

PROFIBUS DP SUPPORT FOR FREESCALE'S POWERQUICC AND QORIQ PROCESSORS WITH PROGRAMMABLE CPM OR QUICC ENGINE CONTROLLER

DATA SHEET

SEPTEMBER 2010



PRODUCT DESCRIPTION

This microcode module fully supports the PROFIBUS (Process Field Bus) DP (Decentralized Peripherals) standard on Freescale's PowerQUICC and QorIQ processors with programmable CPM or QUICC Engine Controller (e.g. MPC82xx, MPC8306 and P1021). It is therefore able to offload a substantial amount of processing resources from the host processor.

Any SCC port (on a CPM based devices) or UCC port (on QUICC Engine-based devices) can be configured as a PROFIBUS port. More than a single port can be supported, or alternatively, two ports may be used as a repeater.

The functionality provided simplifies the PROFIBUS stack, as many operations are implemented at the microcode level. Yet, the user application can closely monitor the bus performance using the comprehensive set of statistics counters provided by the microcode module.

Being a loadable microcode module, it can easily be customized to meet specific customer's requirements.

Future module will support DA/PA gateway.

A built-in tracer is also included which gives the user an invaluable tool to monitor the PROFIBUS performance of the network. A screenshot of the tracer can be found near the end of this document.

Main features include:

- Slave(s) and Master support
- Master automatically switches between Slaves
- Writing directly to memory-mapped I/O devices or read from them (or both) if instructed to. This feature significantly frees the host processor.
- The host processor may add/remove new Slaves dynamically (Master port only).
- Master retries to "silent Slave" is handled automatically. Number of retries is configurable.
- Corresponding statistics counter is updated.
- Maskable interrupts are generated per various events
- A number of statistics counters.

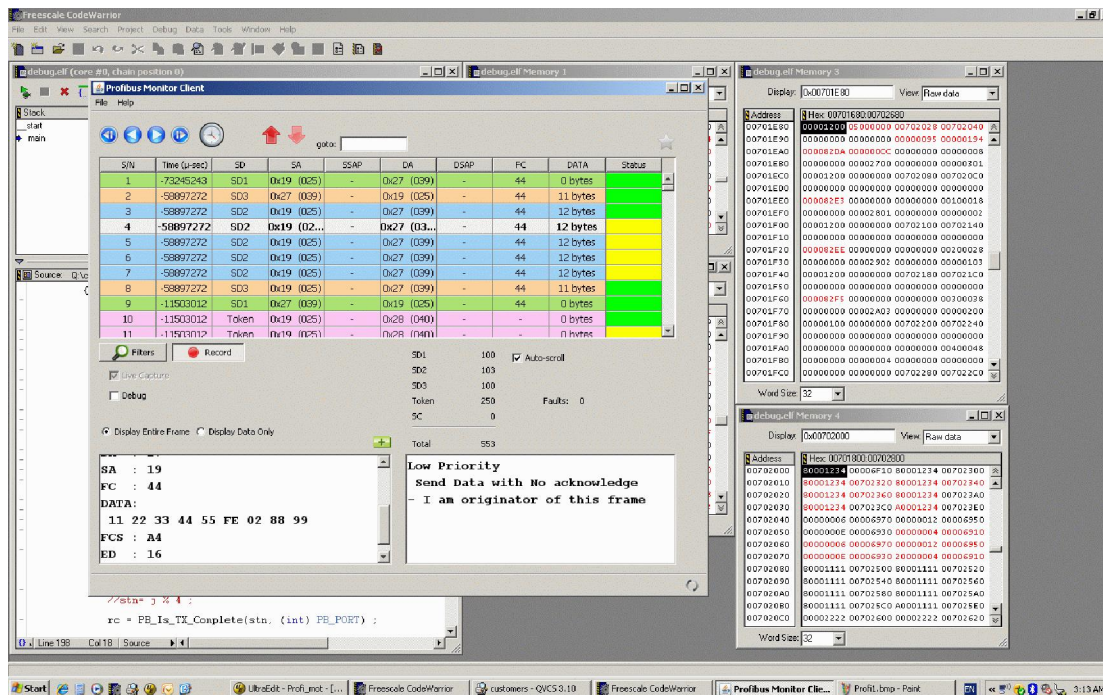
- Generation of frame checksum as well as frame terminators (0x16)
- Three types of timestamps are provided (Receive, Transmit and “Last touch”)
- Transmit and Receive functions use the “classic” buffer descriptors model
- 12Mbps with 8 times oversampling (device dependent clock).
- Master support up to 126 Slaves
- Master automatically generates tokens
- Each port records all its PROFIBUS network activities, encapsulates them into Ethernet UDP frames and send them to PC tracer (PC parser s/w is provided)
- Customizable. Can be customized to meet specific customer requirements.
- Loadable on Freescale's PowerQUICC and QorIQ devices with programmable CPM or QUICC Engine Controller

