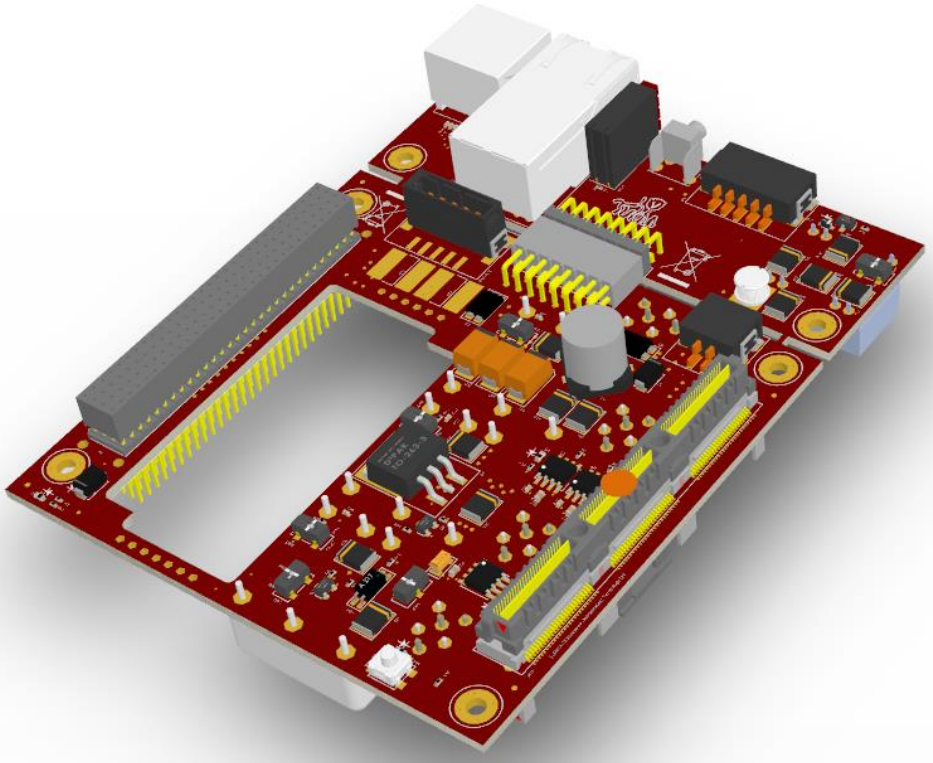
Unit / Module Description:	PCIe/104 PoE 24W PSU
Unit / Module Number:	SMT1024
Document Issue Number:	2.0
Issue Date:	3rd April 2018
Original Author:	Graeme Parker

Product Specification
SMT1024
PCIe/104 Combi PSU



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Revision History

Issue	Changes Made	Date	Initials
	Initial draft/pre-release, version 1	24/6/13	GKP
2.0	First release.	3/4/18	
2.1	Added pictures	1/5/18	TG

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1 Introduction

The SMT1024 is a power supply module with the following features:

- PCIe/104 form factor (with an extension for use in the Sundance SS enclosure).
- Ethernet PoE input, Ethernet output.
- External 10-36V DC input.
- ERNI power connectors for two devices (12V, 5V, 3.3V and -12V). [version 2 only]
- Reset switch.
- Indicator LEDs.
- Can supply +12V, +5V, +3.3V, -12V or all (switch selectable).
- 24W (30W peak) using PoE.
- 78W using external DC input.
- Isolated outputs.
- Wide input voltage range (10 – 57V, see text).

2 Related Documents

DC/DC Converters:

http://www.tracopower.com/fileadmin/medien/dokumente/pdf/datasheets/thn30wi.pdf

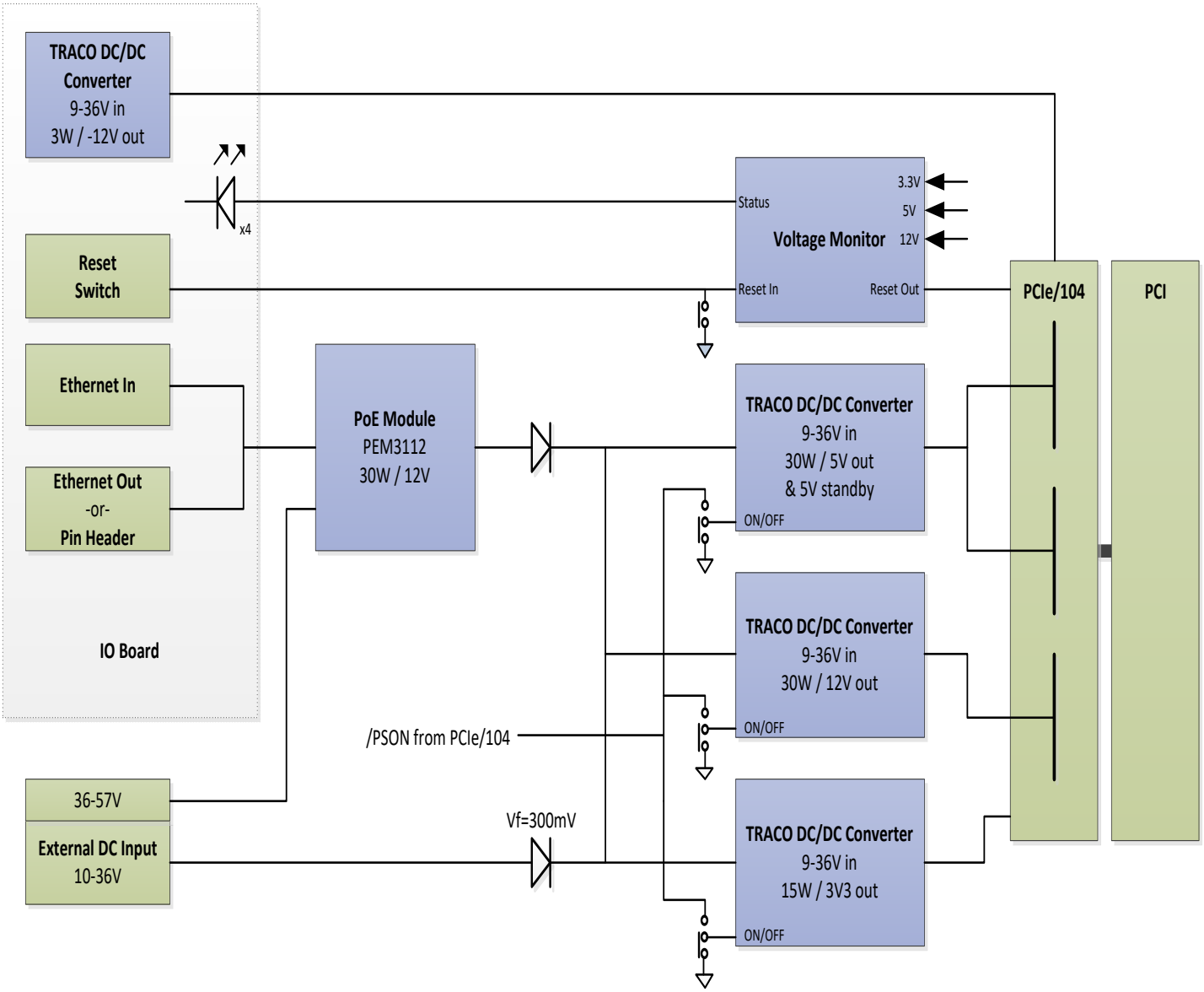
http://www.tracopower.com/fileadmin/medien/dokumente/pdf/datasheets/ten30win.pdf

PoE Module:

http://www.poweredethernet.com/download/PEM3100_Rev13D_R1-0.pdf

3 Functional Description

3.1 Block Diagram



3.2 Module Description

3.2.1 Voltage Source

Power is supplied to the SMT1024 using several methods.

When using a compatible PoE injector, the PoE module (if fitted) will provide up to 24W of power to the on-board DC/DC converters. The output from the PoE module is +12V. To use the PoE function, the I/O board must be fitted to the main PSU board.

The PoE module can also be used without the I/O board but only for a DC input voltage in the range **36-57V (nominal 48V)**. Again the power output of this module is limited to 24W.

The PoE module is a PEM3112 from Infomart. This is a fully integrated IEEE802.3at/af compliant module. It has a peak power rating of 30W (10%) and continuous 24W.

A 5 pin ERNI MaxiBridge connector is the primary power supply mechanism. This connector resides on the I/O board and is capable of providing sufficient current for maximum DC/DC converter power output at all input voltages.

