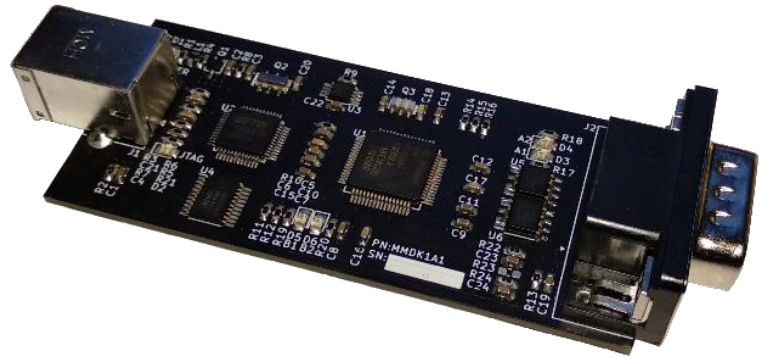


MMDK1

MilCAN Module Development Kit

MilCAN-A Protocol Offloading Controller



The MilCAN Module Development Kit is a reference hardware design and software development kit of a MilCAN-A Protocol (MWG-MILA-001 R3) Stack offloading co-processor.

The Module runs a MilCAN-A Stack in a controlled environment, offloading the processing of MilCAN-A protocol real-time and synchronous functions from a Host computer system that runs the user application using a generic Operating System. Time sensitive MilCAN-A functions are handled internally by the Module while the user developed application runs independently in the Host system and communicates asynchronously with the Module via a library API.

Module Specifications

- Dual ISO 11898-1 CAN Data Link Layer
- Dual ISO 11898-2 CAN Physical Layer (up to 2Mbps)
- USB2.0 for module power and Host connectivity
- *Dimensions:* 92mm x 34mm x 15mm (aprox.)
- *CANbus Connector:* DB9 Male, CiA DS102 compatible
- *Host Connector:* USB-B Female

Offloaded MilCAN-A Functions

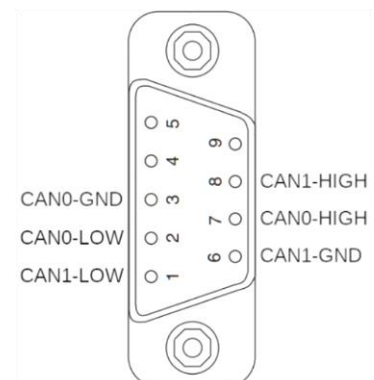
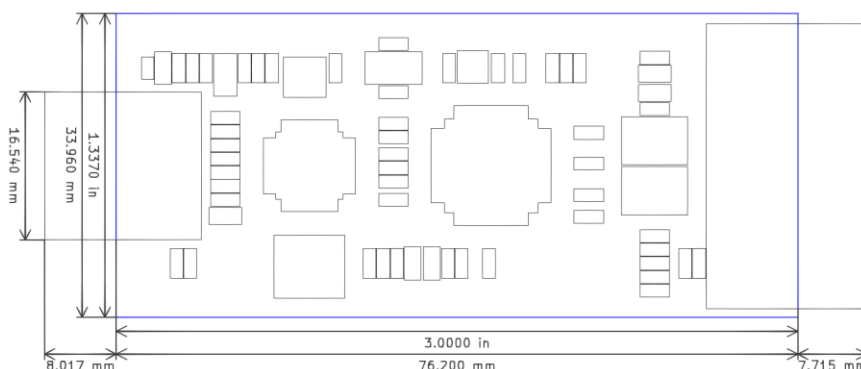
- Sync Master / Sync Slave
- MilCAN-A Priority based message and frame processing and transmission
- Synchronous Messages scheduling and transmission
- Asynchronous Messages transmission
- Request Messages handling and Response Messages transmission
- Synchronous and Asynchronous Multi-frame Messages reception and transmission
- Primary Type and Message ID based filtering
- Frame expiry with user configurable per-priority TTL

Other Functions

- Direct CAN: Raw CAN frame reception and transmission

Host Software

- USB Driver (Linux, *BSD, MS Windows XP-10)
- API Library (C99)
- Example Applications (C99)



MILCAN-A Stack Configuration

Bit-timing

The ISO11898-1 CAN controller bit-timing is configured using the following parameters:

- Prescaler
- Synchronisation Jump Width
- TSeg1
- TSeg2

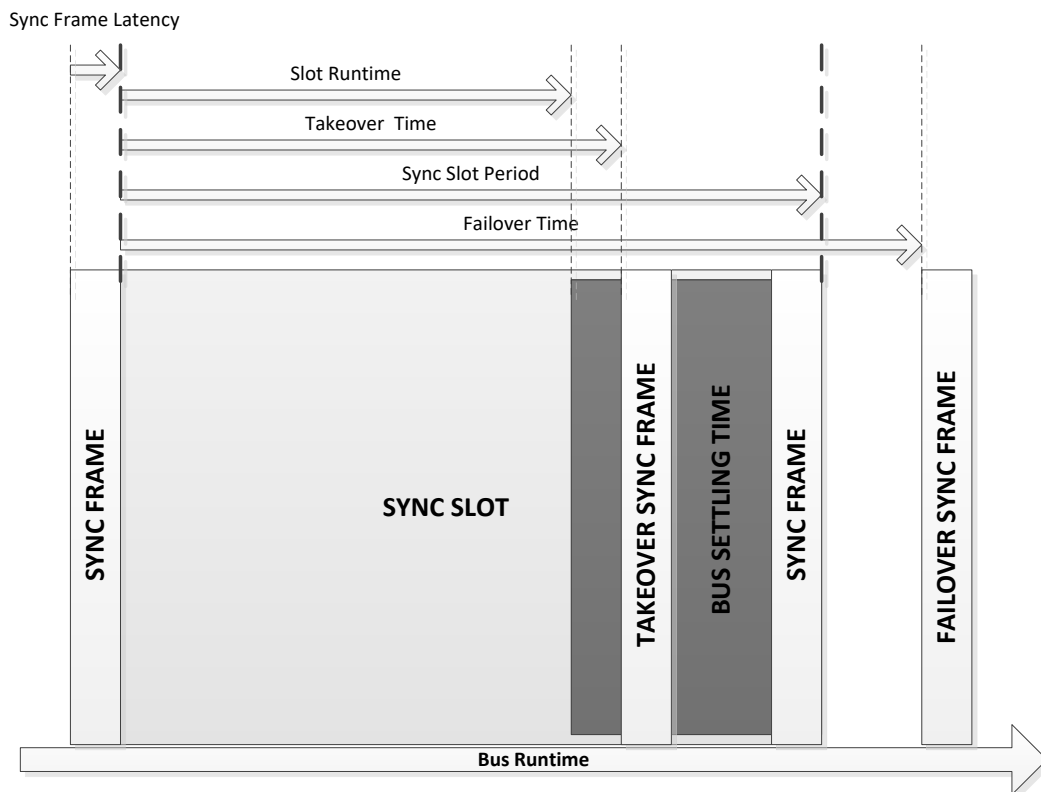
Default configurations are included for 250Kbps, 500Kbps, and 1Mbps bitrates.

PTU timing

The PTU and Sync Frame timings are configured using the following parameters:

- *Sync Slot period*
The time period of a desired PTU.
- *Takeover time*
The time from the beginning of the current PTU at which a Takeover Sync Frame will be sent.
- *Failover time*
The time from the beginning of the current PTU at which a Failover Sync Frame will be sent.
- *Slot Runtime*
The time from the beginning of the current PTU during which transmission of application frames is allowed. Pending frames will be stopped and re-queued, and no further transmissions will be triggered until the next Sync Slot.

These parameters define the PTU and Sync Frame handling timings as shown in the figure below:



Message Filtering

MilCAN frames can be filtered on reception to prevent unnecessary queue and processing loads. The filtering mechanism is controlled by setting the DEFAULT RULE and the FILTERING LISTS. Using a combination of the two, the user can select which MilCAN frames are accepted, queued, and passed to the application.

The DEFAULT RULE sets the primary filtering rule and can be set to one of two options:

- **DEFAULT ALLOW:** All messages are initially considered as Allowed.
- **DEFAULT DENY:** All messages are initially considered as Denied.

The FILTERING LISTS define two lists of MilCAN PRIMARY TYPES and full MilCAN MESSAGE IDS.

The operation flow of the filtering mechanism is as follows:

- The incoming frame is compared against the FILTERING LISTS.
- **IF** the frame's Primary Type is **NOT** found in the PRIMARY TYPES list,
AND
the frame's Message ID is **NOT** found in the MESSAGE IDS list,
THEN
the DEFAULT RULE is **FOLLOWED**.
- **IF** the frame's Primary Type **IS** found in the PRIMARY TYPES list,
OR
the frame's Message ID **IS** found in the MESSAGE IDS list,
THEN
the **OPPOSITE** of the DEFAULT RULE is **FOLLOWED**.

Frame expiry

The mortality of MilCAN frames can be enabled globally and then set individually to each queued frame. A frame with mortality enabled (Mortal Frame) will be discarded if it fails to be transmitted within the maximum Time-To-Live (TTL) value assigned to its MilCAN priority level. This TTL value can be dynamically configured and is specified in number of Sync Slots.

