SuperCAT

User's Manual

Super-Performance Soft EtherCAT Controller



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LEADING EDGE COMPUTING

Preface

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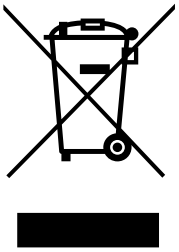
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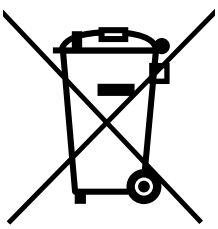
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Battery Labels (for products with battery)









California Proposition 65 Warning



WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Revision History

Revision	Description	Date	By
1.0	Initial release	2023-04-26	RA
1.1	Introduction, features and specifications, system configuration, and appendix updated	2026-04-10	AL

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1 Introduction

ADLINK SuperCAT is a super-performance Soft EtherCAT Controller capable of supporting up to 128 synchronized axes and over 10,000 points. SuperCAT fully supports the ADLINK ECAT-4XMO for EtherCAT to pulse train conversion and diversified pulse control. SuperCAT also supports the ADLINK ECAT-TRG4 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 = Classic C = Premium A = Ultimate	Reserved	Specific application	D = dongle license

- EM: product identifier, short for EtherCAT Motion controller
- n: number of supported axes
- x: product support functionality
- y: license type. 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

- Enhanced computing power and ultra-low system latency ensure superior motion execution performance
- Supports a 125 μs EtherCAT control cycle and up to 128 devices for synchronized motion control
- Real-time performance guaranteed through validation on ADLINK computing platforms
- ADLINK soft-motion framework (user tasks) in RTOS for executing user motion processes
- ADLINK RTOS development environment for user program execution
- Dual-master support for independent cycle times and load balancing

2.2 Key Features

- EtherCAT cyclic synchronous modes supported: CSP / CSV / CST
- Point-table support for continuous motion (contouring) applications
- 2D/3D dynamic error and orthogonal system compensation
- Programmable interrupt control for axes and system parameters
- EtherCAT utilities supported: ECAT Configurator and third-party I/O mapping
- EtherCAT diagnostic tools supported: frame loss, bus loading, and slave device status monitoring
- Master jitter measurement and visualization in the RTOS Configurator tool
- User-defined I/O data sequencing, supporting up to 65,536 points independently

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2.3 Product Function Portfolio

		Classic	Premium	Ultimate
Control Mode	CSP (Cyclic Synchronous Position)	V	V	V
	CSV (Cyclic Synchronous Velocity)		V	V
	CST (Cyclic Synchronous Torque)		V	V
	HM (Homing Mode)	V	V	V
	PT / PVT Motion Mode		V	V
Motion	Speed & Position Override	V	V	V
	Linear / Circular / Helical Interpolation	V	V	V
	E-Gear / Gantry	V	V	V
	Point-table for Continuous Move		V	V
	Linear & Rotary Coordinates Supported	V	V	V
	Backlash & Pitch Error Compensator	V	V	V
	2D Position Error Compensation		V	V
	2D / 3D Dynamic Error Compensation			V
Application	Contouring Synchronized DO Control		V	V
	Position Comparison Trigger Output	V	V	V
	Position Latch Function	V	V	V
	Interrupt Control	V	V	V
	User Task Framework (by API supported)	V	V	V
	User RTOS Application Dev. Environment			V
Utility & GUI	Sampling Function	V	V	V
	API & RTOS Log and Viewer	V	V	V
	EtherCAT Utility & Diagnostic Tools	V	V	V
	IO Address Mapping	V	V	V
	Simulation Axis and IO	V	V	V
	Master Jitter Measurement Tools	V	V	V

