Unit / Module Description:	4 Slot Stand Alone TIM carrier
Unit / Module Number:	SMT144
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Product Specification for SMT144

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Revision History

Issue	Changes Made	Date	Initials
1.0	First release.	22/6/07	GKP
1.1	Removed references to LED array and FX60.	30/1/08	GKP
1.2	Footprint corrections.	31/1/08	GKP

Table of Contents

1 Introduction

The SMT144 is a four site stand-alone TIM carrier board with several external interfaces.

Connectors are provided to interface to:

- RS232 – via USB controller
- JTAG
- SHB
- USB2

2 Related Documents

2.1 Referenced Documents

Datasheets as specified above.

Texas Instruments Module specification.

SMT118: Carrier with 3 Module sites and I/O facilities.

SMT180: Carrier with 8 Module sites.

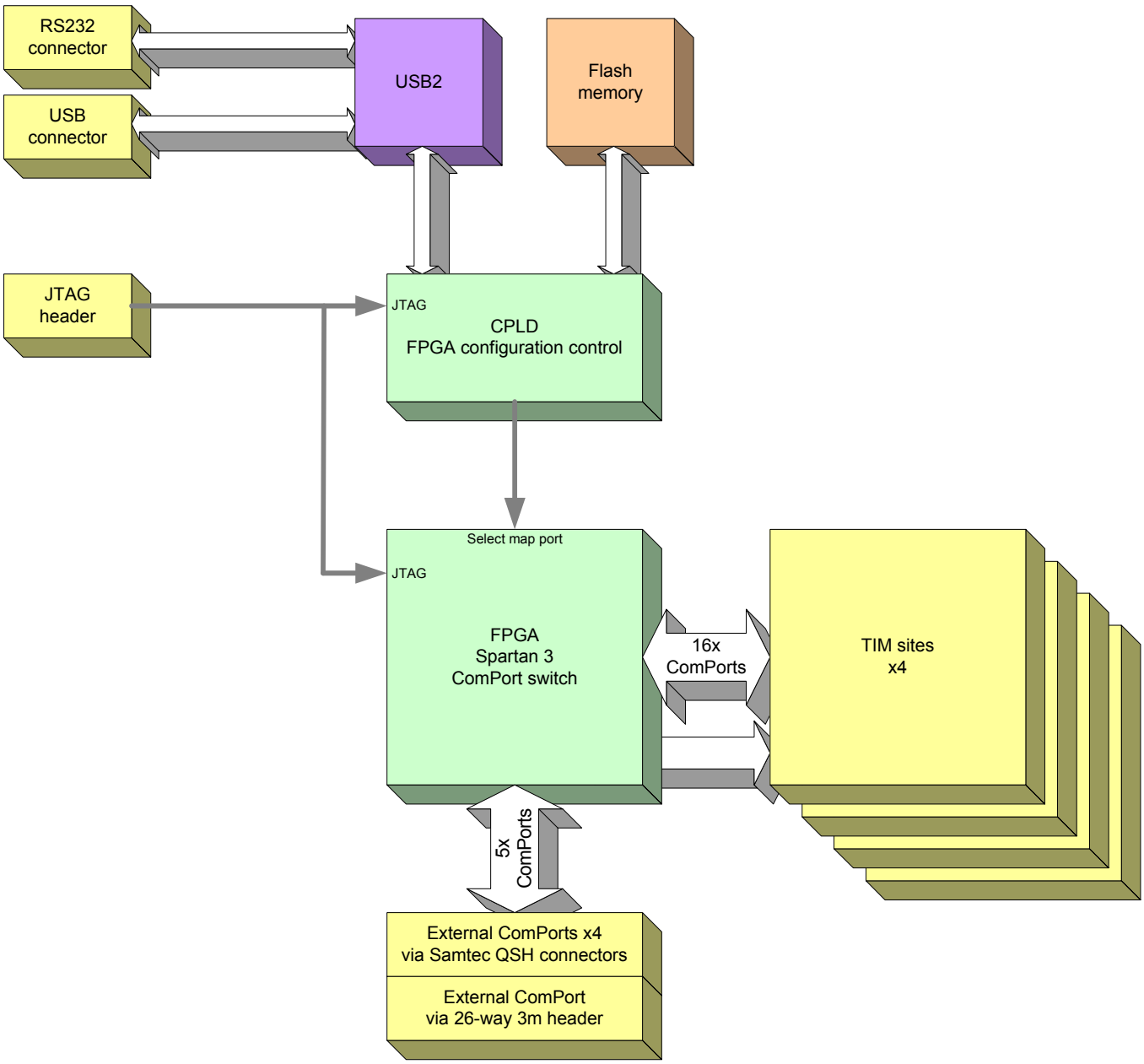
SMT148FX: Carrier with 4 Module sites.