Scheduler

The MilCAN-A Stack includes an extension layer (scheduler) that can be optionally used by the user application to offload the following application tasks:

- Synchronous frame triggering
- MilCAN Response frame triggering
- Asynchronous multi-frame transmission
- Synchronous multi-frame triggering
- Multi-frame reception

The application can register a message-set with the scheduler, which will handle internally the necessary tasks such as triggering of frames at the appropriate Sync Slot, fragmentation and reassembly of multi-frame messages.

MilCAN-A Protocol Compliance Matrix

CID	Supported	Ensured	Application Specific	N/A
<i>PLTEST01</i>				
CID26				X
CID717				X
CID27				X
CID28				X
CID29				X
CID30				X
CID718				X
CID31				X
CID32				X
CID719				X
CID57				X
<i>PLTEST02</i>				
CID61				X
CID63				X
CID67				X
CID69				X
<i>PLTEST03</i>				
CID195				X
CID720				X
CID721				X
<i>PLTEST04</i>				
CID199				X
CID201				X
CID202				X
<i>PLTEST05</i>				
CID210				X
CID211				X
CID212				X
CID214				X
<i>PLTEST06</i>				
CID216				X
CID217				X
<i>PLTEST07</i>				
CID221	Y			
CID222	Y			
CID226				X
CID227	Y			
CID228	Y			
CID229	Y			
CID230	Y			
CID231	Y			
CID232				X
CID233				X
<i>PLTEST08</i>				
CID243				X
CID247				X
CID249				X
<i>DLLTEST01</i>				
CID232				X
CID263		X		
CID265	Y			
CID724	Y			
CID267	Y			
CID269	Y			
CID271	Y			
CID299	Y			
<i>DLLTEST02</i>				
CID319	Y			
CID746	Y			
CID320	Y			
CID748	Y			
CID750		X	X	
CID751		X		
CID321		X	X	

CID	Supported	Ensured	Application Specific	N/A
<i>DLLTEST03</i>				
CID328	Y			
CID330			X	
CID331	Y			
<i>DLLTEST04</i>				
CID729			X	
<i>DLLTEST05</i>				
CID289	Y			
CID732	Y			
CID733	Y			
CID291	Y			
CID292	Y			
CID293	Y			
CID294	Y			
<i>DLLTEST06</i>				
CID296			X	
CID734			X	
CID735			X	
CID297			X	
<i>DLLTEST07</i>				
CID300	Y			
CID301	Y			
CID739	Y			
CID740	Y			
CID327	Y			
<i>DLLTEST08</i>				
CID744	Y			
CID312	Y			
CID745	Y			
CID316	Y			
<i>DLLTEST09</i>				
CID334	Y			
<i>DLLTEST10</i>				
CID339	Y			
CID753	Y			
CID754	Y			
CID340	Y			
<i>DLLTEST11</i>				
CID345				X
CID350	Y			
CID348	Partial			
<i>DLLTEST12</i>				
CID758	Y			
CID761	Y			
CID369	Y			
CID763	Y			
CID373	Y			
CID766	Y			
CID377	Y			
CID378	Y			
CID769	Y			
CID770	Y			
CID773	Y			
CID774	Y			
CID382	Y			
CID776	Y			
CID777	Y			
CID778	Y			
CID386	Y			
CID389	Y			
CID781	Y			
CID390	Y			
<i>APPTTEST01</i>				
CID403	N			
CID404				X

CID	Supported	Ensured	Application Specific	N/A
<i>APPTTEST02</i>				
CID469	Y			
CID514	Y			
CID524			X	
CID788	Y			
CID789	Y			
CID790	Y			
CID791	Y			
CID792	Y			
CID793	Y			
CID794	Y			
CID795	Y			
<i>APPTTEST03</i>				
CID523	Y			
CID550	Y			
CID803	Y			
CID552	Y			
CID804	Y			
CID805	Y			
CID554	Y			

CID	Supported	Ensured	Application Specific	N/A
CID555	Y			
CID807	Y			
CID556	Y			
CID558	Y			
<i>APPTTEST04</i>				
CID800	Y			
CID801	Y			
CID538	Y			
CID540	Y			
<i>APPTTEST05</i>				
CID808	Y			
CID560	Y			
CID561	Y			
CID562	Y			
CID810	Y			
CID563	Y			
CID564	Y			
CID567	Y			
CID568	Y			

Supported: Supported by the provided components, excluding any user application implementations. If the CID is applicable to any function designed and implemented by the user application developer then it is up to the developer to ensure its compatibility.

Ensured: Safe-guards are implemented to ensure compatibility if used by the user application.

Application Specific: It is up to the user application developer to ensure compatibility with the CID.

Not Applicable: The CID does not apply to any provided software component.