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2.4 System Requirements

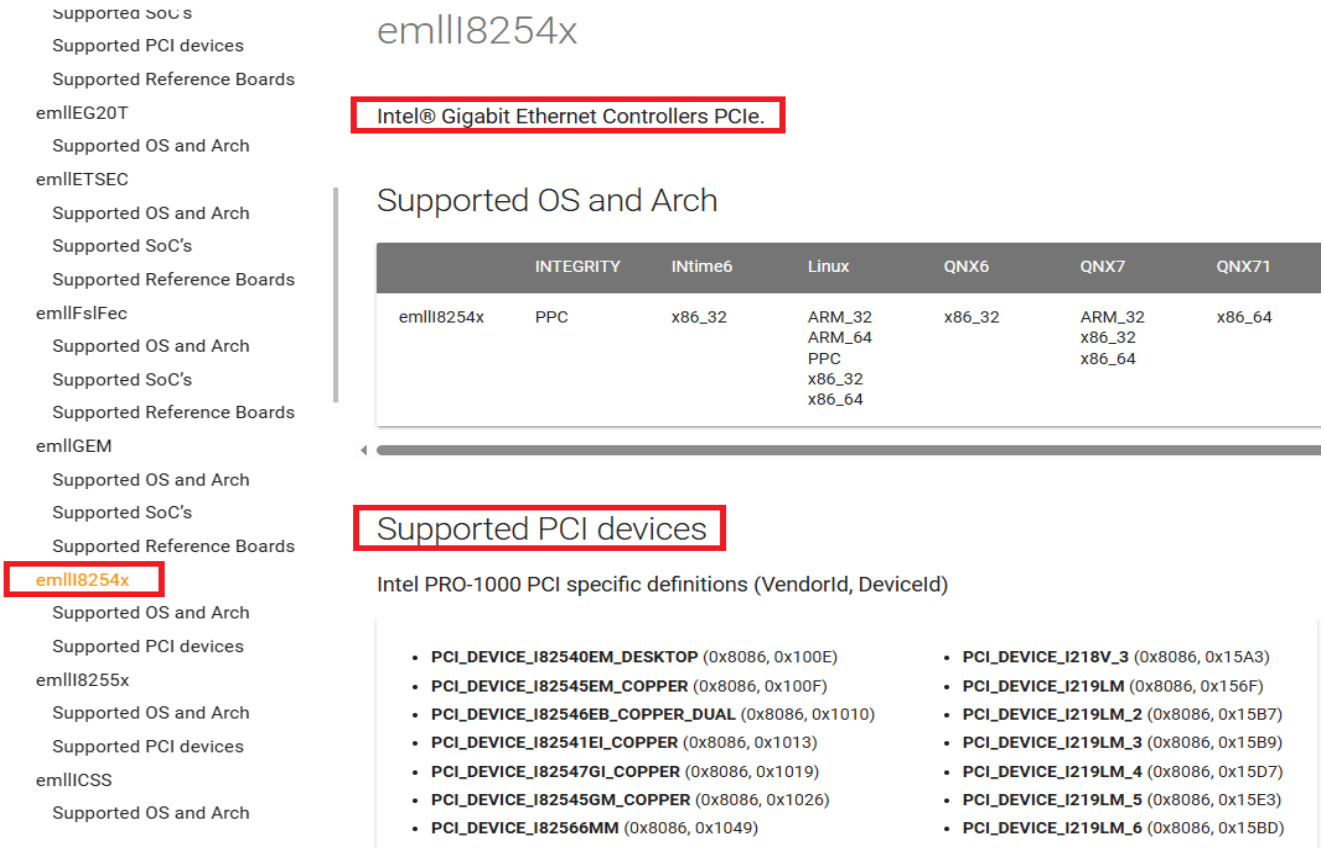
- Supported Operating Systems
  - Windows 10 64-bit
  - Windows 11 64-bit
- Hardware
  - Intel Atom (AHL)/Core-i/Xeon with processor clock speed of 1.8 GHz or faster; dual-core or better is recommended supporting x86 architecture
  - RAM:
    - 64-bit systems: 2 GB min., 8 GB recommended
  - Storage: 32 GB min. Solid State Disk (SSD) recommended (10 GB for operating system and 1 GB for RT system)

2.5 Supported Network Controllers

Link Layer Name	Name	Supported PCI devices
emlll8254x	Intel® Gigabit Ethernet Controllers PCIe	For the latest information, please visit the website
emlll8255x	Intel® PRO100	
emllRTL8139	Realtek® RTL8139	
emllRTL8169	Realtek® RTL8169	

* Website: https://public.acontis.com/manuals/EC-Master/3.1/html/supported-nics/emlll8254x.html

For example, using the “emlll8254x” as a reference:



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3 System Configuration

3.1 SuperCAT Software Installation Guide

There are two SuperCAT software packages:

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

Complete the installation steps below:

Step 1: Download the APS SDK and SuperCAT RTOS SDK files from ADLINK and run each separately. (Installation will start automatically.)

Step 2: Select **NEXT** as prompted to complete installation.

Step 3: After installation is complete, select **FINISH**.

3.2 SuperCAT Configuration Guide

Step 1: Start the RTOS Configurator

Step 2: Assign CPU for RTOS

Step 3: Assign NIC for RTOS

Step 4: Reboot the PC (do not shut down the PC)

For more detailed instructions, please refer to the **"SuperCAT_QuickStart"** file located in **"C:\Program Files (x86)\ADLINK\SuperCAT"** after installing the SuperCAT RTOS SDK.