3 Acronyms, Abbreviations and Definitions

A list of acronyms etc (hyperlink).

4 Functional Description

4.1 Block Diagram



4.2 Module Description

4.2.1 Spartan 3

The Xilinx Spartan 3 device acts as a pre-configured ComPort routing switch. Different ComPort routing schemes are easy to implement using supplied tools (requires Xilinx ISE development software).

This device is also configured by the CPLD, and uses slave SelectMAP mode (8-bit parallel), but is also part of the Xilinx JTAG chain.

4.2.2 TIM Sites

The 144 provides 4 TIM sites. In addition to the standard specification requirements, the 144 also provides the 3.3V supply to the two TIM mounting holes.

Each TIM site has 4 ComPorts connected directly to the Spartan 3 device. The two remaining ComPorts are used to create a simple pipe, with each site connecting to its nearest neighbours.

The reset signals are asserted during power-up, when pressing the on-board reset button, or when signalled to via one of the external ComPort connectors.

4.2.3 USB2

The USB2 interface is provided by the Cypress CY7C68013A device. The Cypress part, in addition to providing USB functions with a FIFO type interface, also contains a USART, and an 8051 micro-controller.

The USB connector pin-out is shown here;

1	USB_ind
2	Data-
3	Data+
4	GND

The interface provided by this controller looks identical to a 16-bit SDB interface, and is routed directly to the Spartan FPGA and the CPLD.

4.2.4 RS232

RS232 data (simple TX and RX) can be controlled by the USB2 controller.

The Rx data pin from a 9-way D-type connector is connected to all three serial interfaces. The Tx data pin from each device is routed to a jumper block which allows the selection of one Tx data output. The RS232 levels are generated using a MAX3227 converter.

1	DCD
2	Rx
3	Tx
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

4.2.5 Flash

The flash memory connected to the CPLD and contains configuration data for the FPGA.

Any additional space within this device can be used to store application programs.

The flash can be directly programmed by the CPLD only.

The external ComPort is directly connected to the CPLD. This allows the reprogramming of the flash using an identical procedure as that employed on the SMT348. After configuration, the CPLD ComPort is tri-stated and the external ComPort functions as an input to the ComPort switch (Spartan 3).

4.2.6 External ComPorts

Four ComPorts are connected to SHB style connectors. Two output-type ComPorts (0 and 1), and two input-type ComPorts (3 and 4) are provided. All 4 ComPorts are connected to both SHB-style connectors. Connector A is arranged 0, 1, 3 and 4, and connector B 3, 4, 0 and 1. With this scheme, a simple one-to-one SHB cable can be used to connect connector A on one 144 to connector B on another 144 or 148FX.

Another ComPorts is available via a 26-way connector, where cable SMT502 can be used to connect to a SMT310Q and download applications from a PC. This connector has the following pin-out.

1	CSTRB	2	GND
3	CRDY	4	GND
5	CREQ	6	GND
7	CACK	8	GND
9	D0	10	D1
11	D2	12	D3
13	D4	14	D5
15	D6	16	D7
17	3.3V	18	GND
19	/RESETOUT	20	GND
21	/RESETIN	22	GND
23	NC	24	NC

External Comports 0, 1, 3 and 4 are routed to two SHB connectors (Samtec QSH-030-01) to allow connection to another SMT144 carrier and its ComPorts. The pin-out is as follow:

