EVM User's Guide: TICS100MOD-EVM

TICS100MOD Carrier and Development Board Evaluation Module

Description

The TICS100MOD evaluation module (EVM) consists of two boards: the carrier board and the development board. The carrier board contains the TICS100MOD, the Ethernet connector and configuration headers. The development board provides the power input, a USB-to-UART bridge, the host interface, and the debug connectors.

Get Started

To get started with the TICS100MOD-EVM:

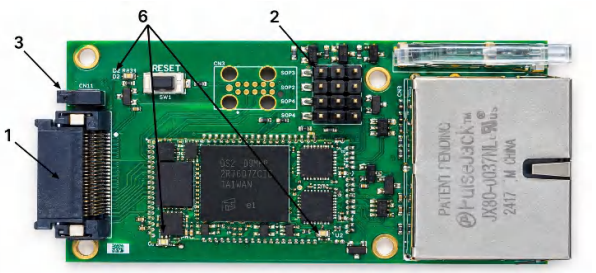
1. Order the EVM: TICS100MOD-EVM
2. Download the latest TICS100MOD-SDK (libraries, examples, firmware and tools)
3. Download the comprehensive reference design files: see Section 4.
4. See the latest release notes and the quick start guide delivered with the SDK.

Features

- Supports EtherCAT, EtherNet/IP, and PROFINET on one common module and API
- Host interface: SPI plus GPIO control signals
- USB-to-UART bridge for ICS configurator, firmware flashing, and console
- Power supply: external 3.3V, or 5V on USB Type-C™
- RJ45, JTAG debug connector, User LED, status LEDs, and MCU reset push-buttons
- Host examples for AM64x-EVM (Linux®) and LP-AM261x (FreeRTOS) included in the SDK

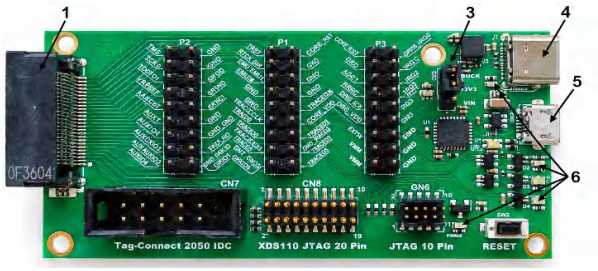
Applications

- Industrial devices that need a fieldbus connection to a PLC or industrial controller (EtherCAT, EtherNet/IP, PROFINET) without implementing the protocol stack on the application processor
- Adding industrial communication to designs with an external host processor (MCU or Linux-based) over SPI



1: Mating connectors
2: CN5 boot mode header
3: CN11 configuration header
6: LEDs

Development Board



1: Mating connectors
3: CN10 power selection
4: 5V input
5: Micro-USB UART access
6: LEDs

Carrier Board

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1 Evaluation Module Overview

This section introduces the TICS100MOD-EVM, lists the kit contents, and summarizes the specifications and main components.

1.1 Introduction

The TICS100MOD-EVM allows engineers to evaluate the TICS100MOD industrial communication module together with the TICS100MOD-SDK to measure performance characteristics, validate functionality, and verify datasheet parameters. The development board hosts the module, the boot mode and configuration headers, and the Ethernet connector. The carrier board adds the power input, the USB-to-UART bridge, the host and debug headers and the JTAG adapters. The EVM works with the Code Composer Studio™ integrated development environment.

The module is connected to the host controller over SPI and GPIO. Host examples for the AM64x-EVM (Linux) and the LP-AM261x (FreeRTOS) are provided in the SDK.

Note

The PCB and auxiliary circuits are not optimized for end-product design; the end customer assumes full responsibility for any integration, validation, or further development required to achieve a finished product.

1.2 Kit Contents

The kit contains:

- 1 × carrier board
- 1 × development board
- 1 × quick start guide

1.3 Specification

Parameter	Value
CPU core	XAM2612AOFFHIZFG (500MHz dual-core Arm® Cortex®-R5F)
Board dimensions	39.65mm × 73.84mm (as stated in the source; board not specified)
Power	External 3.3V / 1A, or 5V / 1A on USB Type-C™ connector J1 with on-board 3.3V regulator
Host interface	SPI (Mode 0, three-wire) and GPIO control signals
Industrial protocols	EtherCAT, EtherNet/IP, PROFINET (firmware selected per protocol)
Connectors	USB Type-C (power), USB micro (UART), SOP header, I2C header, Ethernet connector, interface connector, JTAG connectors
User interface	User LEDs, status LEDs, MCU reset push-buttons
Revision	Rev 3.0.0

1.4 Device Information

Table 1-1 lists the main components of the EVM.

Table 1-1. EVM Components

Component	Part Number	Manufacturer
MCU	AM2612AOFFHIZFGR	Texas Instruments
Buck converter	TPSM863257RDXR	Texas Instruments
Flash	S25FL064LABBHI023	Infineon
Ethernet PHY	DP83826AERHBR	Texas Instruments
BAW oscillator	LMK3C0105V33RERR	Texas Instruments
EEPROM	AT24C512C-MAHM-T	Microchip
ESD protection	ESDS314DBVR	Texas Instruments
Ethernet connector	JX80-0037NL	Pulse

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Table 1-1. EVM Components (continued)

Component	Part Number	Manufacturer
USB-to-UART bridge	FT232RNQ	FTDI

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2 Hardware

This section describes the hardware of the development board and the carrier board. Both boards must be unpowered when assembled or disassembled. These devices are ESD-sensitive: handle the boards by the edges.

