS_set_field_bus_trigger_param	Set compare trigger related parameter	✓	✓	✓
APS_get_field_bus_trigger_param	Get compare trigger related parameter	✓	✓	✓
APS_set_field_bus_trigger_linear	Set linear comparing function	✓	✓	✓
APS_set_field_bus_trigger_table	Set table comparing function	✓	✓	✓
APS_set_field_bus_trigger_manual	Manual output trigger	✓	✓	✓
APS_set_field_bus_trigger_manual_s	Manual output trigger synchronously	✓	✓	✓
APS_get_field_bus_trigger_table_cmp	Get current table comparing value	✓	✓	✓
APS_get_field_bus_trigger_linear_cmp	Get current linear comparing value	✓	✓	✓
APS_get_field_bus_trigger_count	Get triggered count.	✓	✓	✓
APS_reset_field_bus_trigger_count	Reset triggered count.	✓	✓	✓
APS_get_field_bus_linear_cmp_remain_count	Get remaining counter of linear comparator	✓	✓	✓
APS_get_field_bus_table_cmp_remain_count	Get remaining counter of table comparator	✓	✓	✓
APS_get_field_bus_encoder	Get encoder counter	✓	✓	✓
APS_set_field_bus_encoder	Set encoder counter	✓	✓	✓
APS_get_field_bus_timer_counter	Get the timer counter value.	✓	✓	✓
APS_set_field_bus_timer_counter	Set timer count value. The timer is used to simulate for encoder, and be comparator source.	✓	✓	✓
APS_set_field_bus_multi_trigger_table	Push data in table (FIFO) for comparing. There are two comparators designed for multi-dimension comparing application	✓	✓	✓

Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_get_field_bus_multi_trigger_table_cmp	Get current comparing value in the specified multi-dimension table comparator	✓	✓	✓
APS_get_field_bus_multi_table_cmp_remain_count	Used to get remaining counter of multi-dimension comparator.	✓	✓	✓
Field bus position latch functions				
APS_get_field_bus_ltc_fifo_point	Get latch point array.	✓	✓	✓
APS_set_field_bus_ltc_fifo_param	Set latch parameter value.	✓	✓	✓
APS_get_field_bus_ltc_fifo_param	Get latch parameter value.	✓	✓	✓
APS_reset_field_bus_ltc_fifo	Reset latch queue and fifo.	✓	✓	✓
APS_get_field_bus_ltc_fifo_usage	Get latch queue used space.	✓	✓	✓
APS_get_field_bus_ltc_fifo_free_space	Get latch queue free space.	✓	✓	✓
APS_get_field_bus_ltc_fifo_status	Get latch queue and fifo status.	✓	✓	✓
Watch dog timer				
APS_wdt_start	Start / Stop watch dog timer	✓	✓	✓
APS_wdt_get_timeout_period	Get a timeout period of watch dog timer	✓	✓	✓
APS_wdt_reset_counter	Reset counter of watch dog timer	✓	✓	✓
APS_wdt_get_counter	Get counter of watch dog timer	✓	✓	✓
APS_wdt_set_action_event	Set action event of watch dog timer	✓	✓	✓
APS_wdt_get_action_event	Get action event of watch dog timer	✓	✓	✓
Circular limit functions				
APS_set_circular_limit	Set circular limit configurations		✓	✓
APS_get_circular_limit	Get circular limit configurations		✓	✓
Backlash functions				
APS_set_backlash_en	Enable/Disable backlash	✓	✓	✓
APS_get_backlash_en	Check backlash is enabled / disabled	✓	✓	✓
2-D compensation				
APS_set_2d_compensation_table	Create 2D compensation table			✓
APS_get_2d_compensation_table	Get 2D compensation table configuration			✓
APS_start_2d_compensation	Start or stop 2D compensation table			✓
APS_absolute_linear_move_2d_compensation	2D absolute linear interpolation			✓
APS_get_2d_compensation_command_position	Get command and feedback position			✓
Single axis torque motion				
APS_torque_move	Proceed motion of torque for single axis	✓	✓	✓
APS_get_torque_command	Get command torque value.	✓	✓	✓
APS_get_actual_torque	Get actual torque value from device.	✓	✓	✓