When using this connector, the input voltage must be in the range **10-36V**. An extended input voltage build option is available which allows a 19-75V input.

A 2 pin ERNI MaxiBridge connector is a secondary power supply mechanism. This connector is mounted on the main PSU board. As above, the input voltage must be in the range 10-36V. We recommend that when running the SMT1024 at 70C, then the maximum current input should not exceed 6A.

Due to the limit on the input current when using the ERNI connectors, the output power available will vary. The following table describes this:

Input Voltage (V)	Max power using 2-pin (W)	Max power using 5-pin (W)
10	60	Full
12	72	Full
24	Full	Full
36	Full	Full

When using the ERNI connectors, the input voltage is filtered in order to comply with EMC regulations.

Note that there is NO internal fuse on the SMT1024. An external fuse is recommended based on the application requirement and the surge currents of the Traco converters.

3.2.2 Voltage Output

Three output voltages are provided using Traco DC/DC converters on the main PSU board. A fourth voltage is provided by a DC/DC converter on the I/O board.

The primary voltages of +12 and +5 are generated by Traco THN30-24 series converters. The +3.3V output is generated by a Traco THN15-24 series converter.

The -12V supply (provided by the converter located on the I/O board) is generated by a Traco TDR3-24 series converter.

The following table shows the maximum power available and the power input required:

Output Voltage (V)	Max power output (W)	Required power input (W)
+3.3	15	17.5
+5.0	30	33.7
+12.0	30	33.7
-12.0	3	3.7

For any particular application, the required power input values must be summed and ensured that the max power input is not exceeded.

For example, a full 30W output power on both +5V and +12V would require an input power of 67.4W. This amount of power would not be able to be provided using the 2-pin ERNI connector with an input voltage of 10V.

All generated supplies are available on both the PCI and PCI express connectors and are filtered for EMC purposes.

Two ERNI power connectors are also available to provide all power rails to external devices; e.g. EMC²-DP. These connectors can be mounted horizontally or vertically. This is a build option.

Each DC/DC converter may be disabled by an adjacent switch on the two boards. This means that if two SMT1024s are being used together, then one could be set to produce +5V and the other for +12V. Using PoE connections as the means of power input, power available at each output would exceed 21W.

Additionally, all DC/DC converters may be switched on using the PSON signal from the PCI/PCIe connectors. This function requires that V5standby is produced on one PSU module in the system (typically an SMT1024).

The following table shows the associated switch to disable the DC/DC output:

Switch	Voltage
SW2	+12
SW4	+5
SW6	+3.3
SW1	-12

When the above switches are set to the ON position, then the DC/DC controller outputs can optionally be enabled using the PSON signal as previously described. To use this ability SW3 must be set to the PSON position. When set to the ON position, the DC/DC converters are controlled by their local switches as per the table above.

Note that the 5V standby supply is provided all of the time (unless the respective DC/DC is turned OFF). The +5V power output will be enabled when either (or both) of the +12V or +3.3V supplies are present.

The Traco units used are able to withstand surges of 50V for 100ms.

3.2.3 Reset Button

The I/O board has a reset button that is typically accessed through a recessed hole in the enclosure.

In parallel to this button, a supplementary reset button is provided on the main board.

Reset generation is determined by the position of switch 8. Typically, the nPRST/nPE_RST is sourced by the system host. In situations where a host is not present, the SMT1024 can produce this signal. This is a version 2 function. Version 1 requires a build-time option.

3.2.4 Heat Dissipation

Several methods of heat dissipation are available.

On the main power rails, approximately 11% of the provided output power is lost as heat due to the inherent DC/DC converter inefficiencies.

If a DC/DC was providing the full 30W of power, then the input requirement would be 33.7W which results in 3.7W of wasted power as heat.

For low levels of heat dissipation no heatsinking is necessary. This is especially true for systems that are not fully enclosed by a case. Any restriction on air movement (convection or forced air) will necessitate the use of an additional heatsink.

Heatsinks can be mounted directly onto the DC/DC converters.

Alternatively, for use in the Sundance modular metal enclosure, the DC/DC converters may be thermally attached to the enclosure base plate.