2.1 Additional Images

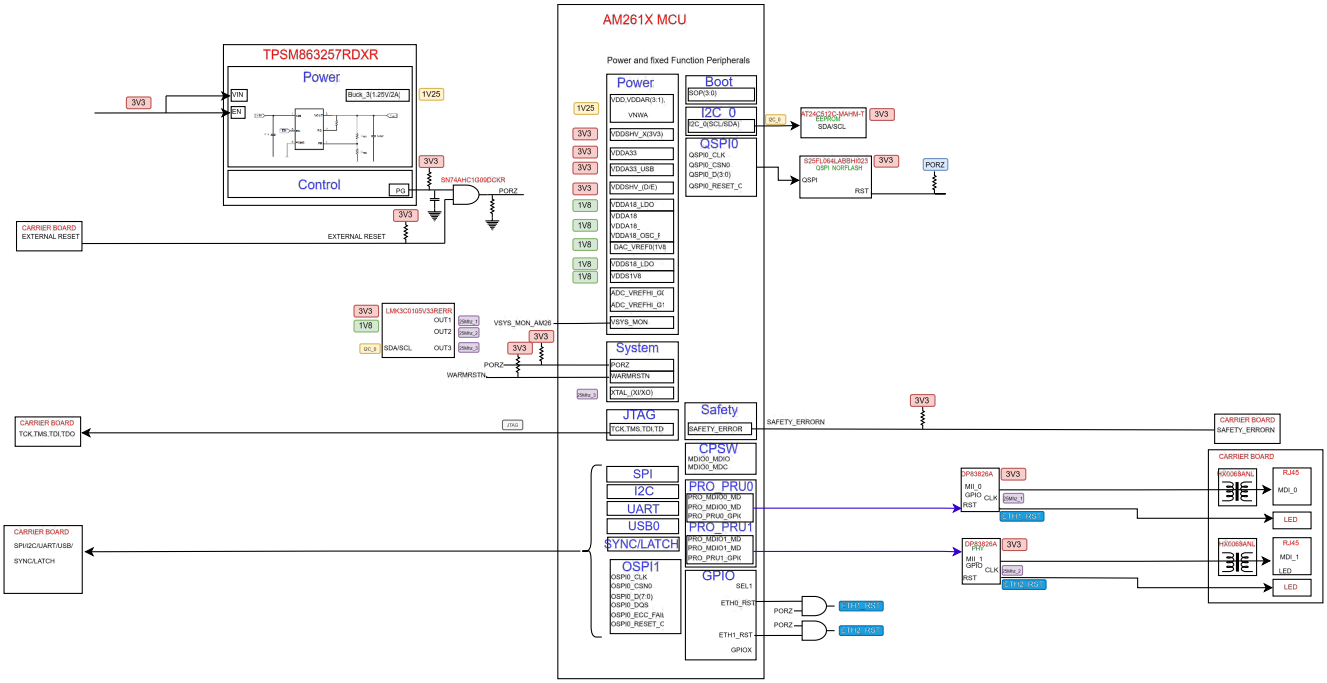


Figure 2-1. EVM Block Diagram

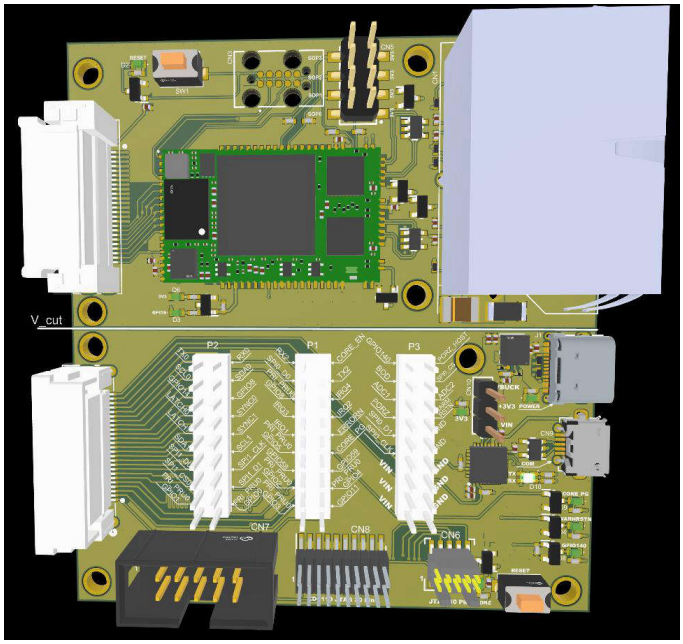


Figure 2-2. EVM Overview

Figure 2-2 shows the carrier board with TICS100MOD, SOP header, and Ethernet connector at the top, and the development board with headers P1P3, J1, CN9, CN10 and debug connectors on the bottom.

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2.2 Power Requirements

The EVM requires 3.3V / 1A DC power, provided either through the carrier board connector or through the on-board regulator of the carrier board.

- When the board is powered, the green LED D6 lights up, indicating the presence of 3.3V.
- To power the EVM from the on-board regulator, apply 5V / 1A DC to the USB Type-C connector J1.
- The CN10 header selects the on-board 3.3V regulator or an external 3.3V supply. With an external supply, source the power on pins 2-4-6 of connector P3.

CAUTION
Use only a 5V supply on the 5V input. Higher voltage or reversed polarity damages the board.

2.3 Setup

Step 1: Connect the carrier board to the Development Board

Make sure both boards are unpowered. Align the carrier board connector with the development board connector and press down evenly until the boards are fully seated.

Step 2: Boot mode (CN5)

Use OSPI (4S) boot mode: no jumpers are fitted, leave all pins of CN5 open (see Section 2.5).

Step 3: Select Config Mode (CN11)

For firmware flashing with ICS Configurator, fit the CN11 jumper (GPIO59 to GPIO58) to select Config Mode before applying power. The mode is selected at start-up; after changing CN11, power-cycle the board.

Step 4: Connect power and UART

1. Connect the micro-USB cable (CN9) to the PC.
2. Connect the 5V supply to the 5V input.
3. Open {SDK_DIRECTORY}\tools\ics-configurator\ics-configurator.exe, select the Target tab, select the UART COM port and select *Connect*.

If the COM port is not listed, install the FTDI Virtual COM Port (VCP) driver (https://ftdichip.com/drivers/vcp-drivers/), reconnect the micro-USB cable, and refresh the COM port list.

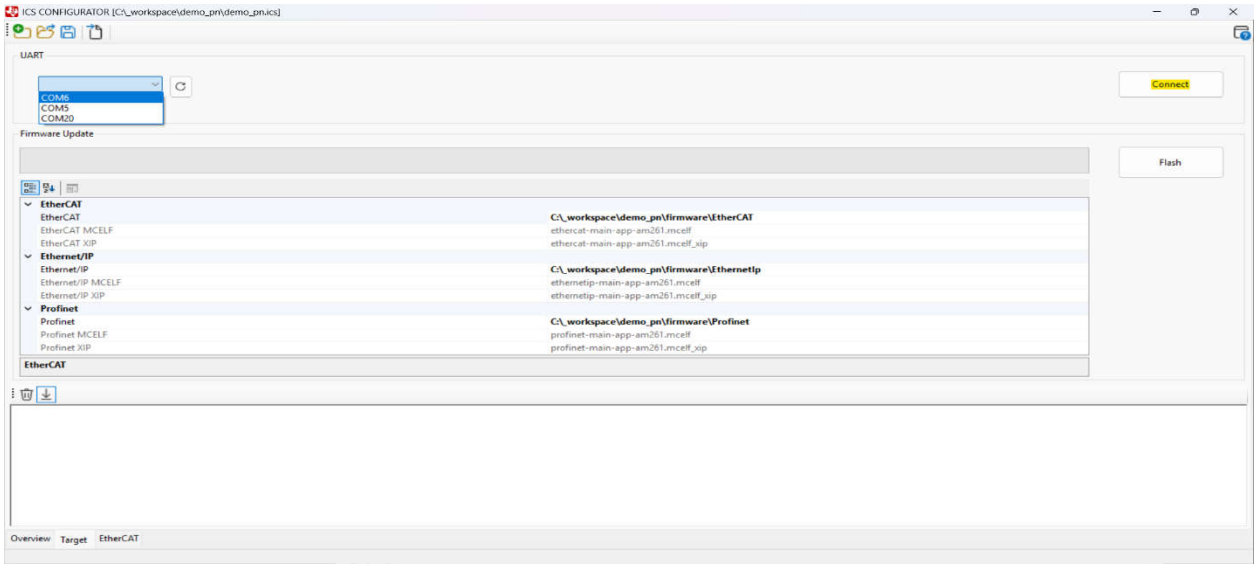


Figure 2-3. ICS Configurator COM Port Selection

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Step 5: Power-cycle the board and check LEDs and startup message

Power-cycle the board (5V supply off, then on). Compare the LEDs with the tables in Section 2.8 and check the serial output:

- Config Mode: ICS Bootloader v1.0.0, Enter config mode., Read Flash 1MB in 4us
- Run Mode: ICS Bootloader v1.0.0, Receive identification ...

Step 6: Flash the firmware

See Section 3.5. After flashing, power off, remove the CN11 jumper to select Run Mode and power on again.

2.4 Header Information

Table 2-1 shows an overview of headers and connectors:

Table 2-1.