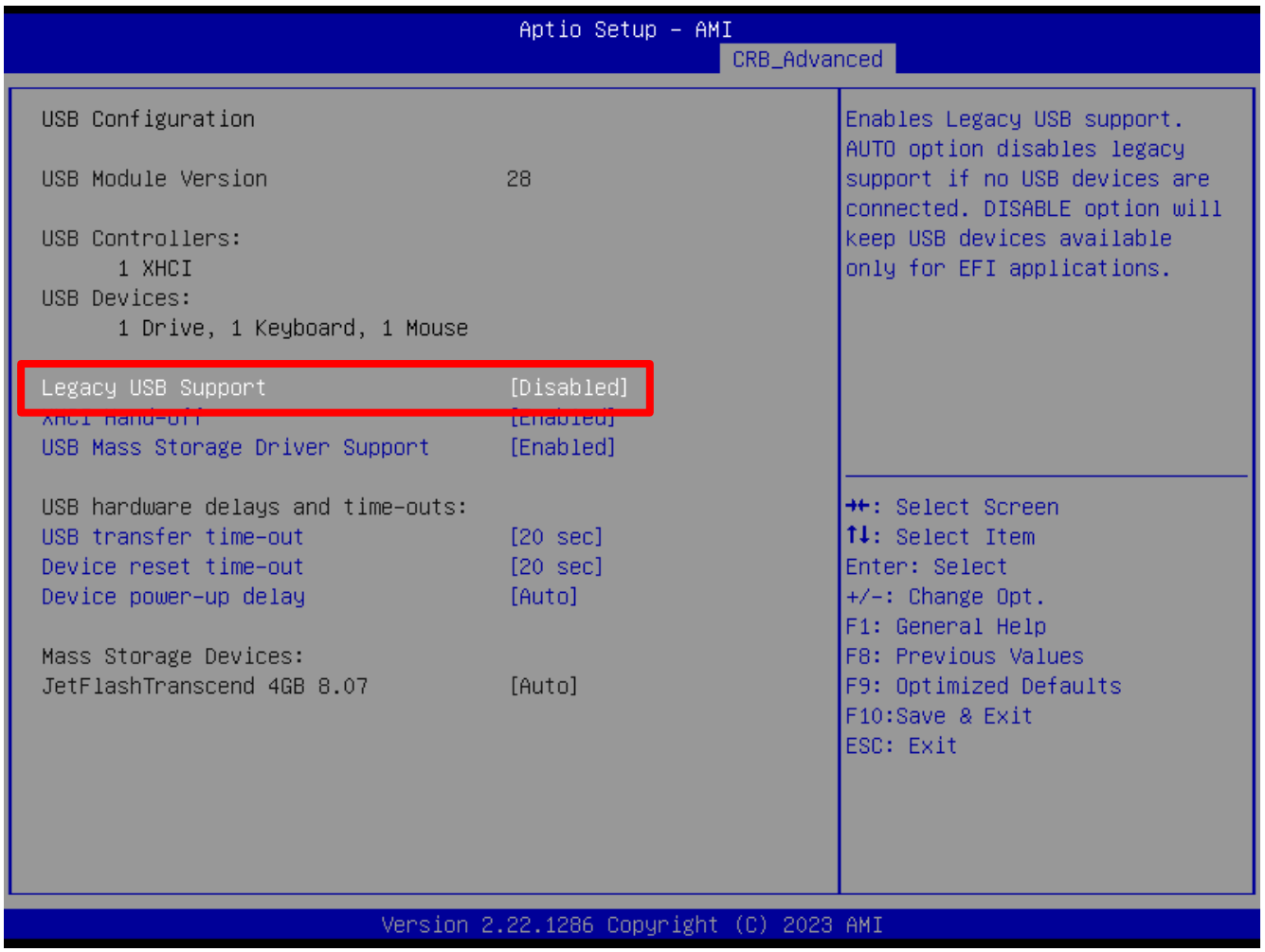
Function name	Description	EM-xP00	EM-xC00	EM-xA00
APS_set_command_control_mode	Set the command control mode of axis to cyclic synchronous position (CSP)mode or cyclic synchronous torque(CST) mode	✓	✓	✓
APS_get_command_control_mode	Get the command control mode of axis	✓	✓	✓
Diagnostic function				
APS_get_field_bus_frame_loss_diagnostic	Confirm if EtherCAT Master was under continuous frame losing situation	✓	✓	✓
APS_reset_field_bus_frame_loss_diagnostic	Reset frame loss diagnostic result.	✓	✓	✓
APS_get_field_bus_slave_connecting_diagnostic	Confirm whether the connecting slave is in the connecting state	✓	✓	✓
Table definition		✓	✓	✓
Board parameter table		✓	✓	✓
Axis parameter table		✓	✓	✓
Sampling parameter table		✓	✓	✓
Sampling source table		✓	✓	✓
Motion IO status and motion status definitions		✓	✓	✓
Motion status definition table		✓	✓	✓
Interrupt factor table		✓	✓	✓
Field bus parameter table		✓	✓	✓
Gantry parameters table		✓	✓	✓
APS functions return code		✓	✓	✓