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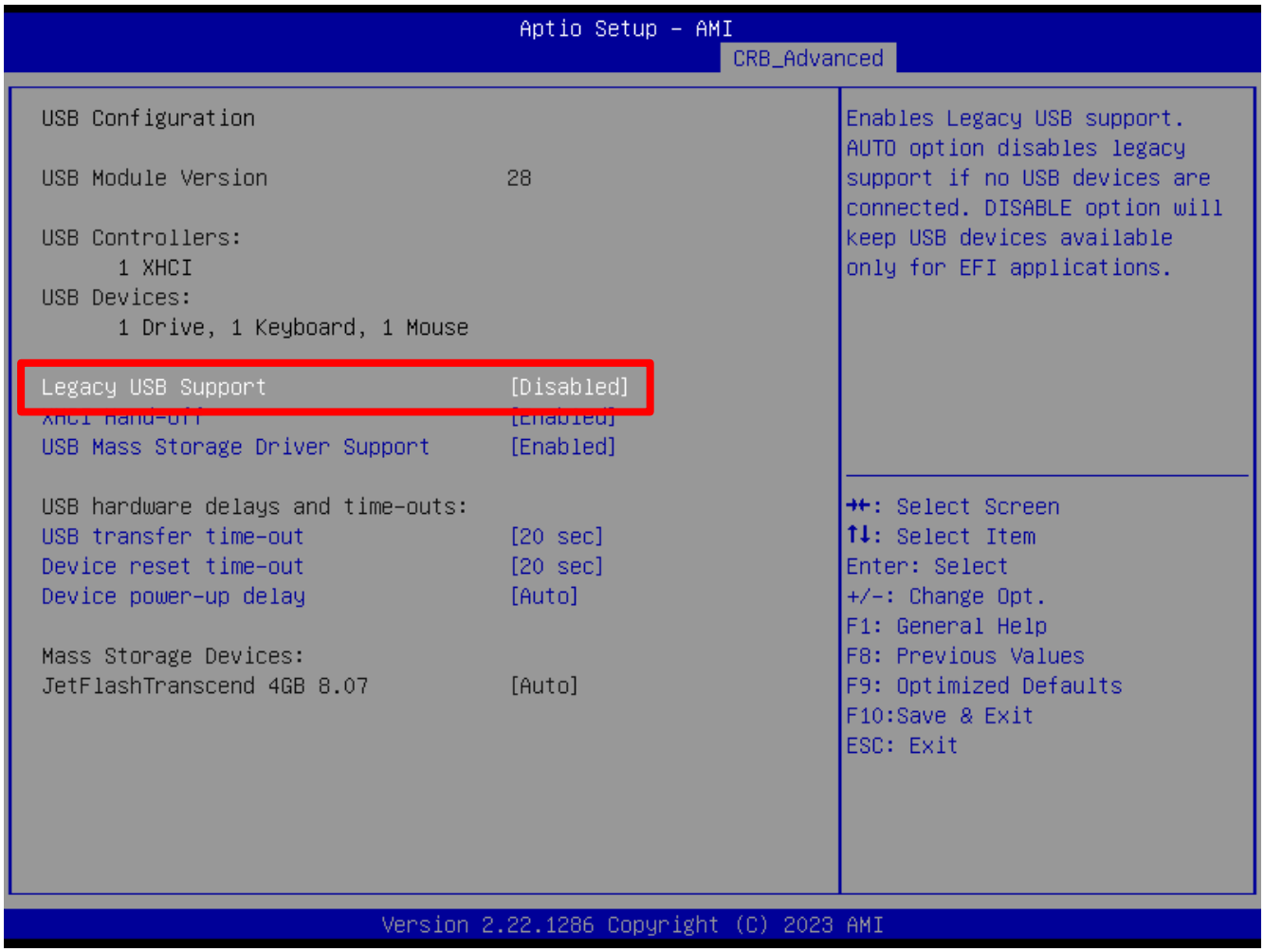
4 Appendix

4.1 SuperCAT Performance Optimization

4.1.1 Adjust BIOS Settings

4.1.1.1. CRB_Advanced Menu Settings

- Disable **Legacy USB Support**.