Reference	Board	Description
CN5	Development board	SOP boot mode header (SOP0-SOP3)
CN11	Development board	Configuration mode jumper header (GPIO59 / GPIO58)
CN3	Development board	TC2050-IDC 10-pin JTAG connector
CN1	Development board	RJ45 Ethernet connector
CN2 / CN4	ICS dev. board / Carrier board	50-pin board-to-board mating connectors
CN10	Carrier board	Power source selection (on-board 3.3V regulator or external 3.3V)
P1, P2, P3	Carrier board	2 × 9 pin headers with module signals; external 3.3V on P3 pins 2-4-6
CN6 / CN7 / CN8	Carrier board	JTAG adapter connectors (10-pin, Tag-Connect 2050 IDC, XDS110 20-pin)
J1	Carrier board	USB Type-C, 5V power input
CN9	Carrier board	USB micro connector, FTDI UART0

Table 2-2 shows signals of the TICS100MOD module on the 50-pin interface connector:

Table 2-2. Board-to-Board Connector Pin Assignment

Pin Number	Pin name	Function	Pin Number	Pin name	Function
1	GPIO11	IO	26	GPIO59	Config mode selection
2	PRI_PRU0_GPIO3	IO	27	GPIO58	Config mode selection
3	PRI_PRU0_GPIO4	IO	28	CORE_PG	Power good status
4	PRI_PRU0_GPIO2	IO	29	3V3	3.3V input
5	PRI_PRU0_GPIO1	IO	30	3V3	3.3V input
6	PRI_PRU0_GPIO0	IO	31	GND	GND
7	SPI1_CS0	SPI chip select	32	GND	GND
8	SPI1_D1	SPI1 DOUT	33	SPI0_CLK	SPI0 clock
9	SPI1_D0	SPI1 DIN	34	PRI_PRU0_GPIO5	IO
10	SPI1_CLK	SPI1 clock	35	AM261_SAFETY_ERRORN	Error status
11	I2C1_SDA	I2C1 data	36	HPI_IRQ1	IO
12	I2C1_SCL	I2C1 clock	37	HPI_IRQ2	IO
13	PR0_IEP0_EDC_LATCH_IN1	IO	38	HPI_IRQ3	IO
14	PR0_IEP0_EDC_SYNC_OUT1	IO	39	HPI_IRQ4	IO
15	PR0_IEP0_EDC_LATCH_IN0	IO	40	PRI_PRU0_GPIO8	IO
16	PR0_IEP0_EDC_SYNC_OUT0	IO	41	SPI0_D1	SPI0 DOUT
17	GPIO14	Target request output	42	SPI0_D0	SPI0 DIN
18	GPIO8	Target busy output	43	AM261_PORZ	Module reset

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Table 2-2. Board-to-Board Connector Pin Assignment (continued)

Pin Number	Pin name	Function	Pin Number	Pin name	Function
19	I2C0_SCL	I2C0 clock	44	AM261_WARMRSTN	Reset status
20	I2C0_SDA	I2C0 data	45	ADC1	ADC1
21	UART0_TXD	UART0 TX	46	ADC2	ADC2
22	UART0_RXD	UART0 RX	47	BOD	ADC3
23	UART2_TXD	UART2 TX	48	SPI0_CS	SPI0 chip select
24	UART2_RXD	UART2 RX	49	GPIO140	IO
25	CORE_EN	Module core voltage status	50	AM261_PORZ_HOST	Module reset

Table 2-3. SOP Boot Mode Header (CN5)

Header Pin	Description	Header pin	Description
CN5_1	+3V3	CN5_2	SOP0
CN5_3	+3V3	CN5_4	SOP1
CN5_5	+3V3	CN5_6	SOP2
CN5_7	+3V3	CN5_8	SOP3

Boot mode pins provide vital information to the ROM code for boot. These pins must be set up properly before the power ramp.

2.5 Jumper Information

Use OSPI (4S) mode. In this mode no jumpers are fitted; leave all pins of CN5 open.

Table 2-4. CN5: Boot Mode

Boot mode	SOP3	SOP2	SOP1	SOP0
OSPI (4S) - Quad Read Mode	0	0	0	0
UART	0	0	0	1
OSPI (1S) - Single Read Mode	0	0	1	0
OSPI (8S) - Octal Read Mode	0	0	1	1
DevBoot	1	0	1	1
xSPI 8D (SFDP)	1	1	0	0
USB DFU	1	1	1	0
Unsupported boot mode	All other combinations are not defined			

Table 2-5. CN11: Configuration Mode

Jumper placement	Module mode
Connected (GPIO59 and GPIO58 connected)	Module in Config Mode
Not connected	Module in Run Mode

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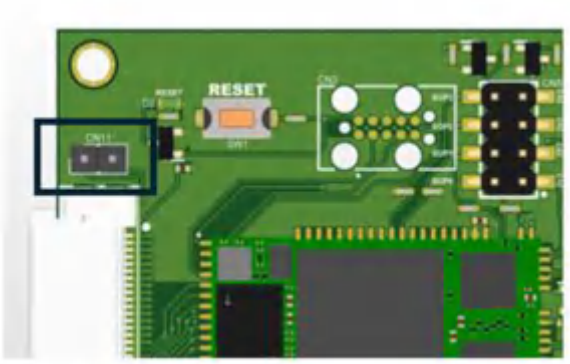


Figure 2-4. CN11 Configuration Jumper Position

CN10: power source selection

CN10 selects between the on-board 3.3V regulator and an external 3.3V supply (see Section 2.2).

2.6 Push Buttons

Both boards provide a reset push-button that resets the MCU. After an MCU reset, a system reset occurs and the flash and the PHYs are also reset. User push-buttons are not available.

Name	Board	AM261 pin	Active
SW1	Development board (system reset)	PORZ	Low-active
SW2	Carrier board (system reset)	PORZ	Low-active

2.7 Interfaces

2.7.1 Ethernet

The development board provides two Ethernet ports (DP83826AERHBR PHYs) on one RJ45 connector (CN1, JX80-0037NL). Two ESD protection circuits (ESDS314DBVR) protect each PHY output.

2.7.2 Serial Connection to the PC (UART0)

When the carrier board is connected to a PC through USB micro (CN9) for the first time, the required driver installs automatically and a new COM port is created. This COM port provides communication with the board via UART0 (FT232R). ICS Configurator uses 115200 baud. The assigned COM port is listed in the Windows® Device Manager under Ports (COM & LPT).

2.7.3 Host Interface (SPI and GPIO)

The host is the SPI controller and the TICS100MOD is the SPI peripheral (SPI Mode 0, tested at 1MHz; this is the tested frequency, not a specified maximum).

Signal	Module pin	Direction	Role
SCLK	SPI0_CLK	Host to target	SPI clock generated by the host
PICO	SPI0_D0	Host to target	Data sent by the host to the module
POCI	SPI0_D1	Target to host	Data sent by the module to the host
Target Request Feed	SPI0_CS	Host to target	Host GPIO output connected to a target interrupt input (not an SPI chip select)
Target Busy	GPIO8	Target to host	Indicates that the target is busy
Target Request	GPIO14	Target to host	Allows the target to request communication
Reset	PORZ_HOST	Host to target	Module reset input