4.2 SuperCAT Performance Optimization

4.2.1 Adjust BIOS Settings

4.2.1.1. CRB_Advanced Menu Settings

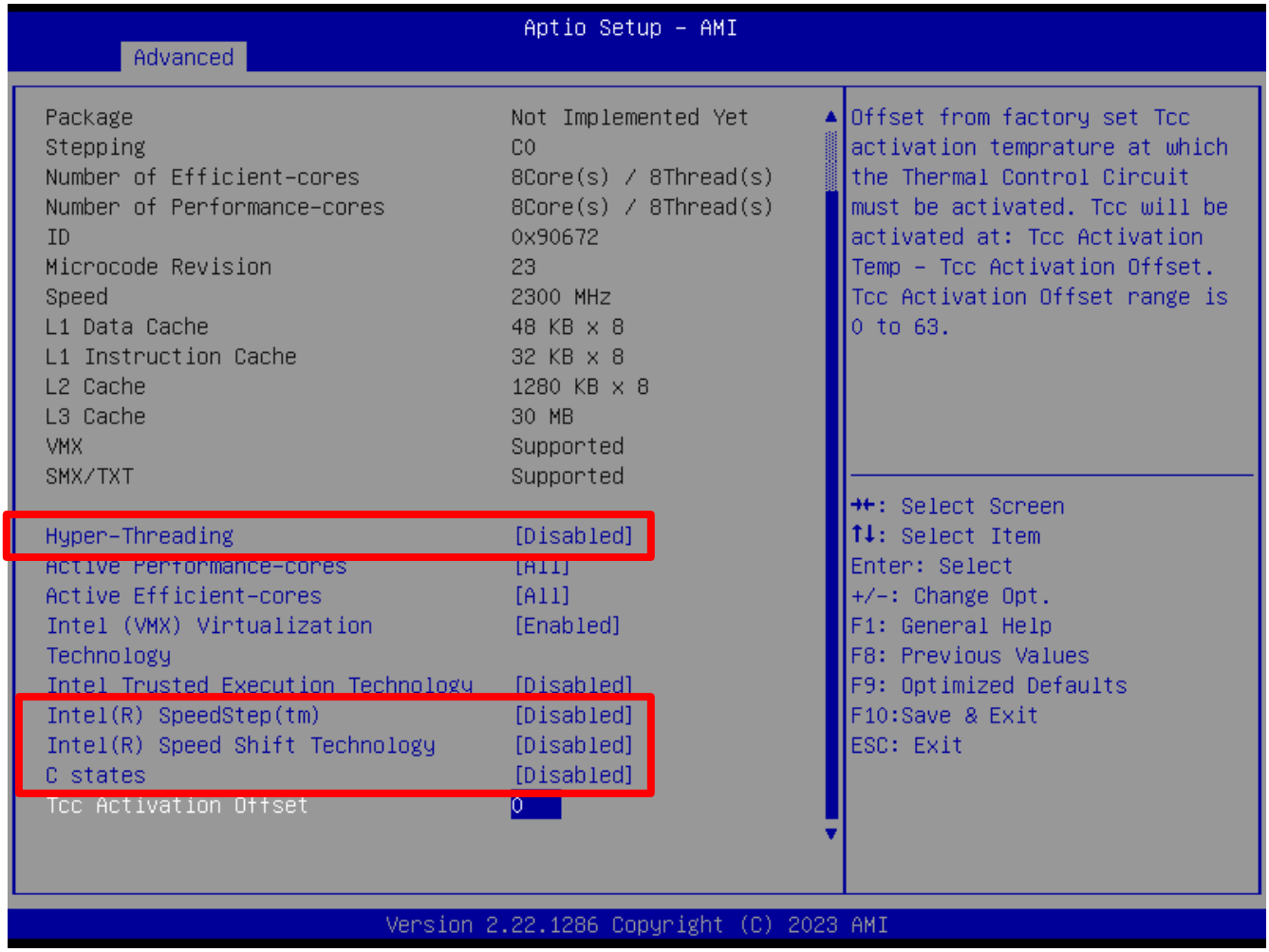
- Disable **Legacy USB Support**.



4.2.1.2. Advanced Menu Settings

Disable the following Advanced menu settings:

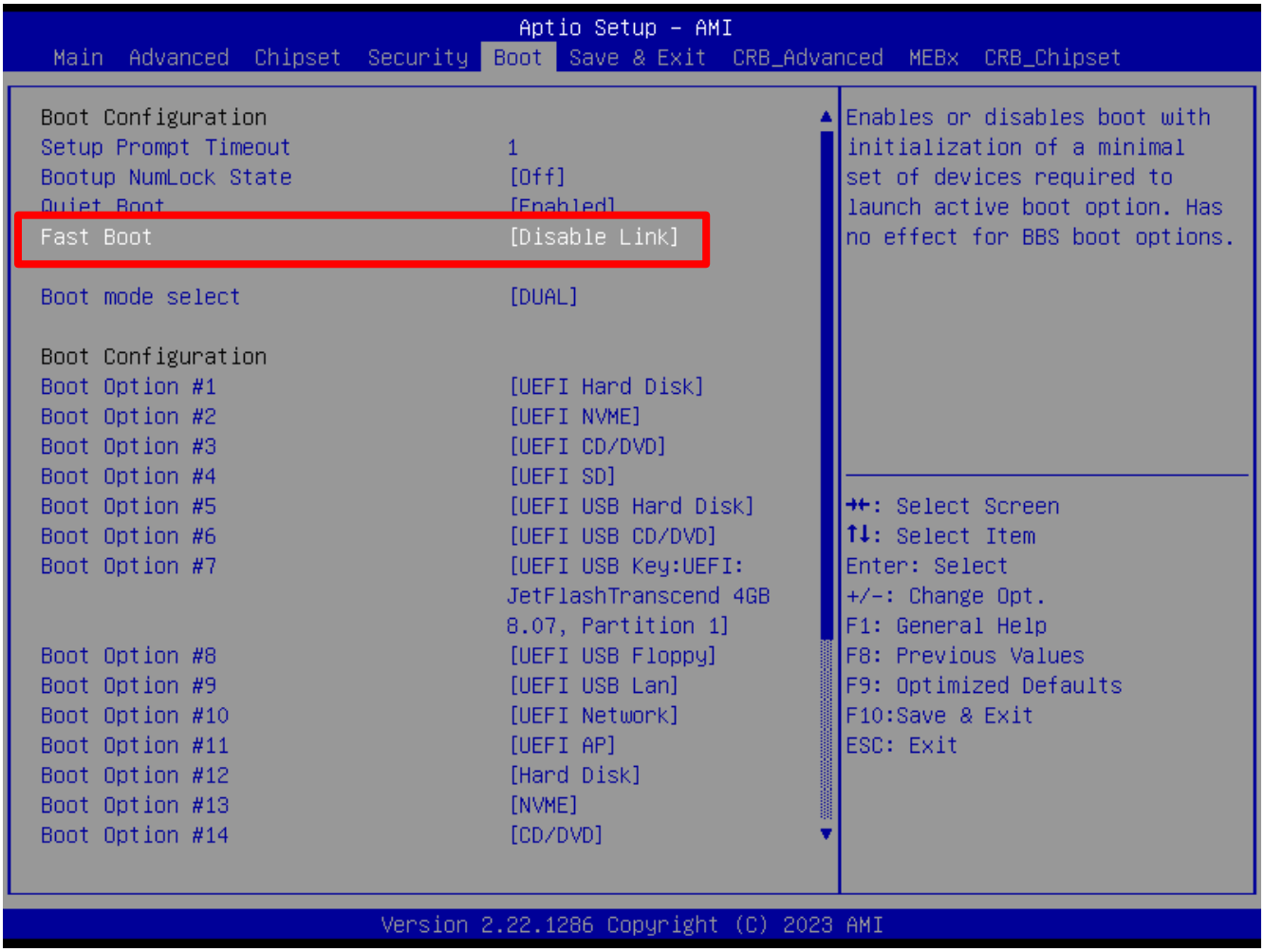
- Hyper-Threading
- Intel(R) SpeedStep(tm)
- Intel(R) Speed Shift Technology
- C states



4.2.1.3. Boot Menu Settings

Disable the following Boot menu setting:

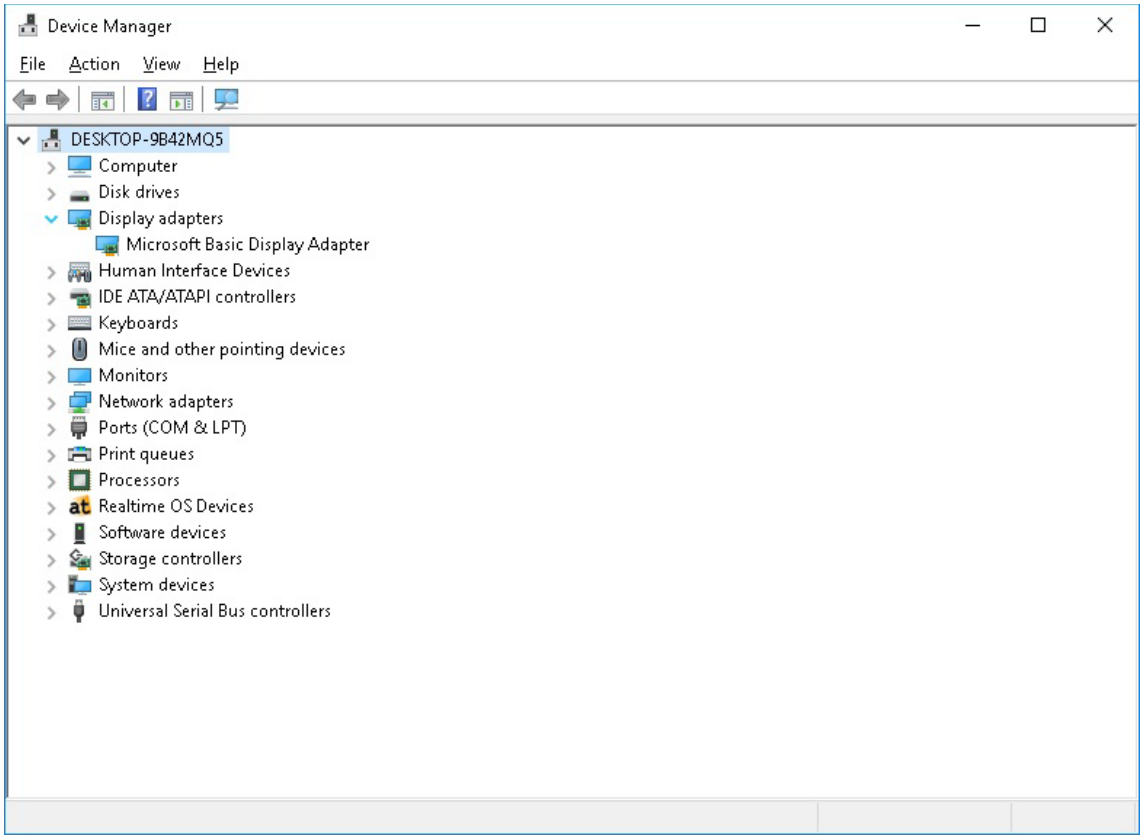
- Fast Boot (if HDD Fast Startup is not available)