1	STRB_0	2	RDY_0	3	REQ_0	4	ACK_0
5	D0_0	6	D1_0	7	D2_0	8	D3_0
9	D4_0	10	D5_0	11	D6_0	12	D7_0
13		14		15	STRB_1	16	RDY_1
17	REQ_1	18	ACK_1	19	D0_1	20	D1_1
21	D2_1	22	D3_1	23	D4_1	24	D5_1
25	D6_1	26	D7_1	27		28	
29	STRB_3	30	RDY_3	31	REQ_3	32	ACK_3
33	D0_3	34	D1_3	35	D2_3	36	D3_3
37	D4_3	38	D5_3	39	D6_3	40	D7_3
41		42		43	STRB_4	44	RDY_4
45	REQ_4	46	ACK_4	47	D0_4	48	D1_4
49	D2_4	50	D3_4	51	D4_4	52	D5_4
53	D6_4	54	D7_4	55		56	
57		58		59		60	RESET

Compatible with the 148, 148LT and 148FX, an active low RESET signal is provided. When two 144 boards are interconnected with a 60 way cable assembly, the RESET is propagated from one 144 to the other.

4.2.7 Internal ComPorts

Each TIM site has 6 ComPorts.

Four of these are connected directly to the Spartan 3 FPGA. These are ComPorts 0, 1, 3 & 4.

ComPorts 2 & 5 are connected between TIM sites in a pipe configuration as follows;

TIM1 ComPort 2 connects to TIM2 ComPort 5

TIM2 ComPort 2 connects to TIM3 ComPort 5

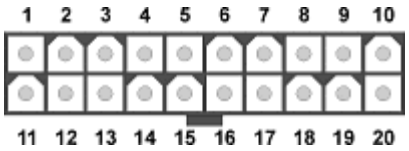
TIM3 ComPort 2 connects to TIM4 ComPort 5

TIM4 ComPort 2 connects to TIM1 ComPort 5

4.2.8 Power input

Power is supplied from an ATX style power supply. Please consult Sundance for a suitable unit.

4.2.9 ATX Power Connector Pin-Out



Main 20 pin connector:

Name	Pin	Pin	Name
+3.3V	1	11	+3.3V
+3.3V	2	12	-12V
GND	3	13	GND
+5V	4	14	ON (input)
GND	5	15	GND
+5V	6	16	GND
GND	7	17	GND
-	8	18	-
-	9	19	+5V
+12V	10	20	+5V

Extension for BTX:

+12V			+5V
+3.3V			GND

4.2.10 Power output

Power can be supplied to external devices or modules. The 8-pin connector (Receptacle, mini fit 8 Way, Molex) providing different voltages has the following pinout:

	Pin number
-12V	1
+12V	2
+5V	3
+3.3V	4
GND	5
GND	6
GND	7
Key	8

Table 1 : Power out pinout

4.2.11 JTAG

A single JTAG chain connects all 4 TIM sites and the JTAG in & out connectors. This chain is used with the TI Code Composer Studio software suite. Although in essence it is a chain, the chain exists internally to a Xilinx CPLD. The CPLD drives and receives signals to the 4 TIM sites independently. This allows JTAG clock frequencies in excess of 30MHz to work reliably.

The JTAG-out (JTAG2) connector can be connected to the JTAG-in (JTAG1) connector of other SMT144, thus extending the chain (see cable SMT503).

All JTAG chaining and TIM bypass is performed within the CPLD.

4.2.12 Reset Scheme

A power rail monitor observes the state of the 3.3V supply. This device will generate a reset to the SMT144 (RESET148) during power-up or if the 3.3V supply drops below 3V. This signal is an open-collector output and is also driven to the inter-card ComPort connector, and thus to another SMT144.

The POR (power on reset) signal is driven to the RESETOUT pin on the external ComPort1 connector. The RESETIN pin on the above connector is buffered by an open-collector device which in turn can also drive the RESET148 signal. An additional 4 pin header is provided to allow other devices to share the open-collector RESET148 signal.

The TIM reset pins are connected to the FPGA and will be reset when RESET148 is active as well as when some firmware conditions trigger a reset to the different TIMs (see Firmware description for more details about TIM reset).