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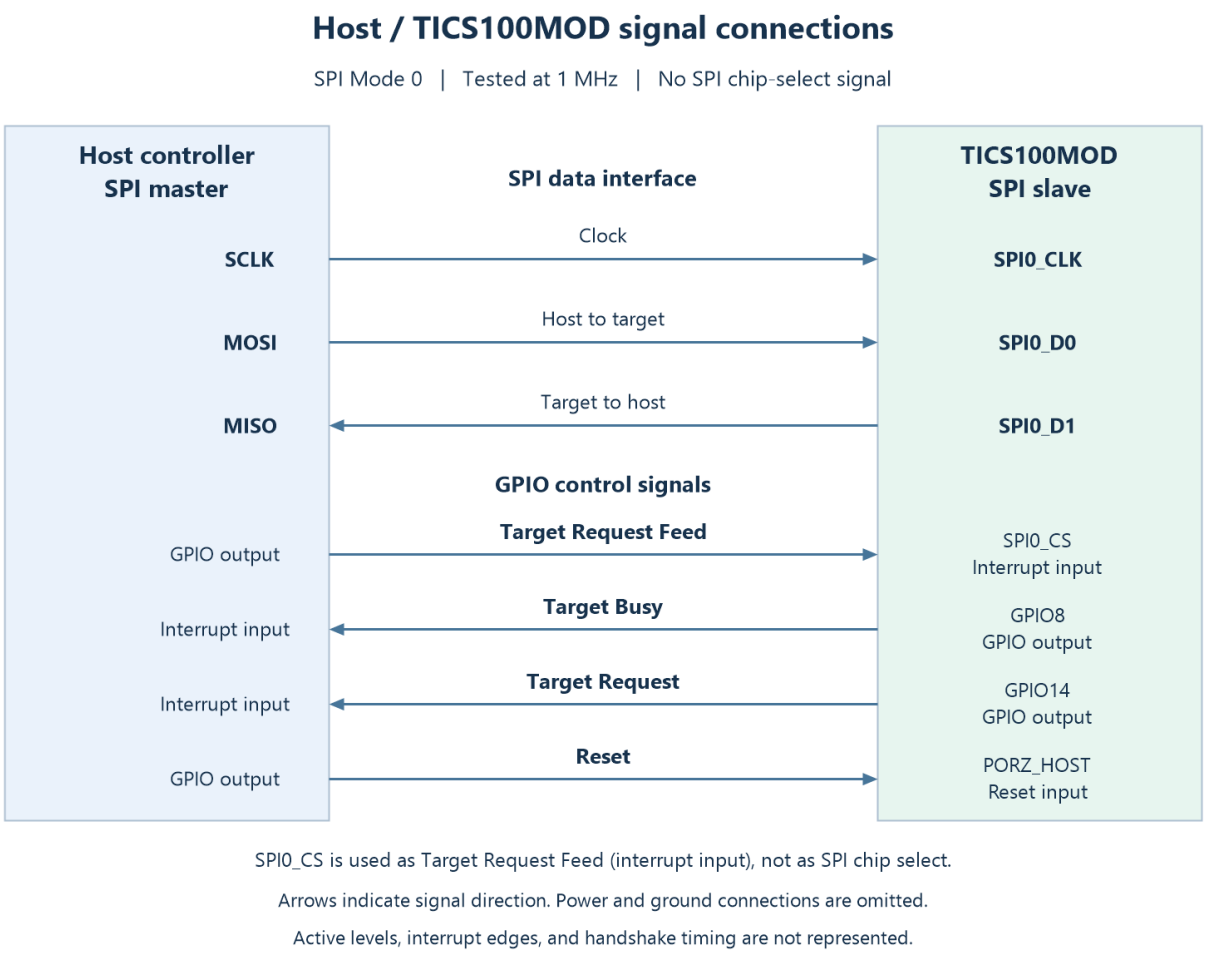


Figure 2-5. SPI and GPIO Signal Connections Between Host and TICS100MOD

2.8 Debug Information

The development board provides a debug interface to the MCU through the TC2050-IDC 10-pin JTAG connector (CN3). The carrier board adapts the TC2050-IDC connector to a standard 10-pin and a 20-pin Arm JTAG connector, and is designed for XDS110 and TM4C129 programmers.

Table 2-6. Development Board LEDs

Name	Signal	Color	Active
D2	PORZ (reset status)	Green	High-active
D3	User LED (GPIO139)	Green	High-active
D6	3.3V presence	Green	High-active

Table 2-7. Carrier Board LEDs

Name	Signal	Color	Active	Expected at power-on
D4	AM261_WARMRSTN (warm reset deasserted)	Green	High-active	ON
D7	PORZ (power-on reset deasserted)	Green	High-active	ON
D8	User LED (GPIO140)	Green	High-active	OFF
D9	CORE_PG (input supply and +3V3 output rail valid)	Green	High-active	ON
D14	3.3V presence	Green	High-active	ON
D10	UART COM (TX/RX)	Green/Red	-	OFF

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D2, D4, and D7 indicate reset status on different signals. When these LEDs are ON, the MCU is not held in reset. These indicators apply in both Config Mode and Run Mode; CN11 selects the module operating mode.

2.9 Best Practices

- The boards are ESD-sensitive: handle them by the edges.
- Never plug or unplug the boards while powered; make sure both boards are unpowered before assembly.
- Use only a 5V supply on the 5V input; higher voltage or reversed polarity damages the board.
- Set the boot mode pins (CN5) and the configuration jumper (CN11) before applying power. After changing CN11, power-cycle the board.
- Close any serial terminal or other application using the device COM port before connecting ICS Configurator.

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3 Software

The TICS100MOD-SDK contains examples, libraries and tools to develop industrial communication applications with the TICS100MOD. This software enables real-time industrial communication for any external host processor.

3.1 Software Description

The host application accesses the TICS100MOD through the common ICS API, while the module handles the industrial protocol stack. Both sides use the same shared core and communicate through SPI and GPIO signals. The main software components are:

Component	Description
Customer Application	Application logic running on the host; uses the common ICS API and the repository variables
ICS API	Common API to create/start the ICS instance, build the repository and access objects (IcsObject_get, IcsObject_set, IcsObject_apply, IcsObject_refresh) and callbacks
Shared Core	Repository, command handler and interpreter, serialization and IPC protocol shared by host and target
Protocol Support (Host)	Protocol-specific services, built-in objects and generated repository for EtherCAT, EtherNet/IP and PROFINET
Transfer / HAL / OSAL	SPI transfer with GPIO control signals plus hardware and OS abstraction (Linux, FreeRTOS)
TICS100MOD Firmware	Bootloader and pre-built firmware for EtherCAT, EtherNet/IP and PROFINET on the module
ICS Configurator	Desktop tool that generates repository, device, channel and protocol configuration from ESI, GSDML or JSON files and programs the target firmware