4.2.2 Windows 10 Real-time Optimization

4.2.2.1. Microsoft Basic Display Adapter Driver

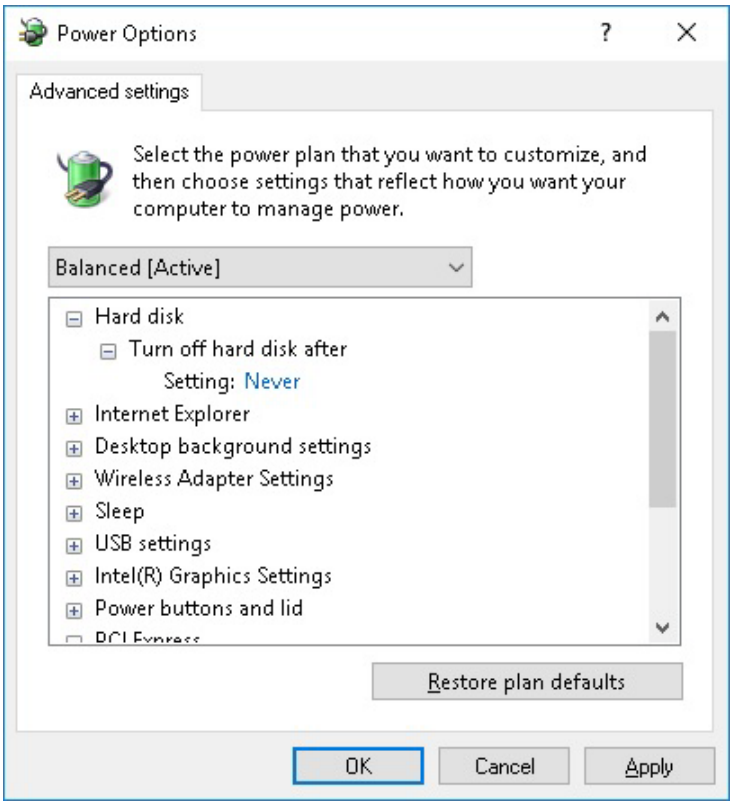
Open the Device Manager by selecting **Start > Control Panel > Device Manager**. Set the default display driver to the Windows driver.



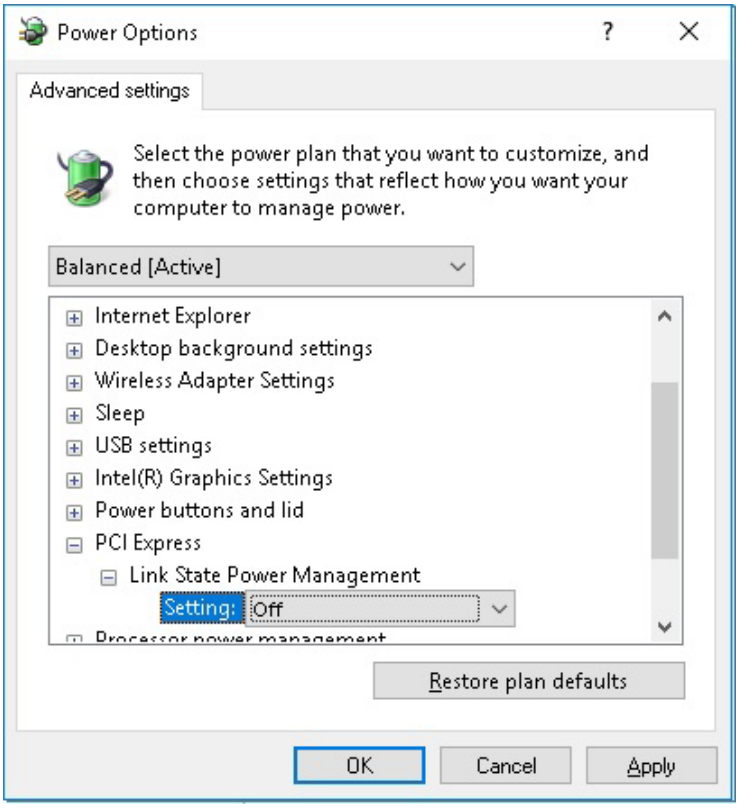
4.2.2.2. Power Options Advanced Settings

Open the Power Options Advanced Settings by selecting **Start > Control Panel > Power Options.** Under **Selected plan**, click **Change plan settings**, and then click **Change advanced power settings**.