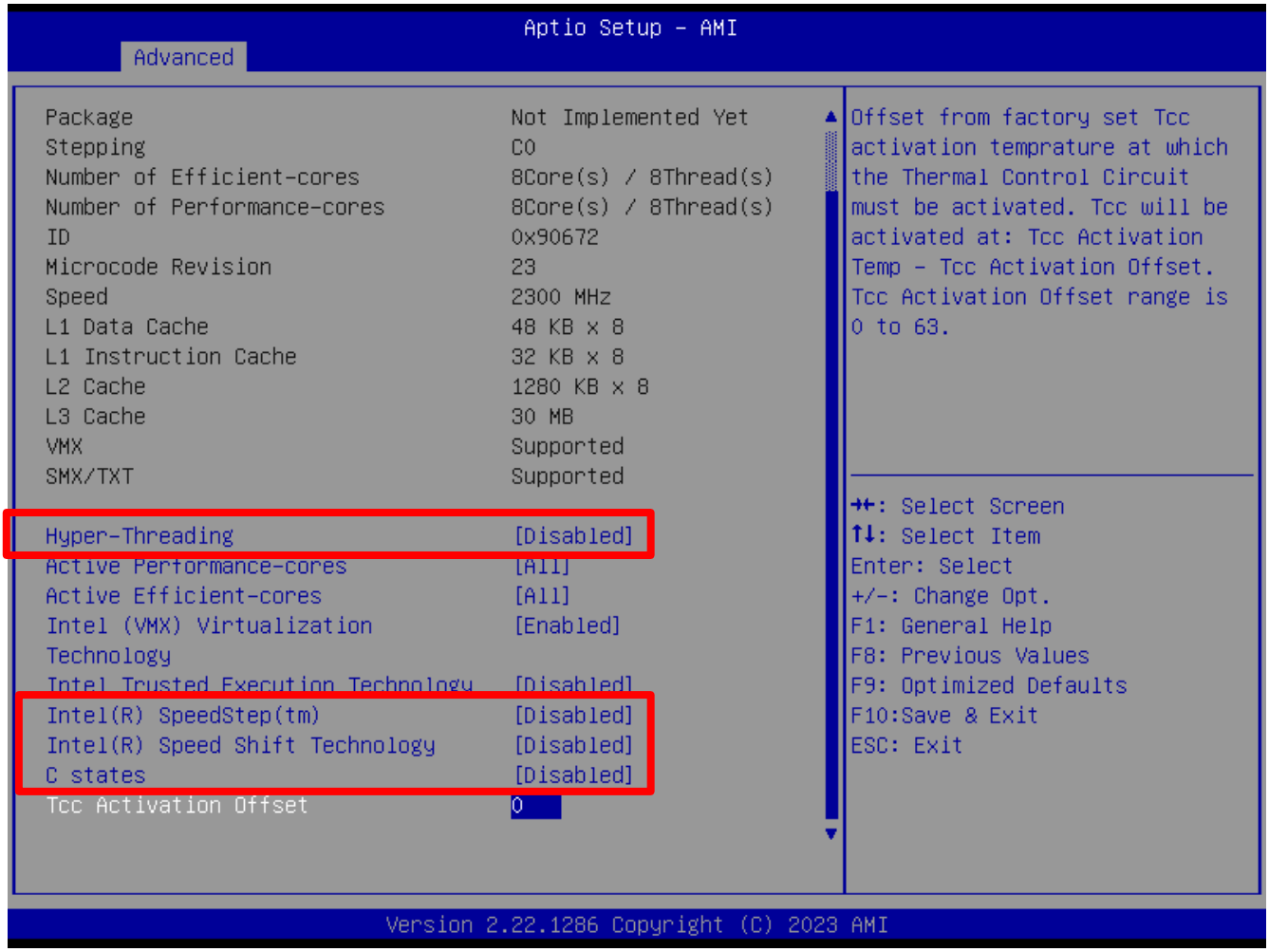


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4.1.1.2. Advanced Menu Settings

Disable the following Advanced menu settings:

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

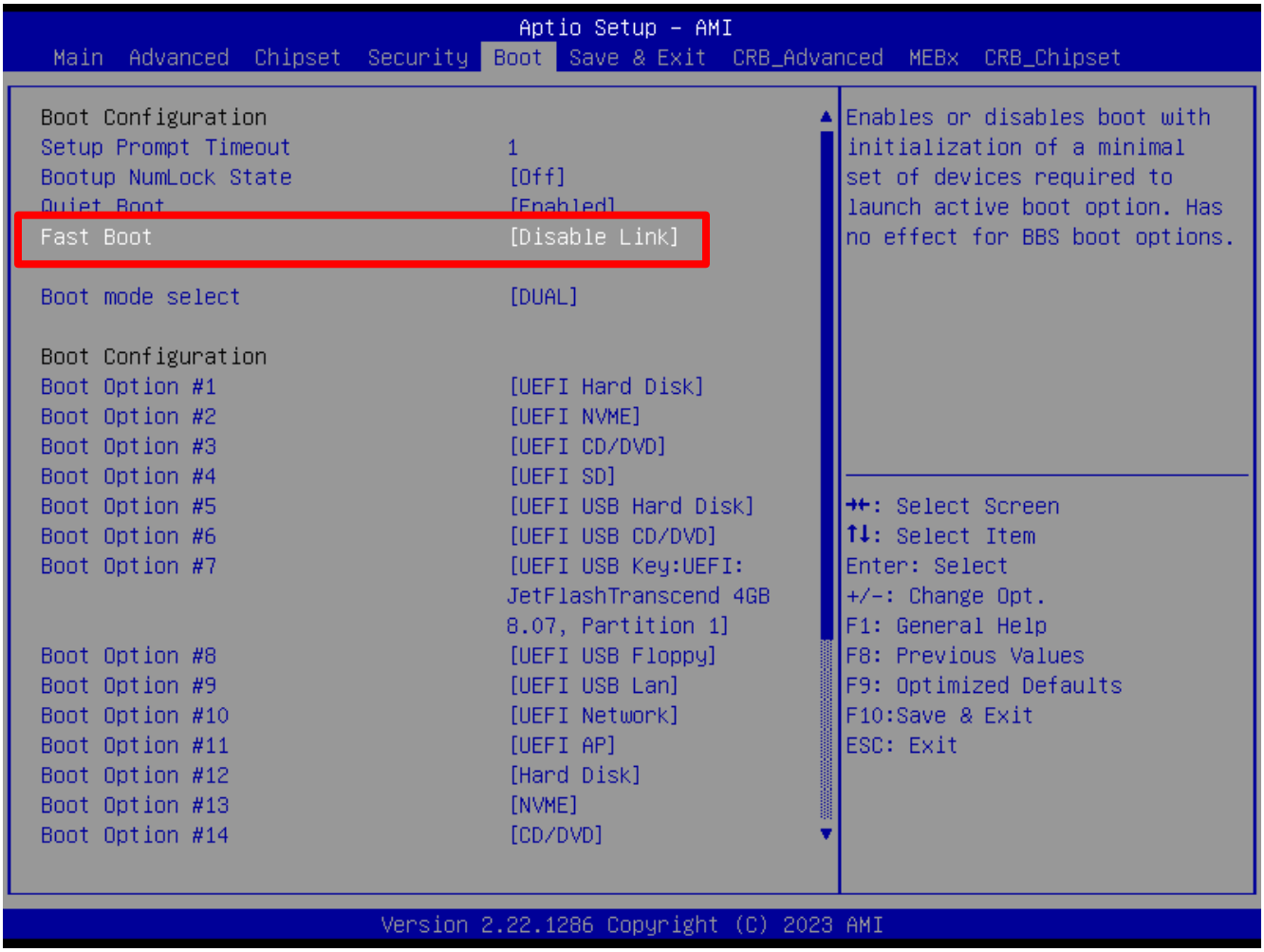


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4.1.1.3. Boot Menu Settings

Disable the following Boot menu setting:

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

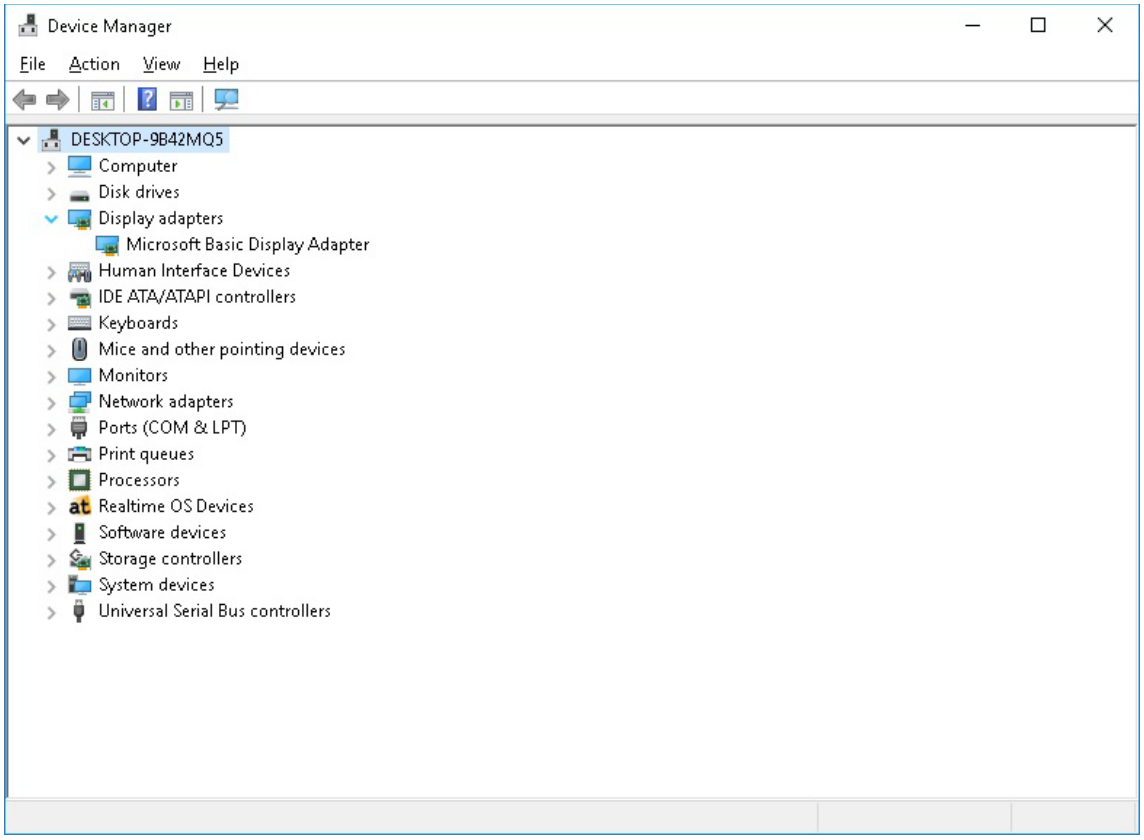


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4.1.2 Windows 10 Real-time Optimization

4.1.2.1. 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.