3.2.5 LED Indicators

The power rails +12V, +5V and +3.3V have voltage monitors that constantly examine the voltage levels on the PCI and PCIe connectors. These voltages are typically produced by an SMT1024 but when other PSU modules are also employed (for example an additional SMT1024), then the voltages from the other PSUs will be monitored.

The voltage monitors' outputs are used to generate the PCI and PCIe RESET signal.

Four LEDs are provided on the I/O board that indicate when the respective power supplies are within specified limits (only under voltages are detected).

3.2.6 RJ45

An RJ45 connector acts as the source for the PoE converter. The power signals are directly extracted from the RJ45 (embedded magnetics) pins.

An RJ45 output connector can propagate the Ethernet signals to a CPU/Network card.

Alternatively, in place of the output RJ45, a pin-header can be fitted. This, together with an appropriate Sundance I/O board, can mean that the Ethernet connection to the CPU/Network board is internal to any enclosure (instead of having to rely on having the PSU's Ethernet output externally connected to the CPU/Network card input).

Note: The RJ45 Ethernet input LEDs are non-functional.

3.2.7 Inter-Board Connector Signals

A 16-way 0.1" dual-row pin/socket header combination is used to connect the main and I/O boards together.

Signal	Pin #	Pin #	Signal
10-36V	1	8	-12V
10-36V return	2	9	DC/DC on control
DC IN return	3	10	DC IN +ve
DC IN return	4	11	DC IN +ve
12V LED	5	12	5V LED
LED return	6	13	3.3V LED
PoE return	7	14	PoE +ve
/RESET	15	16	nc

The above table is a true physical representation of the pin numbering, including pins 15 and 16!

3.2.8 PCI Connector Signals

All of the PCI signals are (by connector design) passed from one side of the board to the other.

The following signals are generated or used:

Signal	Use
/RESET	This signal can be pulled low by the voltage monitors and push button switches of the SMT1024.
/PSON	This signal can be used by the SMT1024 to turn on the DC/DC converters.
+12V	Generated by the SMT1024[1]
-12V	Generated by the SMT1024[1]
+5V	Generated by the SMT1024[1]
+5V standby	Generated by the SMT1024[2]
+3.3V	Generated by the SMT1024[1]
GND	Return for all power supplies.
V i/o	Not used.

[1] Generated when the respective switch is not set to OFF and (if selected) /PSON is active (low).

[2] Generated continuously when the respective switch is not set to OFF irrespective of the state of the /PSON signal.

[*] The +5V and +5V standby outputs use the same DC/DC converter.

3.2.9 PCI Express Connector Signals

The top and bottom PCIe connectors are configured in a route-thru mode. That is, all signals are passed from one side of the board to the other.

The following signals are generated or used:

Signal	Use
/RESET (PE_RST#)	This signal can be pulled low by the voltage monitors and push button switches of the SMT1024.
/PSON	This signal can be used by the SMT1024 to turn on the DC/DC converters.
+12V	Generated by the SMT1024[1]
+5V	Generated by the SMT1024[1]
+5V standby	Generated by the SMT1024[2]
+3.3V	Generated by the SMT1024[1]
GND	Return for all power supplies.

[1] Generated when the respective switch is not set to OFF and (if selected) /PSON is active (low).

[2] Generated continuously when the respective switch is not set to OFF irrespective of the state of the /PSON signal.