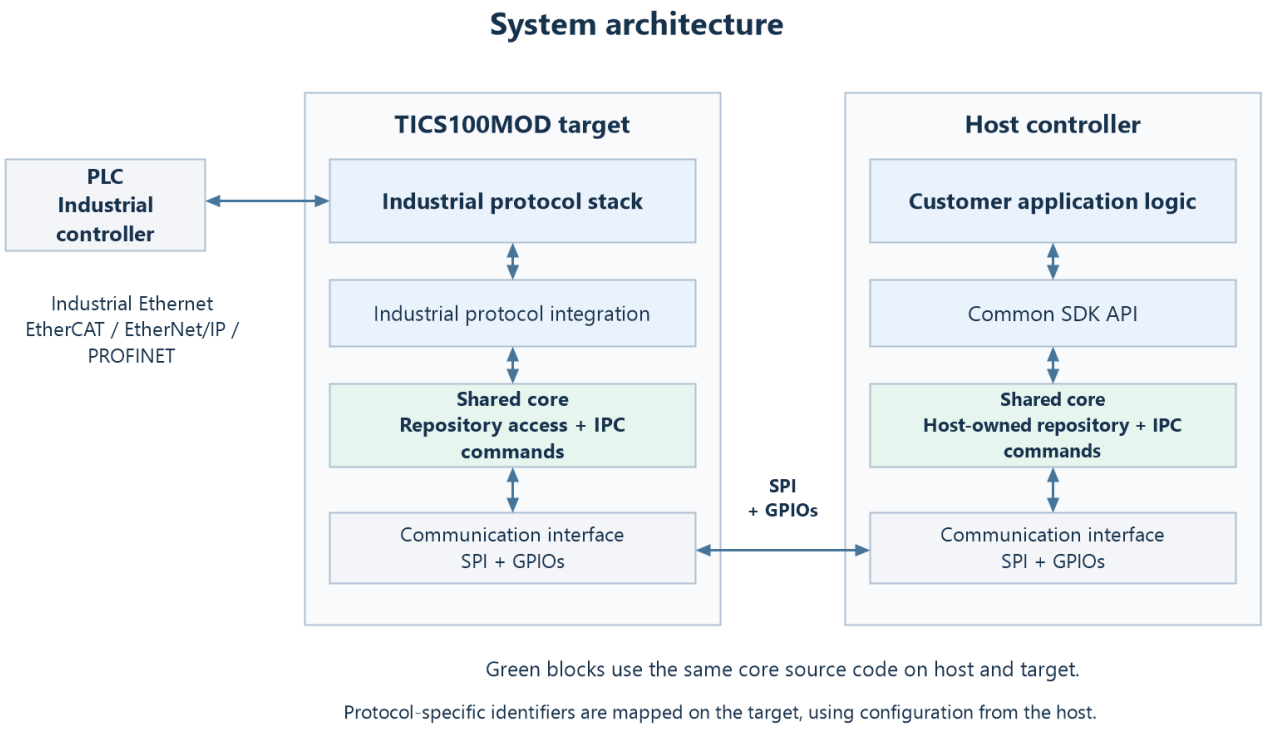


Figure 3-1. TICS100MOD-SDK System Architecture

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3.2 Software Installation

Install the TICS100MOD-SDK (${SDK_INSTALL_PATH}). Table 3-1 lists the main folders:

Table 3-1. Main Folders of TICS100MOD-SDK

Folder	Description
docs/	Offline browsable HTML documentation
examples/	Example applications and sample configuration files (ESI, GSDML, JSON)
examples/ics-host/am64-main-app/	Host application example for AM64x (Linux)
examples/ics-host/am261-main-app/	Host application example for AM261x (FreeRTOS)
firmware/	Pre-built TICS100MOD firmware images: Ethercat, EthernetIp, Profinet
source/TICOM/	SDK source code (shared core, API, protocol, HAL, OSAL)
tools/ics-configurator/	ICS Configurator application including the code generator

Check the documentation for validated tool versions.

3.3 GUI Installation

See the TICS100MOD-SDK documentation for instruction using the Configurator tool.

3.4 Software Development

Host application development environments in the SDK:

- **AM64x-EVM (Linux host, `am64-main-app`):** Eclipse IDE for C/C++ Developers, Arm GNU Toolchain (aarch64-none-linux-gnu) and MinGW (make). Linux SDK ti-processor-sdk-linux-am64xx-evm with the kernel/ device-tree patch supplied with the example (mcu_spi0, GPIOs, TPIC2810 LED driver).
- **LP-AM261x (FreeRTOS host, `am261-main-app`):** Code Composer Studio (CCS) with MCU+ SDK AM261X, SysConfig and TI Arm Clang.

Table 3-2. Host Pin Mapping to the TICS100MOD

Signal	Module pin	AM64-EVM (safety connector)	LP-AM261x
CLOCK	SPI0_CLK	16 (MCU_SPI0_CLK)	J1.7
PICO	SPI0_D0	4 (MCU_SPI0_D0)	J2.15
POCI	SPI0_D1	2 (MCU_SPI0_D1)	J2.14
CS / Target Request Feed	SPI0_CS	12 (MCU_GPIO0_9)	J2.19
Target Busy	GPIO8	5 (MCU_GPIO0_8)	J6.53
Target Request	GPIO14	9 (MCU_GPIO0_7)	J8.78
Target Reset	PORZ_HOST	20 (MCU_I2C0_SCL)	J8.77
GND	GND	23 (DGND)	-

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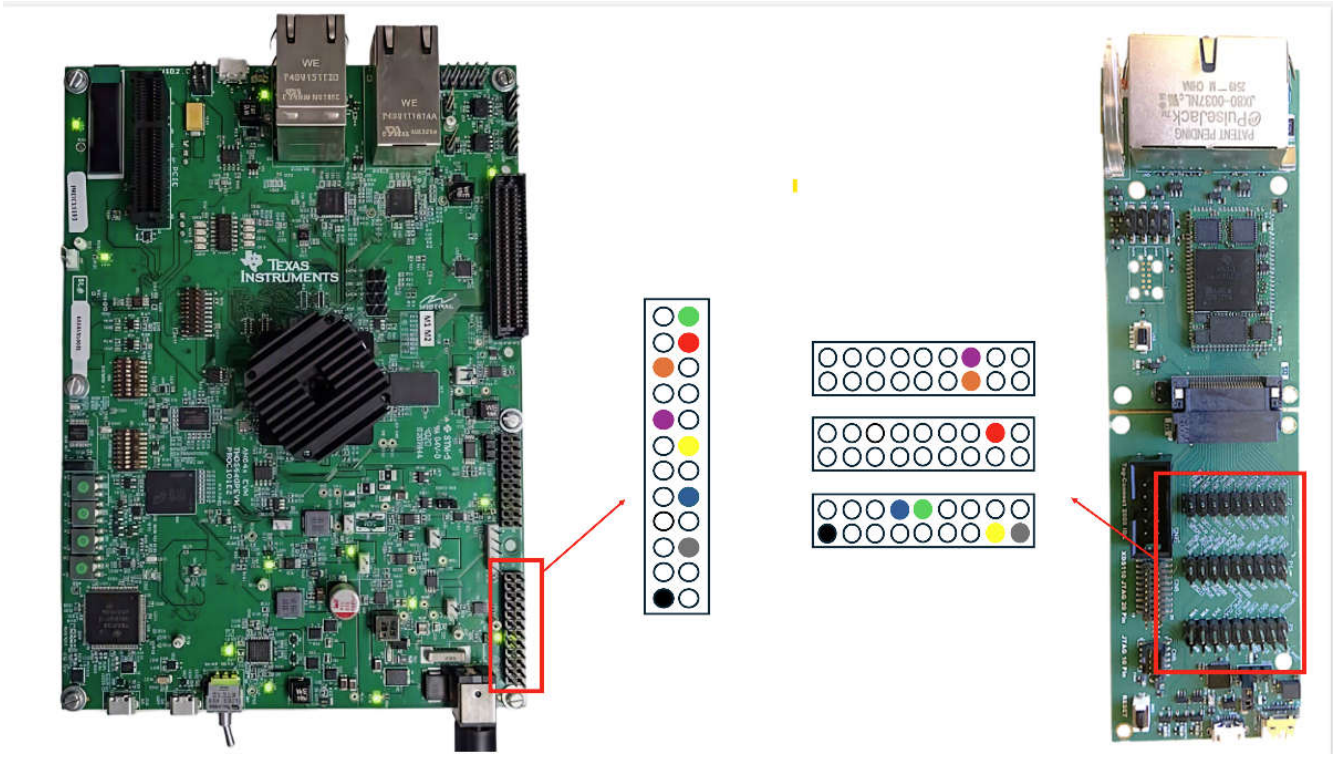