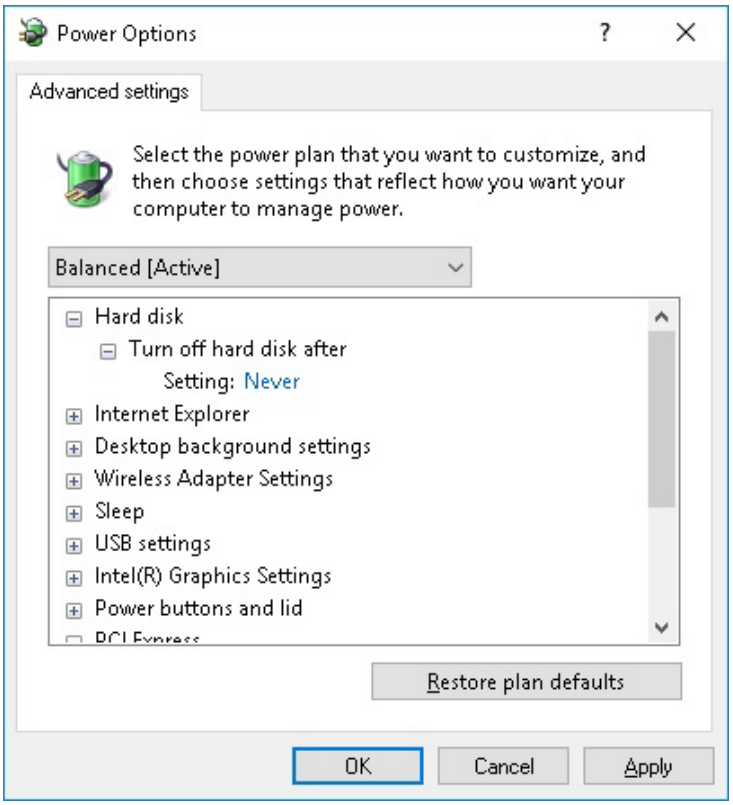


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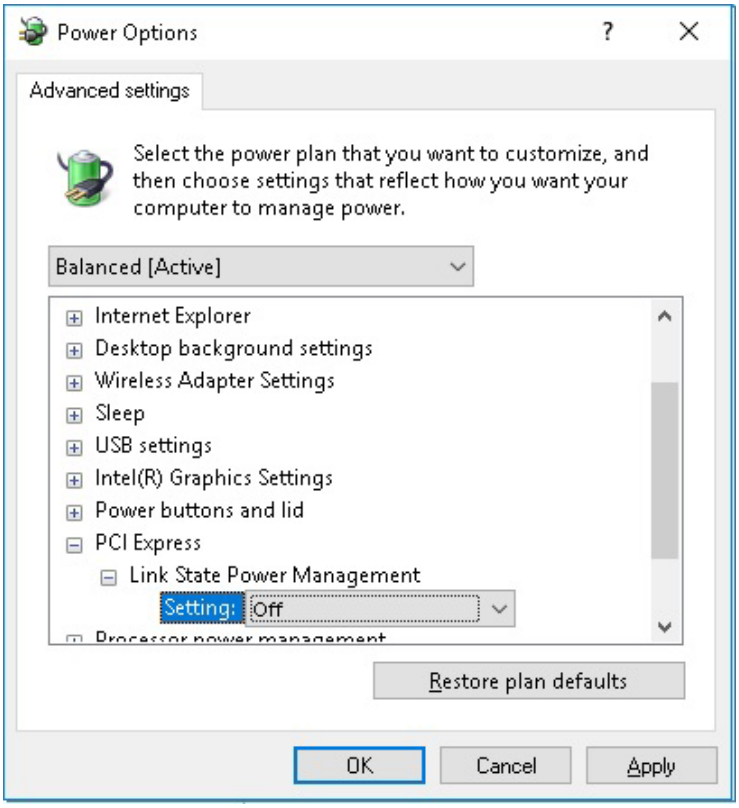
4.1.2.2. Power Options Advanced Settings

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**.

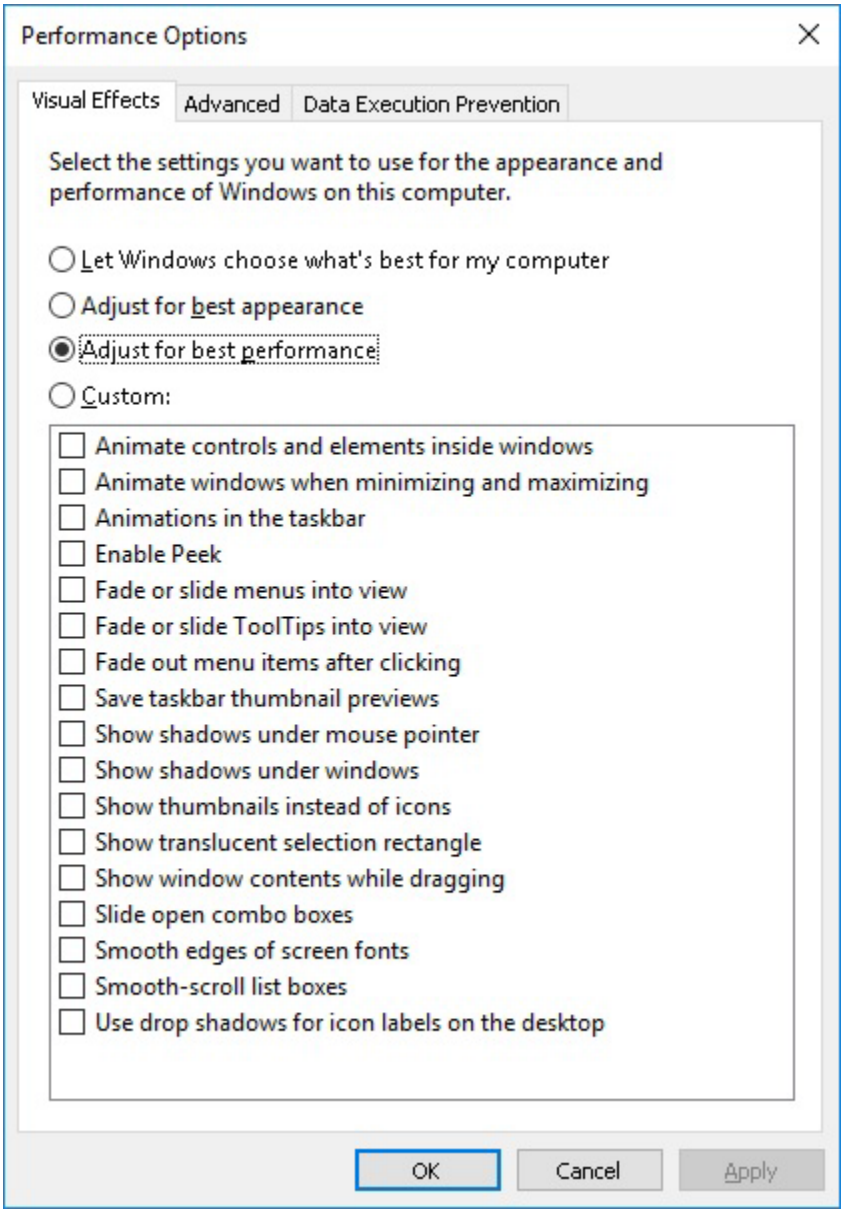


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4.1.2.3. Performance Options Settings