4.2.13 FPGA configuration

In the default configuration the FPGA is configured by the CPLD that fetches the configuration data from the flash device. However it is possible to download a new configuration to the FPGA using the Xilinx JTAG cable connected to a PC and to JP6 on the SMT144 carrier. The pin-out is as follows:

Signal	Pin	Pin	Signal
GND	1	2	V33
GND	3	4	TMS
GND	5	6	TCK
GND	7	8	TDO
GND	9	10	TDI
GND	11	12	-
GND	13	14	-

5 Verification, Review and Validation Procedures

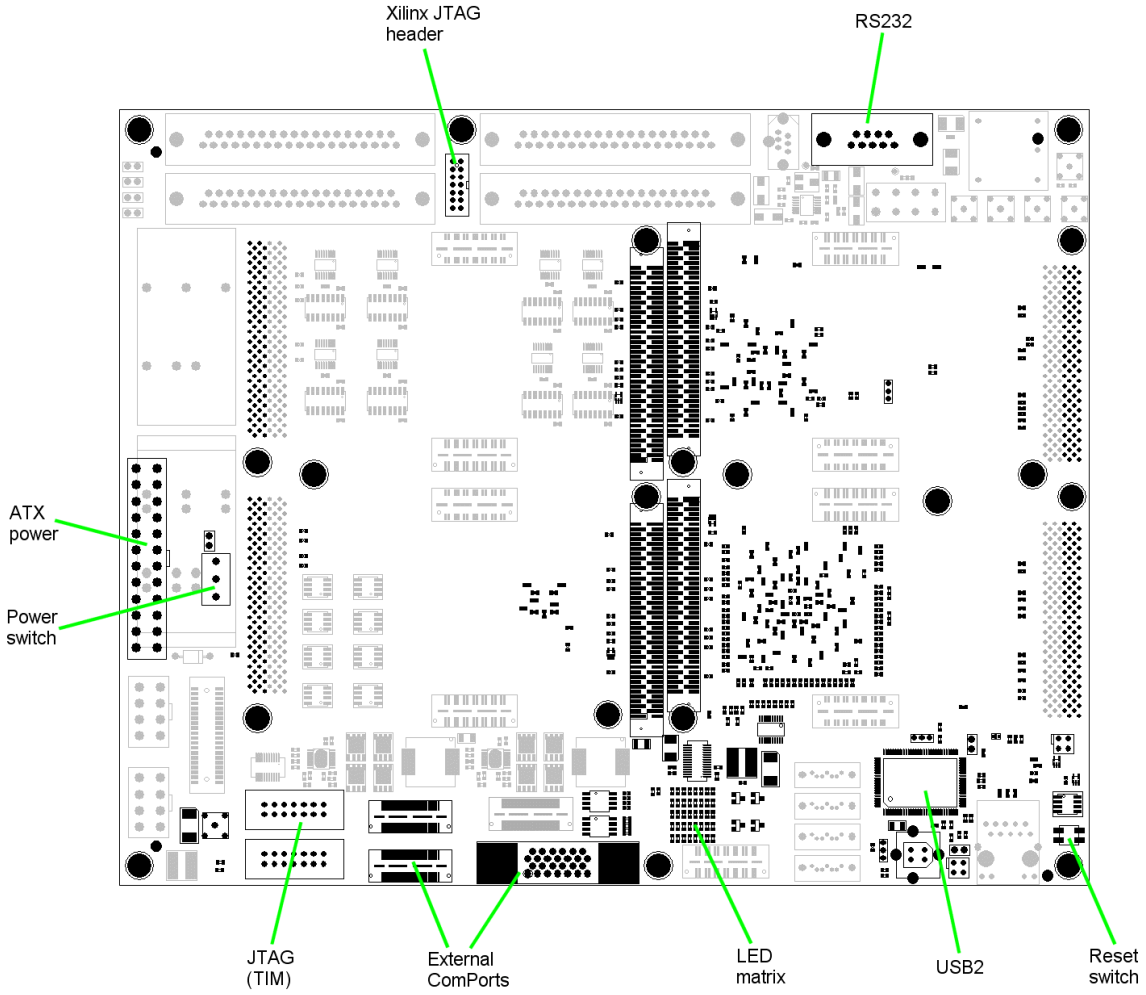
To be carried out in accordance with the Sundance Quality Procedures (ISO9001).