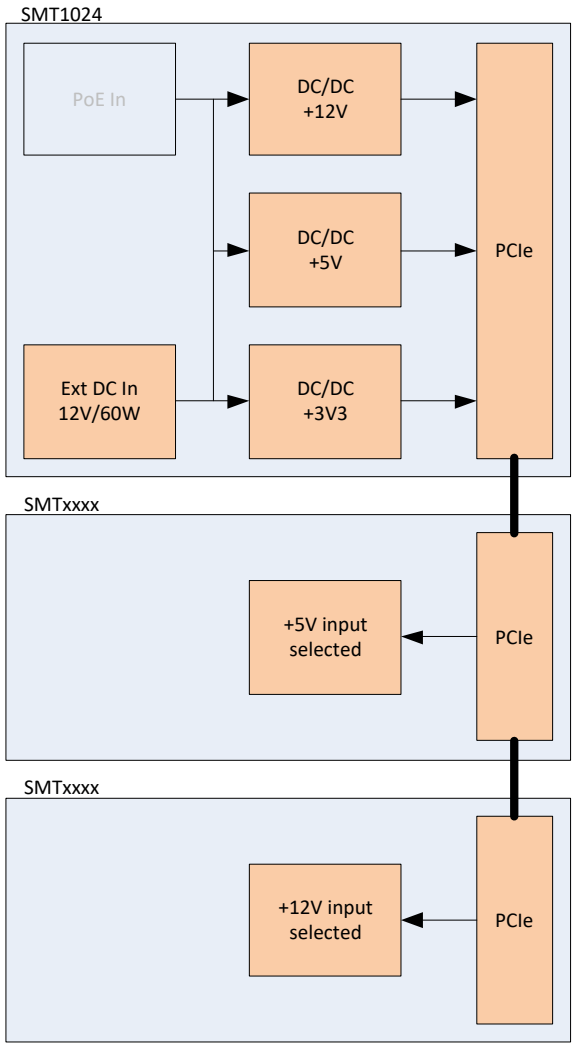
[*] The +5V and +5V standby outputs use the same DC/DC converter.

4 Verification/Review/Validation Procedures

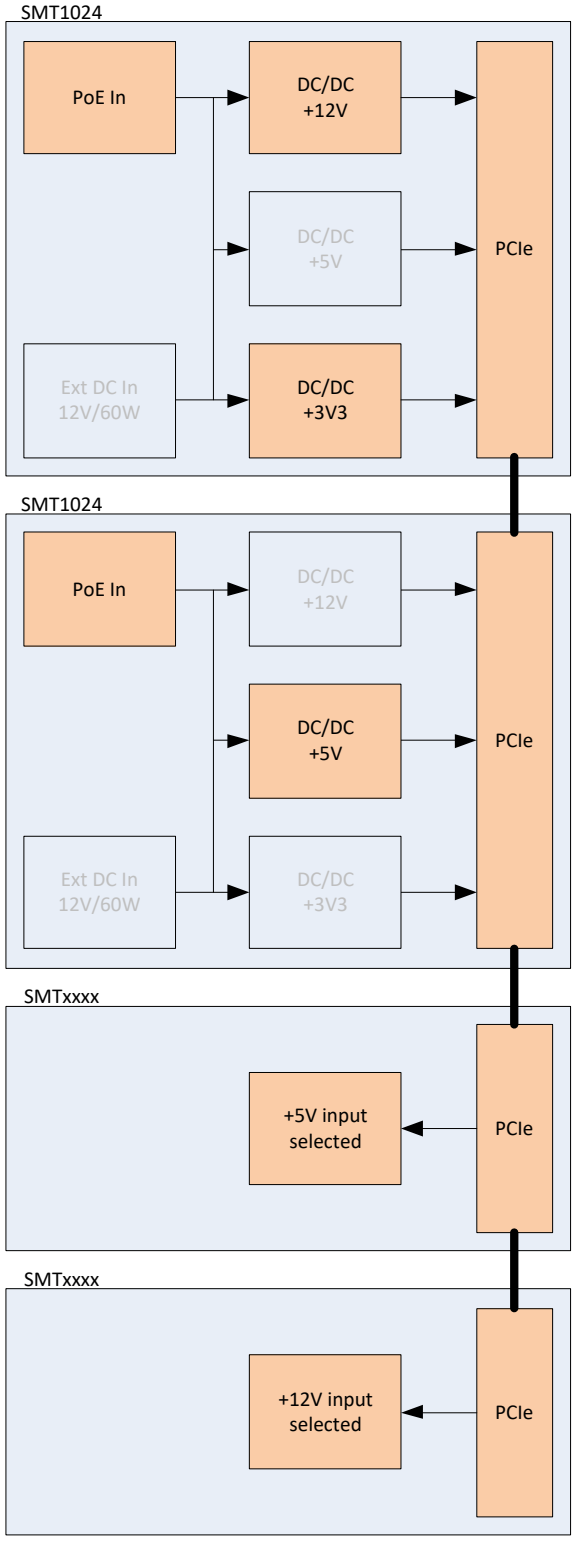
To be carried out in accordance with the Sundance Quality Procedures (ISO9001).
See: http://www.sundance.com/web/files/static.asp?pagename=quality