Figure 3-2. AM64-EVM to TICS100MOD Connections

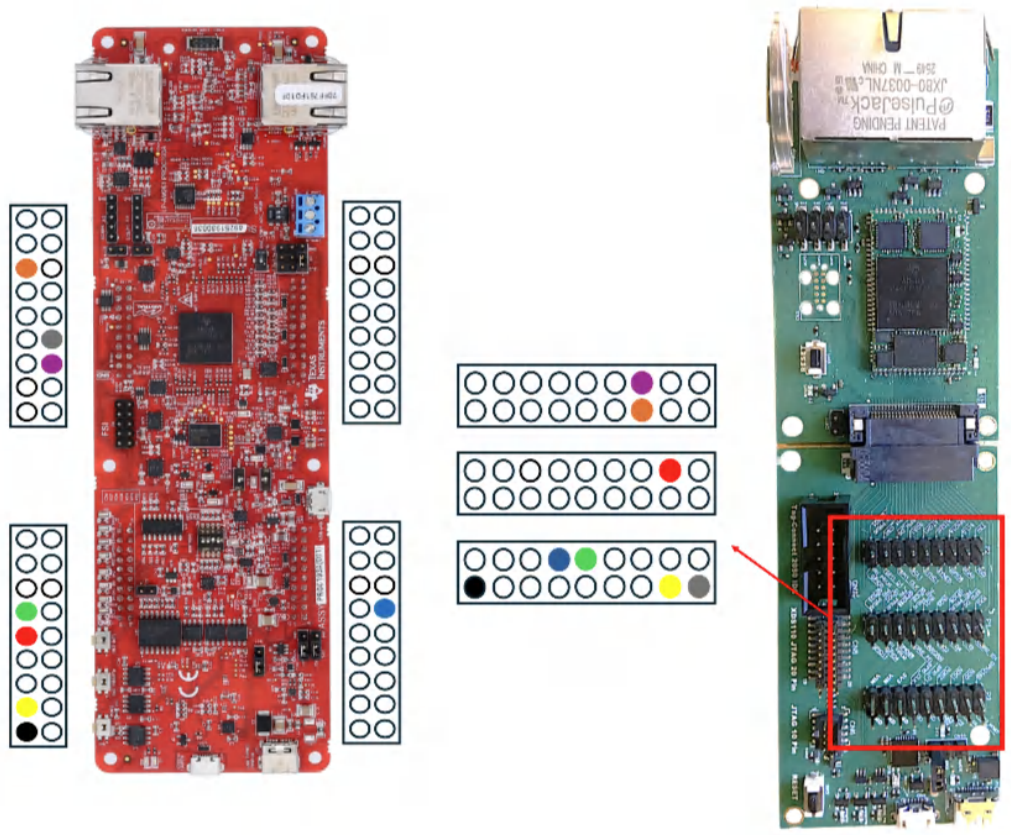


Figure 3-3. LP-AM261x to TICS100MOD Connections

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3.5 Programming Options

The TICS100MOD boots into the bootloader and supports two operating modes selected with CN11 before power-on: **Config Mode** (communicates with ICS Configurator for target programming) and **Run Mode** (starts the application). Firmware can be programmed in two ways.

3.5.1 Programming the Module With ICS Configurator (UART)

1. Fit the CN11 jumper (Config Mode), connect the micro-USB cable and power the board. Verify the decoded message "Enter config mode." in the Target tab output.
2. In ICS Configurator, click Create New Workspace and choose a name and location for the .ics workspace.
3. On the Target tab, select the firmware folder of each protocol to flash with the "..." button: {SDK_DIRECTORY}\firmware\Ethercat, \EthernetIp or \Profinet. The .mcelf and .mcelf_xip file names are filled in automatically.
4. Select the COM port, click Connect, then click Flash and wait for "Flashing completed successfully."
5. Power off, remove the CN11 jumper (Run Mode) and power on again. Keep the CN5 OSPI boot selection unchanged.

3.5.2 Firmware Provisioning From the Host

The host can start a protocol firmware already stored in the module flash (protocol index 0: EtherCAT, 1: PROFINET, 2: EtherNet/IP) or provide the firmware images during startup; the target writes them to flash and boots from them. Set Generate Firmware to True in the ICS Configurator workspace to generate the target_firmware.c data used for this path.

3.5.3 Boot Modes

The boot mode is selected with the SOP pins on CN5 (see Section 2.5). Use OSPI (4S).

3.6 Developing an Application

A host application uses the common ICS API and the repository of variables; the module handles the industrial protocol stack. Basic steps:

1. Generate the repository and protocol configuration with ICS Configurator: create a workspace, select the protocol (EtherCAT, PROFINET or EtherNet/IP), the catalog file (ESI XML, GSDML XML or EDS + JSON) and the output folder, and generate the code.
2. Configure the project: select HAL and OSAL sources for the host platform (Linux or FreeRTOS), exclude unused protocol sources and define the macros MEMORY_BUFFER_SIZE (always) and, for Linux, HAL_SPI_ENABLED, HAL_PIN_ENABLED, HAL_ICU_ENABLED, HAL_TIMER_ENABLED.
3. Implement the core callbacks: IcsUser_getDeviceConfig, IcsUser_getChannelConfig, IcsUser_getChannelSetting and IcsRepository_initialize.
4. Initialize the selected protocol: IcsEthernetip_initialize(), IcsProfinet_initialize() or IcsEthercat_createServices().
5. Create and start the ICS instance, access objects with IcsObject_get / IcsObject_set and exchange data with the target with IcsObject_refresh / IcsObject_apply. Register read/write callbacks with IcsObject_registerReadCallback / IcsObject_registerWriteCallback.

For details see the SDK documents: Application Development User Guide, Common API (TICS100MOD Software Documentation), and the host examples for AM64x-EVM and LP-AM261x.

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4 Hardware Design Files

The schematics, assembly drawing and bill of materials of the EVM are given below.