Statistics counters include:

- Global error counters:
 1. Unexpected Start-of-Frame counter
 2. RxBD Busy Error counter
 3. Unexpected End-of-Frame Error Counter */
 4. LE/LEr mismatch error counter
 5. FCS error counter
 6. ED error counter
 7. Tx state err(unexpected Tx-char in Tx-idle state)
- Global statistics for correct frames:
 1. Number SD1 frames
 2. Number SD2 frames
 3. Number SD3 frames
 4. Number SD4 (token) frames
 5. Number SC frames
 6. Number of else station counter (I am not the target of the Rx frame)
 7. Number of correct frames
 8. Number of Time-out (master only)
- Additional per-channel (station) statistics:
 1. Number of Rx busy counter
 2. Number of Tx busy counter
 3. Number of Rx frames
 4. Number of Tx frames

5. Number of Tx retry frames

PROFIBUS microcode module tracer screenshot:



The screenshot displays the Profibus Monitor Client interface. The main window shows a table of frames with the following columns: S/N, Time (μsec), SD, SA, SSAP, DA, DSAP, FC, DATA, and Status. The table contains 11 rows of data, with the last row (S/N 11) highlighted in pink, indicating a token frame.

S/N	Time (μsec)	SD	SA	SSAP	DA	DSAP	FC	DATA	Status
1	-73245243	SD1	0x19 (025)	-	0x27 (039)	-	44	0 bytes	Green
2	-59897272	SD3	0x27 (039)	-	0x19 (025)	-	44	11 bytes	Green
3	-59897272	SD2	0x19 (025)	-	0x27 (039)	-	44	12 bytes	Green
4	-59897272	SD2	0x19 (025)	-	0x27 (039)	-	44	12 bytes	Green
5	-59897272	SD2	0x19 (025)	-	0x27 (039)	-	44	12 bytes	Green
6	-59897272	SD2	0x19 (025)	-	0x27 (039)	-	44	12 bytes	Green
7	-59897272	SD2	0x19 (025)	-	0x27 (039)	-	44	12 bytes	Green
8	-59897272	SD3	0x27 (039)	-	0x19 (025)	-	44	11 bytes	Green
9	-11503012	Token	0x27 (039)	-	0x19 (025)	-	44	0 bytes	Green
10	-11503012	Token	0x27 (039)	-	0x28 (040)	-	-	0 bytes	Green
11	-11503012	Token	0x19 (025)	-	0x28 (040)	-	-	0 bytes	Green

Below the table, a status window displays the following information:

```

SA : 19
FC : 44
DATA:
11 22 33 44 55 FE 02 88 99
FCS : A4
ED : 16
  
```

The interface also shows various settings and a list of memory addresses on the right side.

ABOUT DOGAV SYSTEMS

DoGav Systems is a leading provider of software and hardware consultancy and training services. It specializes in Freescale's processors, in particular the PowerQUICC family of communication processors. It has a proven track record of over 25 years supporting Freescale customers in developing market-leading products for the communications equipment market.

DoGav Systems is Freescale's most experienced and active microcode developer. Since receiving its license in 2000, it has developed numerous customized microcode packages for both small and large Freescale customers. These packages are now successfully deployed in commercial products. In addition, DoGav Systems also offers more than 30 off-the-shelf microcode products for the PowerQUICC I, PowerQUICC II, PowerQUICC III and PowerQUICC II Pro processors.