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

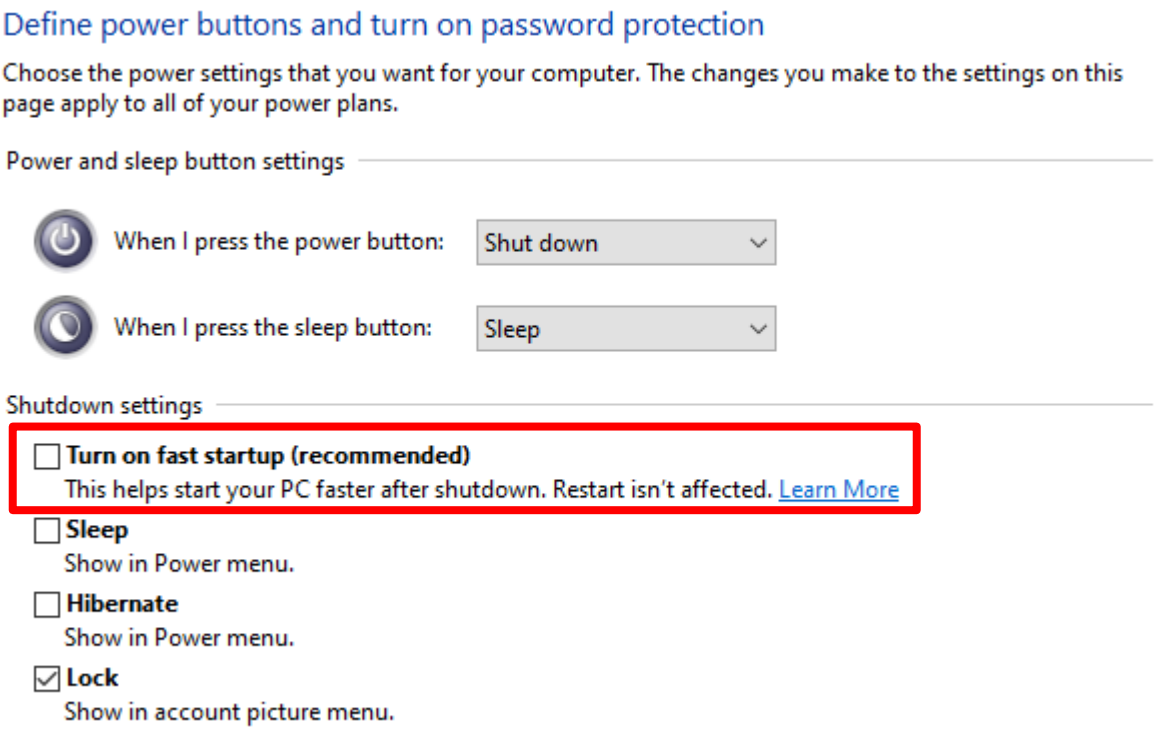
- Set **Visual Effects** to **Adjust for best performance**.
- Disable all unused Windows Services.



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4.1.2.4. Power Options

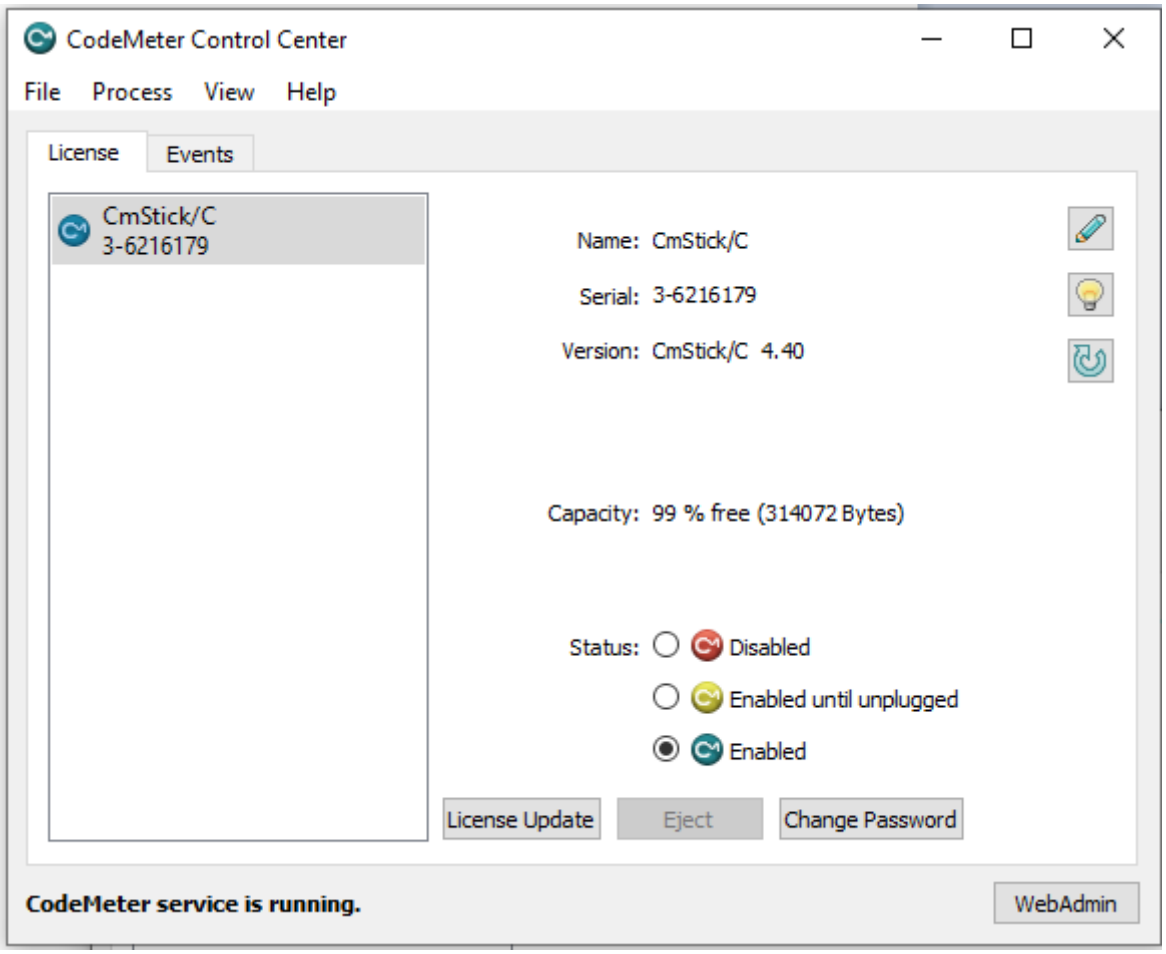
Open the Power Options by selecting **Start > Control Panel > Power Options** and then clicking **Choose what the power buttons do**. Disable **Turn on fast startup (recommended)**.