Set **Turn off hard disk after** to **Never**.



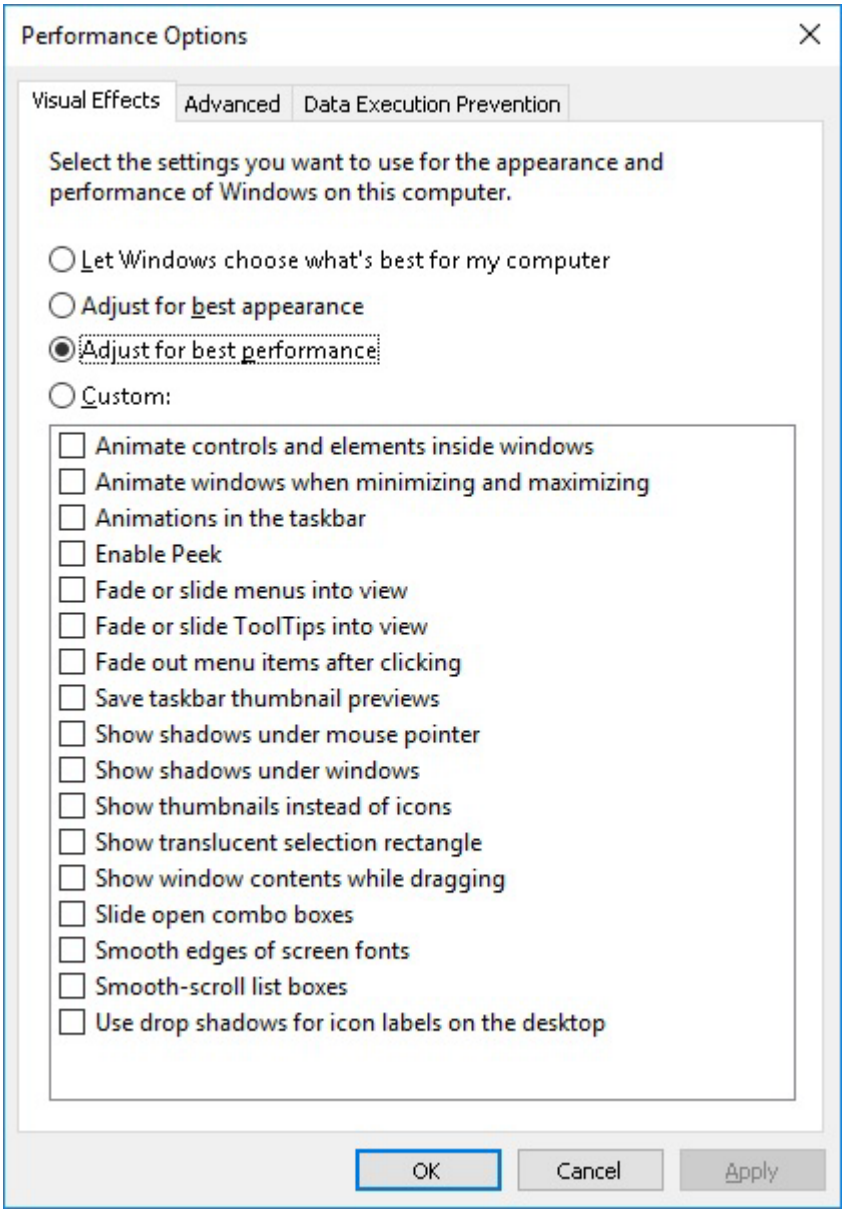
Set the **PCI Express > Link State Power Management** to **Off**.