6 Timing Diagrams

7 Circuit Description / Diagrams

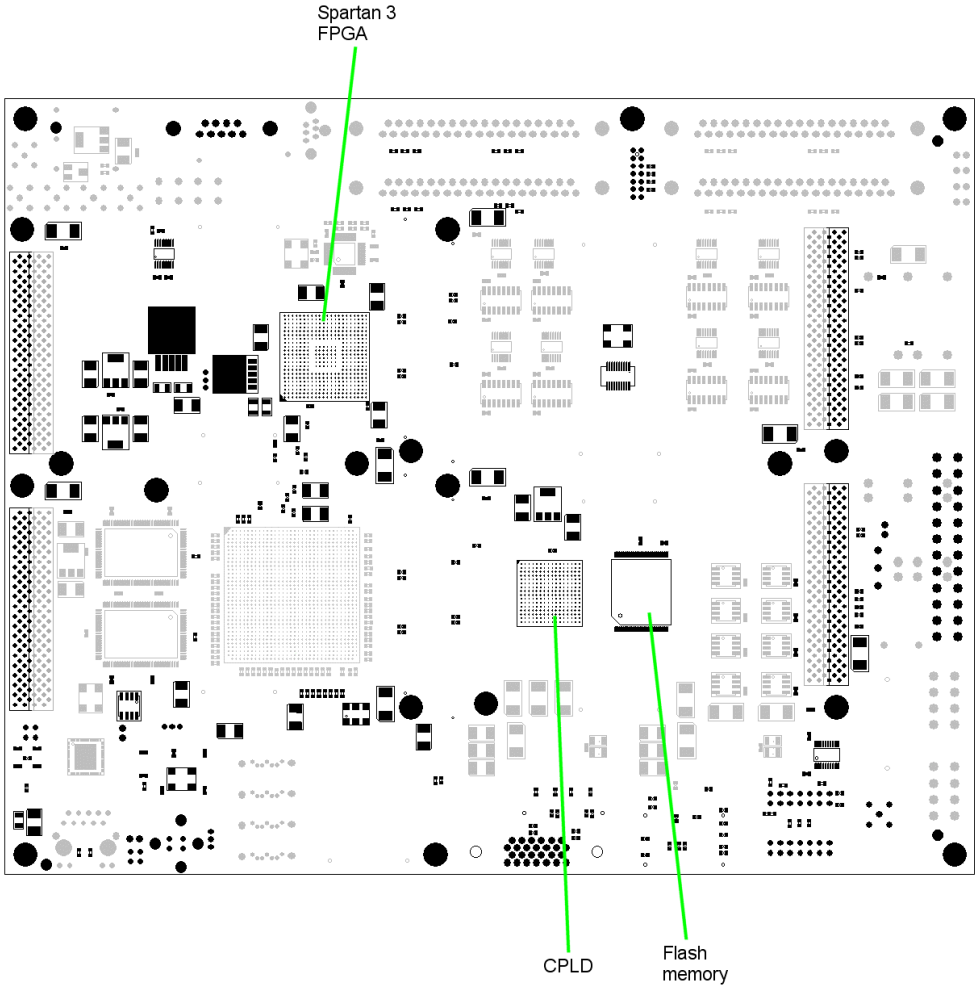
8 Footprint

8.1 Top View



Shaded components are available on the SMT148FX only.

8.2 Bottom View



9 Support Packages

10 Physical Properties

Dimensions	250 x 200 mm
Weight	

MTBF	

11 Thermal Management

Sundance are able to provide a heat-pipe type thermal management solution for two TIM sites (sites 2 and 3). This involves increased height TIM and RSL connectors for these sites, the fixing of the heat-pipe system direct to the TIMs' components, and the addition of an off-board heatsink and fan. Please consult Sundance for pricing and availability for this option.

Several components in both the onboard 3.3V and 5.0V supplies are rated at 125°C maximum. Without adequate cooling, the inductors in this circuit can reach in excess of 170°C when running at full rated load.

12 Safety

This module presents no hazard to the user when in normal use.

13 EMC

This module is designed to operate from within an enclosed host system, which is build to provide EMC shielding. Operation within the EU EMC guidelines is not guaranteed unless it is installed within an adequate host system.

This module is protected from damage by fast voltage transients originating from outside the host system which may be introduced through the output cables.

Short circuiting any output to ground does not cause the host PC system to lock up or reboot.

14 Ordering Information

SMT144	Standard product.