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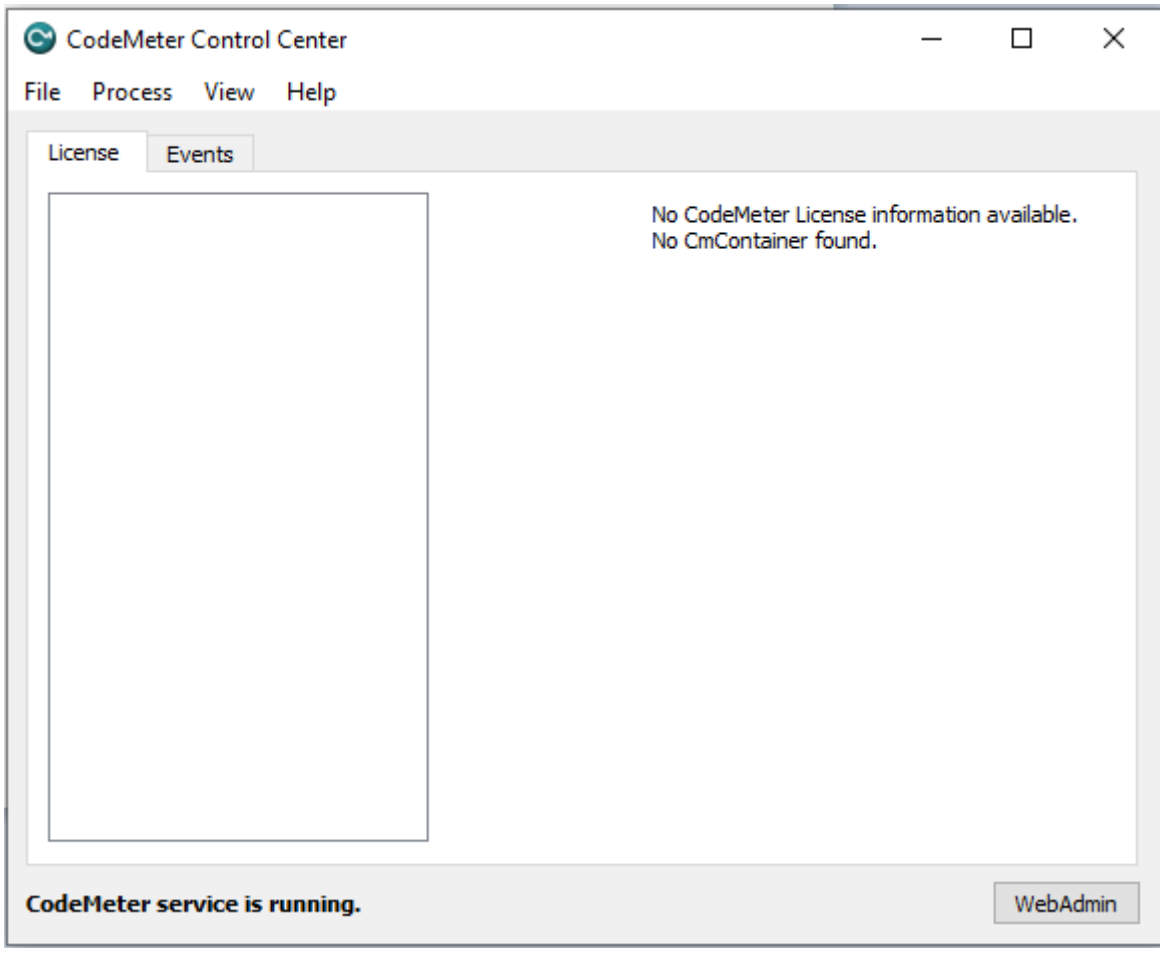
4.1.3 CodeMeter

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.

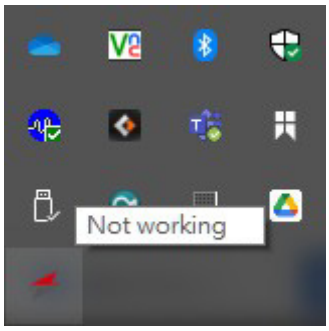


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If there is no license available, the CodeMeter Control Center License tab will be empty.



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



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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.

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

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