4.2.2.3. Performance Options Settings

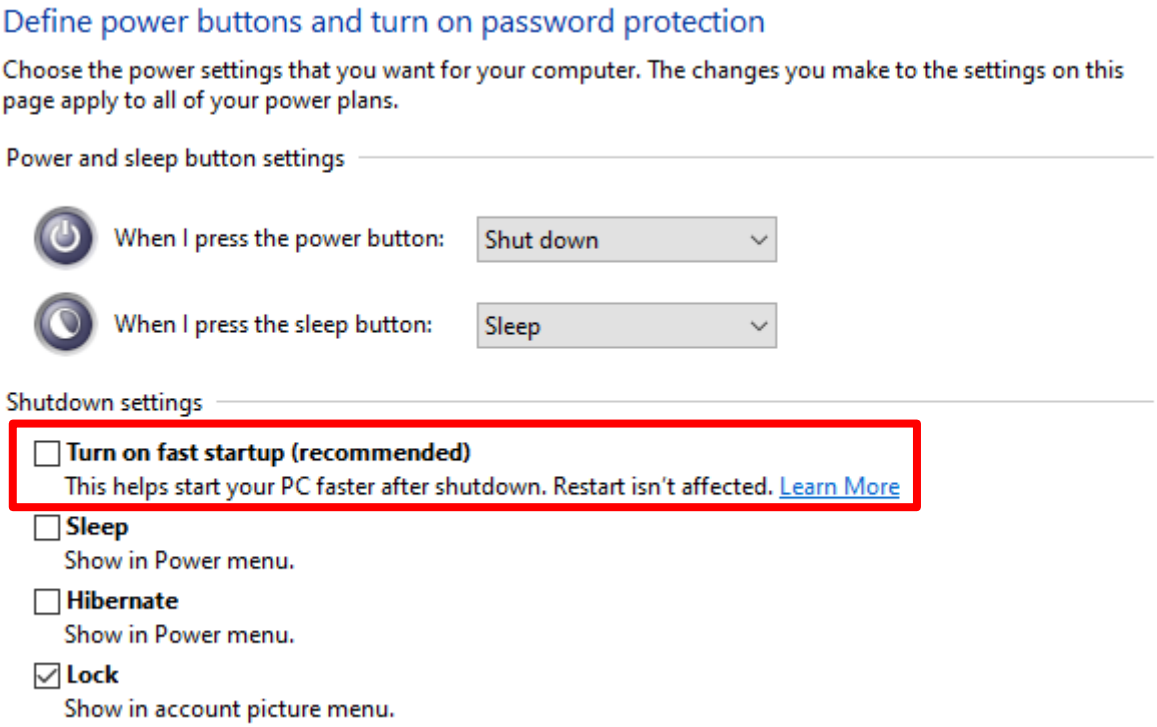
Open the Performance Options by selecting **Start > Control Panel > System > Advanced system settings** and then clicking **Settings** under **Performance**.

- Set **Visual Effects** to **Adjust for best performance**.
- Disable all unused Windows Services.



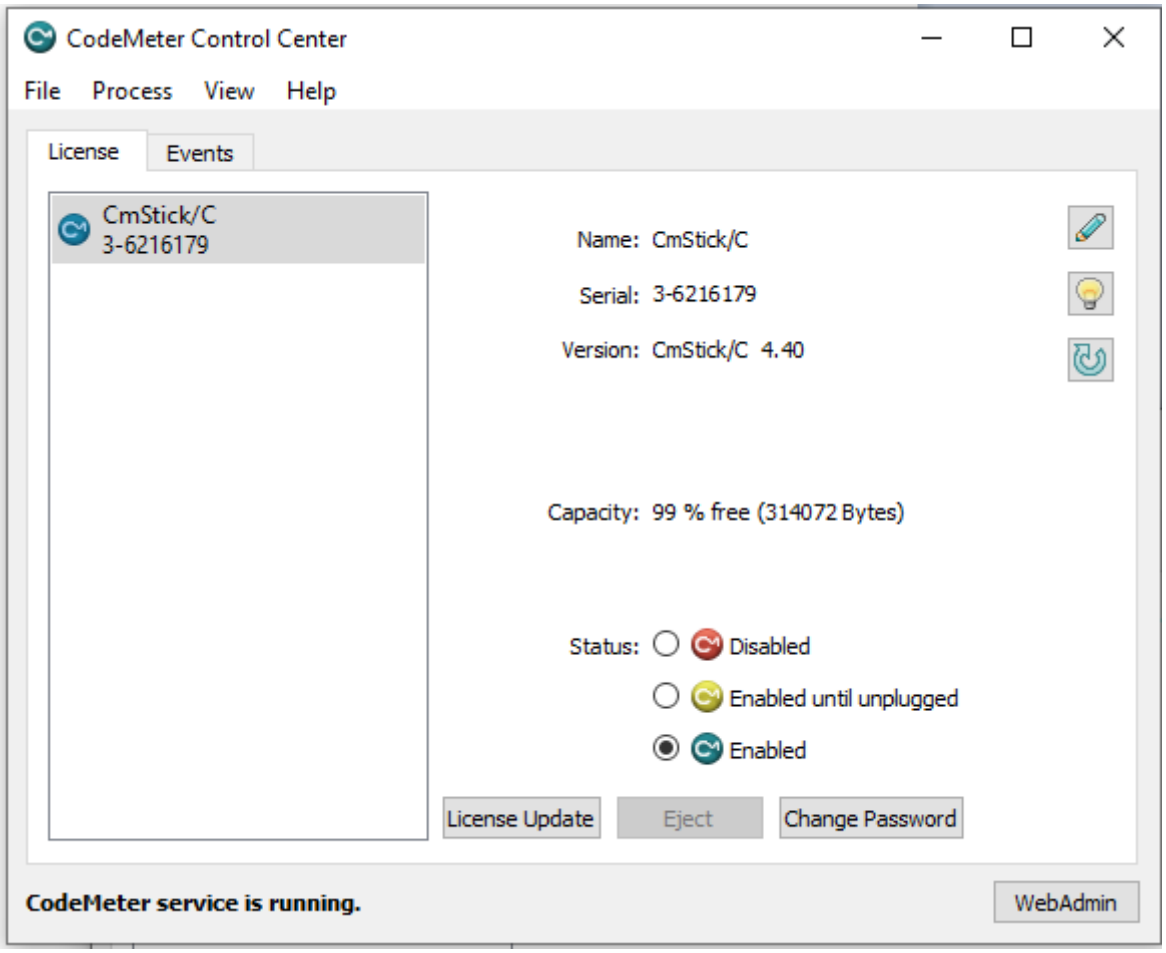
4.2.2.4. Power Options

Open the Power Options by selecting **Start > Control Panel > Power Options** and then clicking **Choose what the power buttons do**. Disable **Turn on fast startup (recommended)**.