4.1 Schematics

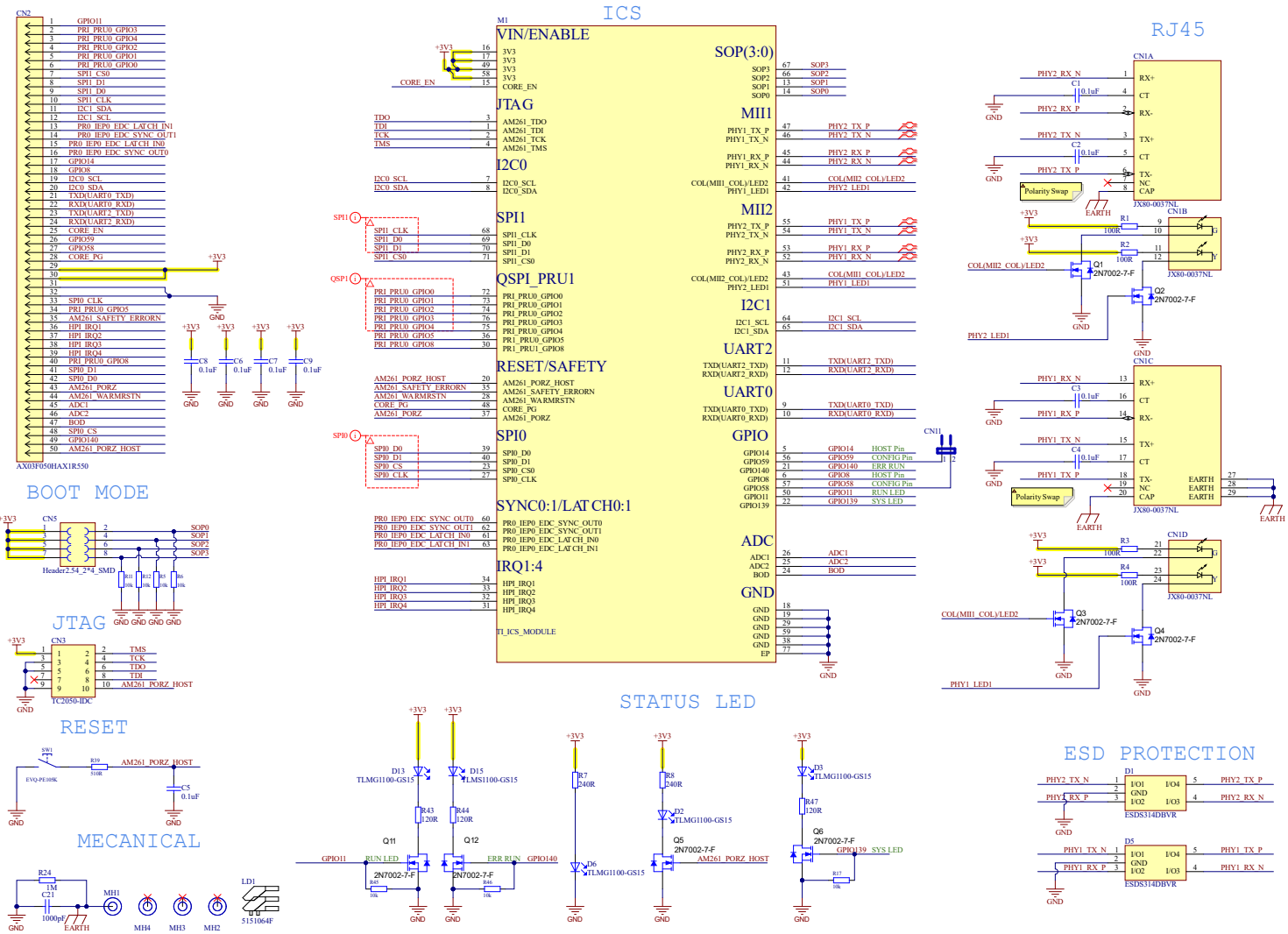


Figure 4-1. Carrier Board Schematic

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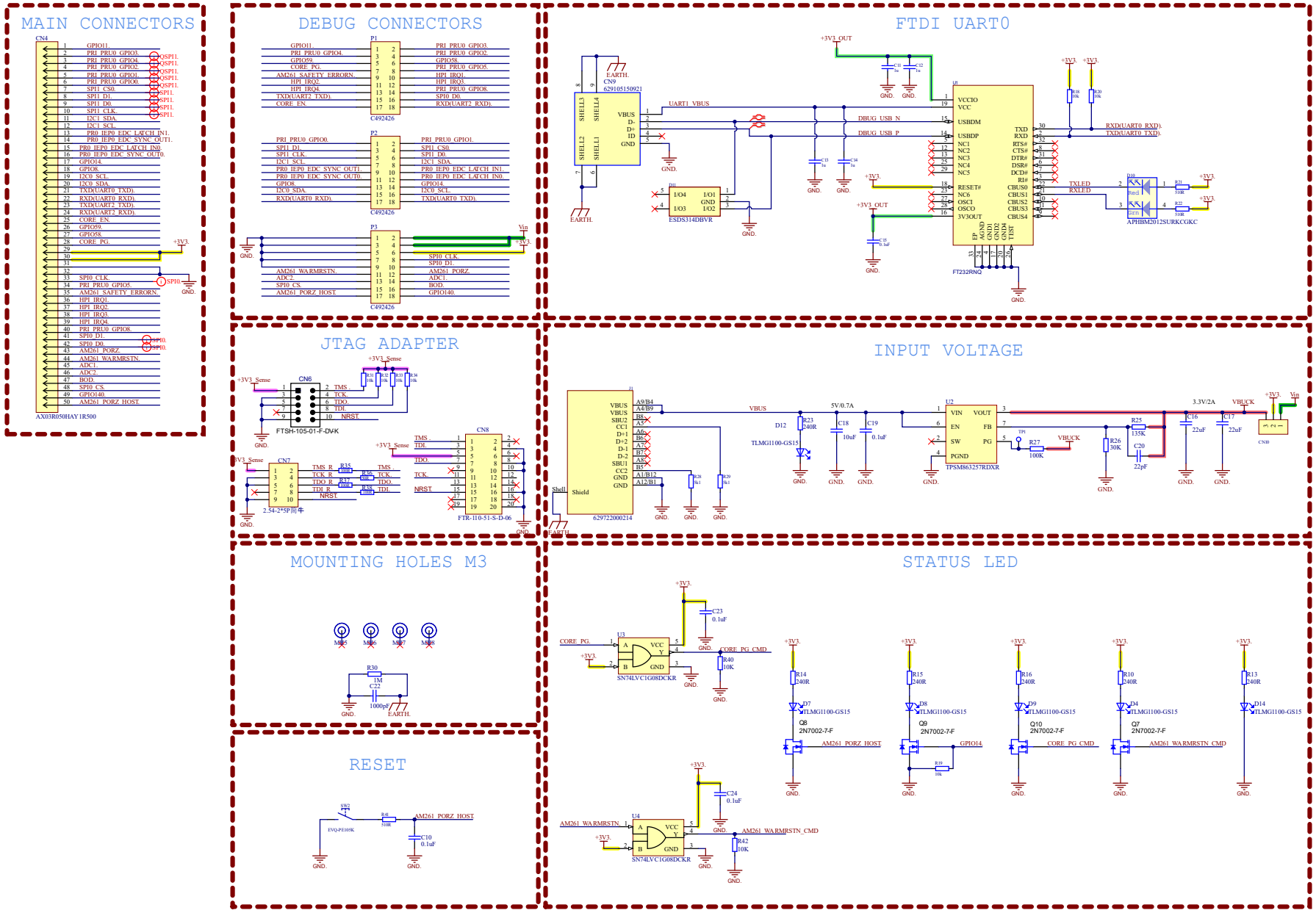