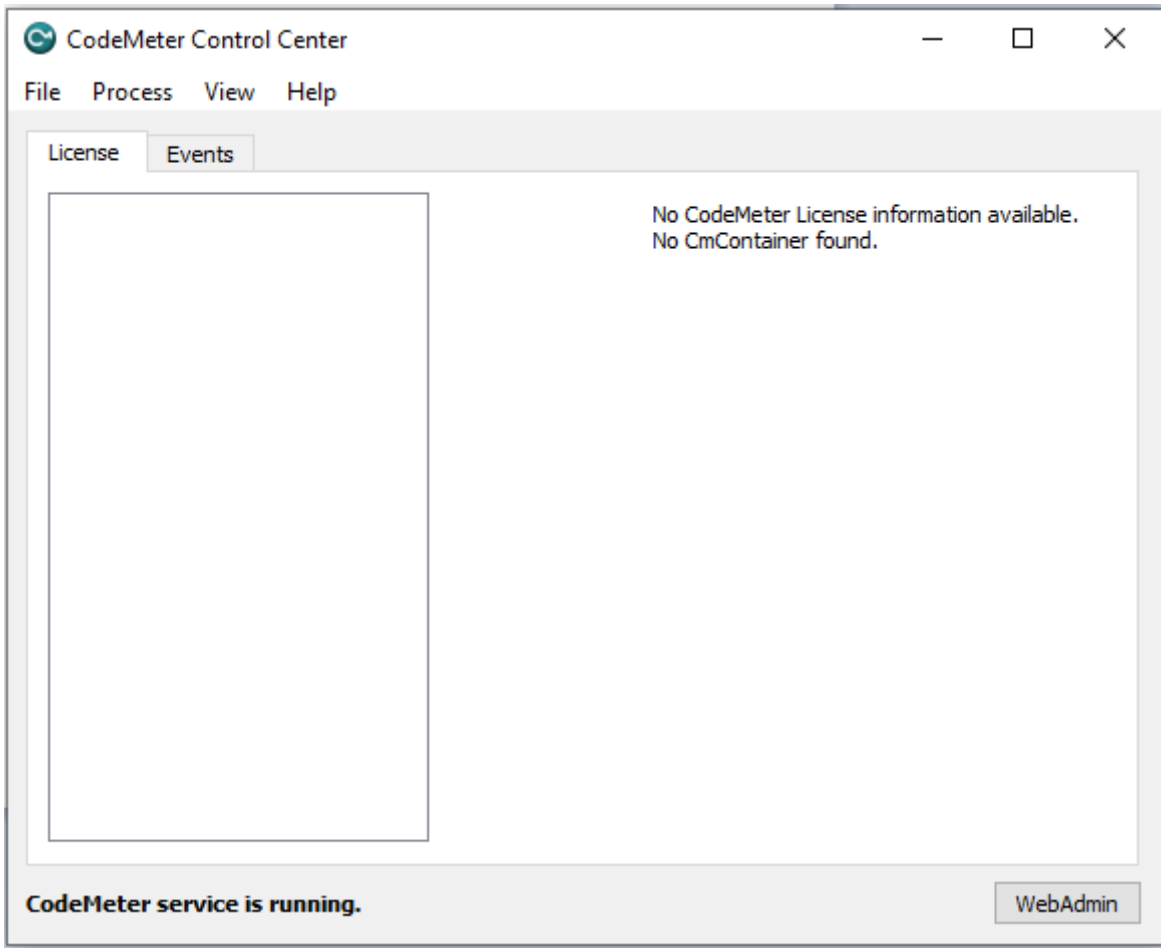


4.2.3 CodeMeter

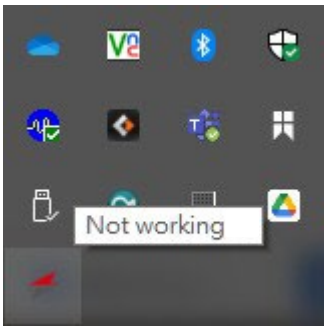
The SuperCAT license is protected by WIBU, and CodeMeter is a service that runs in the system tray. Through the CodeMeter Control Center, users can review the license information.



If there is no license available, the CodeMeter Control Center License tab will be empty.



If there is no license agreement, the SuperCAT run-time might not work as designed, or ocassionally stop working altogether, with the following message.



Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

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