Figure 4-2. Development Board Schematic

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4.2 PCB Layouts

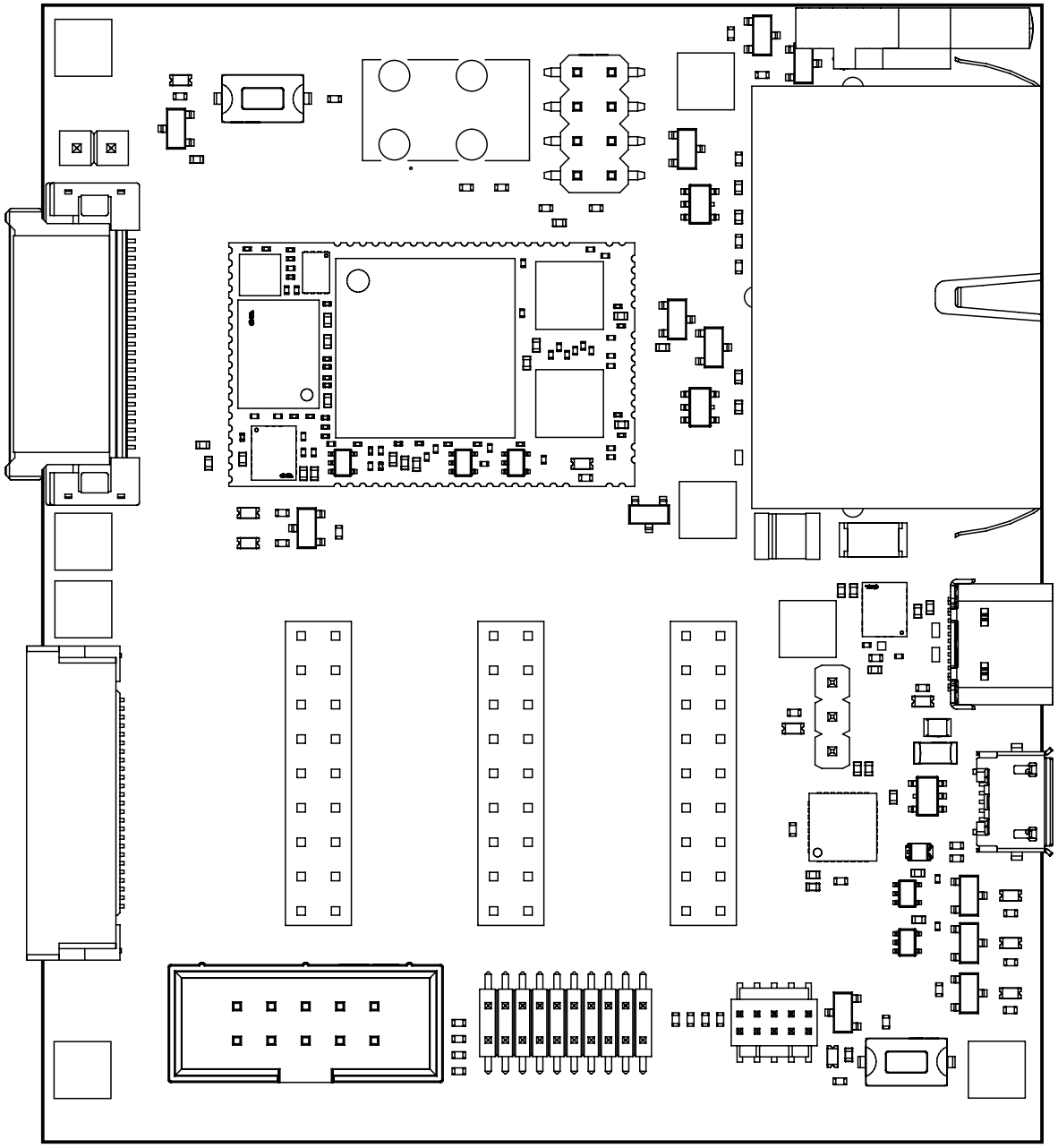


Figure 4-3. Carrier and Development Board Assembly Drawing

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4.3 Bill of Materials (BOM)

Bill of materials of the carrier board and the development board (preliminary; transcribed from the source PDF, verify ordering codes against the released BOM):

Designator	Ordering code	Value	Qty	Description	Manufacturer
CN8	FTR-110-51-S-D-06		1	Connector	Samtec®
M1			1	The ICS module	
CN7	2.54-2*5P		1	Connector 5 p 2 rows	BOOMELE
Q1-Q10	2N7002-7-F	60V	10	MOSFET, N-CH, 60V, 0.17A, SOT-23	Diodes Incorporated
U1	FT232RNQ-TRAY	FT232RNQ	1	IC XCVR USB TO UART CTLR 3.3-5.25V QFN32	FTDI
CN5	PZ254-2-04-S		1	Receptacle, 6-Pin, Dual row	HCTL
CN2	AX03F050HAX1R550		1	Connector	JAE Electronics
CN4	AX03R050HAY1R500		1	Connector	JAE Electronics
C20	C0402C220J5GACAUTO	22pF	1	Capacitor	KEMET
D10	APHBM2012SURKCGKC	2.1V Green, 1.95V Red	1	LED RED/GRN DUAL 30MA SMT	Kingbright
R25	RN73H1ETTP1353F50	135K	1	Resistor	KOA Speer Electronics
C21	1812GC102KAT1A	1000pF	1	Capacitor	KYOCERA AVX
C22	1206GC102KAT1A	1000pF	1	Capacitor	KYOCERA AVX
C11-C14	GRM155C81C105KE11D	1µF	4	Capacitor	Murata
C15	GCM155R71H104KE02D	0.1µF	1	Capacitor	Murata
C1-C10, C19	GCM155R71H104KE02D	0.1µF	11	Capacitor	Murata
C16, C17	GRM158R61A226ME15J	22µF	2	Capacitor	Murata
C18	GRM155R60J106ME15D	10µF	1	Capacitor	Murata
SW1, SW2	EVQ-PE105K		2	Taster 1pol	Panasonic®
CN1	JX80-0037NL		1	RJ45 Ethernet connector	Pulse Electronics
CN6	FTSH-105-01-F-DV-K		1	Header (Shrouded), 1.27mm, 5x2, Gold, SMT	Samtec
D1, D5, D11	ESDS314DBVR	3.6V	3	ESD protection for USB and Ethernet	Texas Instruments
U2	TPSM863257RDXR		1	Buck converter	Texas Instruments
D2, D3, D4, D6, D7, D8, D9, D12, D14	TLMG1100-GS15	2.1V	9	Single colour LED, CHIPLED (SMD 0603) green	Vishay®
R21, R22	CRCW0402510RFKED	510R	2	Resistor	Vishay
R7-R10, R13-R16, R23	WR04X2400FTL	240R	9	Resistor	Walsin Technology
CN9	629105150921		1	CON 5 USB MICRO-AB RA SKT SMT 0.65MM SP AU	Würth Elektronik
CN10	613003111121		1	Connector 3pol	Würth Elektronik
J1	62972200214		1	WR-COM USB 2.0 Type C Receptacle Horizontal SMT 18P	Würth Elektronik

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Designator	Ordering code	Value	Qty	Description	Manufacturer
P1, P2, P3	PZ254V-12-18P		3	18P 2x9P pin header 2.54mm, through hole	XFCN
R1-R4, R35, R37, R38	RC0402FR-07100RL	100R	7	Resistor	Yageo®
R5, R6, R11, R12, R17-R20, R31-R34	RC0402FR-0710KP	10k	12	Resistor	Yageo
R26	RC0201FR-0730KL	30K	1	Resistor	Yageo
R27	AC0201JR-07100KL	100K	1	Resistor	Yageo
R28, R29	RC0402FR-7W5K1L	5k1	2	Resistor	Yageo
R30	AC0805FR-7W1ML	1M	1	Resistor	Yageo
R36	RC0402JR-0750RL	50R	1	Resistor	Yageo
R24	RC2010JK-071ML	1M	1	Resistor	Yageo

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5 Additional Information

5.1 Known Hardware or Software Issues

Known issues of the SDK are documented in the corresponding release notes.

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5.2 Terminology

TICS100MOD	Industrial communication module that connects a host controller to an industrial network
SDK	Software framework used by the host application to configure and communicate with the TICS100MOD
Host	MCU, Linux board, or other SPI-capable controller running the customer application
Target	TICS100MOD software and hardware that manages the industrial protocol stack
PLC	Industrial controller connected through EtherCAT, EtherNet/IP, or PROFINET
Shared core	Component used by host and target for repository access, command handling, serialization, and data exchange
Repository	Hierarchical collection of SDK objects and variables used to represent application data
Configurator	Desktop tool that generates repository, device, channel, and protocol configuration data
Bus State	Built-in repository variable indicating the state of the industrial communication bus
Config Mode / Run Mode	Bootloader modes selected by the CN11 jumper: target programming with ICS Configurator / application start
SOP	Boot mode pins read by the ROM code at power-up
ESI / GSDML / EDS	Device description files for EtherCAT / PROFINET / EtherNet/IP

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6 Related Documentation

The following documents are part of the TICS100MOD-SDK documentation:

6.1 Supplemental Content

- Quick Start Guide
- Common API (TICS100MOD Software Documentation)
- ICS Application Development User Guide
- TICS100MOD Configurator User Guide
- Linux Host AM64-EVM Example and FreeRTOS Host AM261x-LP Example
- Release Notes

7 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
October 2026	*	Initial Release

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2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

Evaluation Kits are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.

User shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

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