5 System Diagrams

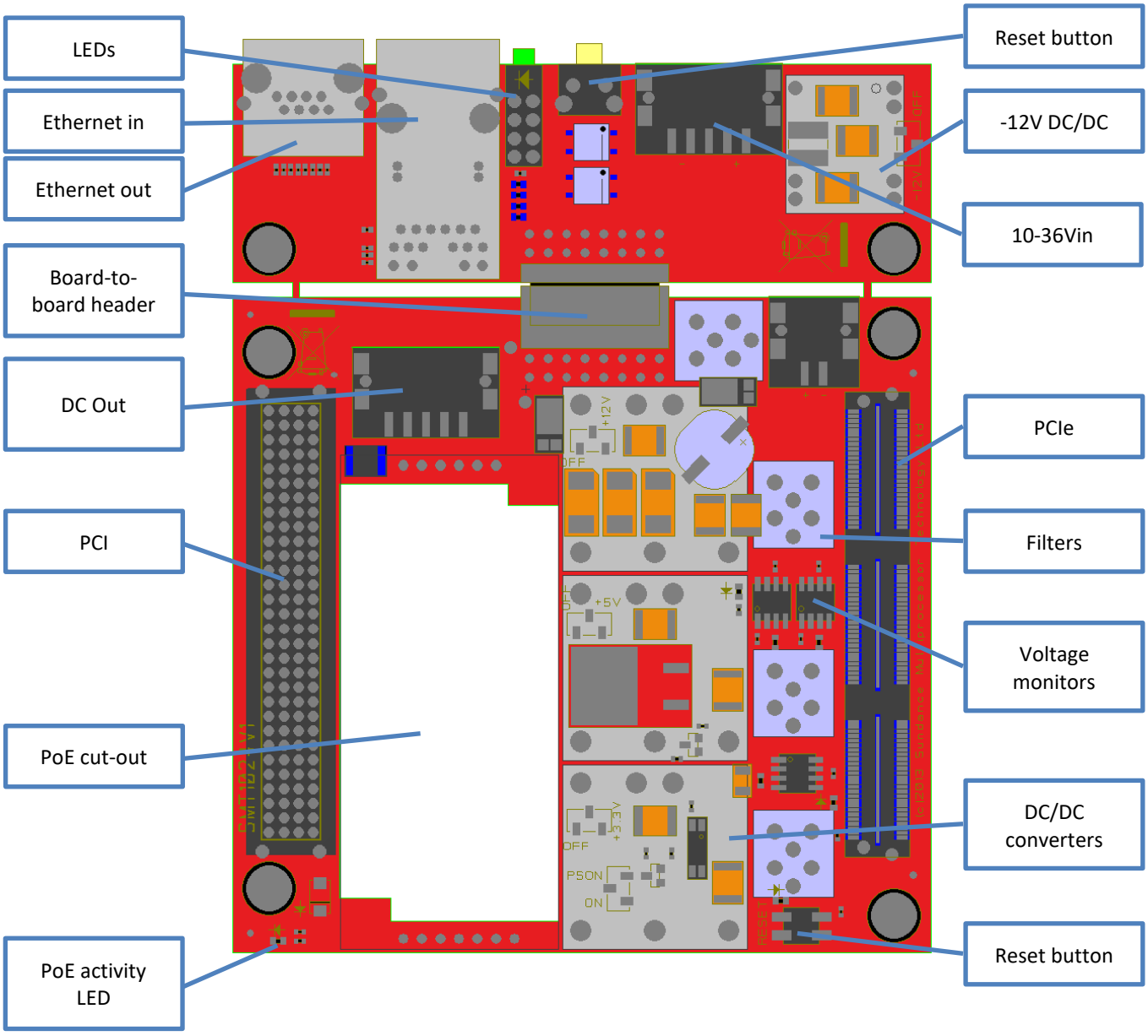
This system diagram shows a single SMT1024 using an external 60W DC power supply to provide power to 2 x SMTxxxx. Each SMTxxxx has the ability to use either the 5V or 12V power rails from the PCIe/104 connector.



This system shows the use of 2 x SMT1024 each supplied from a PoE source. The 1st SMT1024 provides +12V and +3V3 (low power requirement), and the 2nd provides the +5V rail. Again, the SMT6678s use different power rails.



6 Footprint



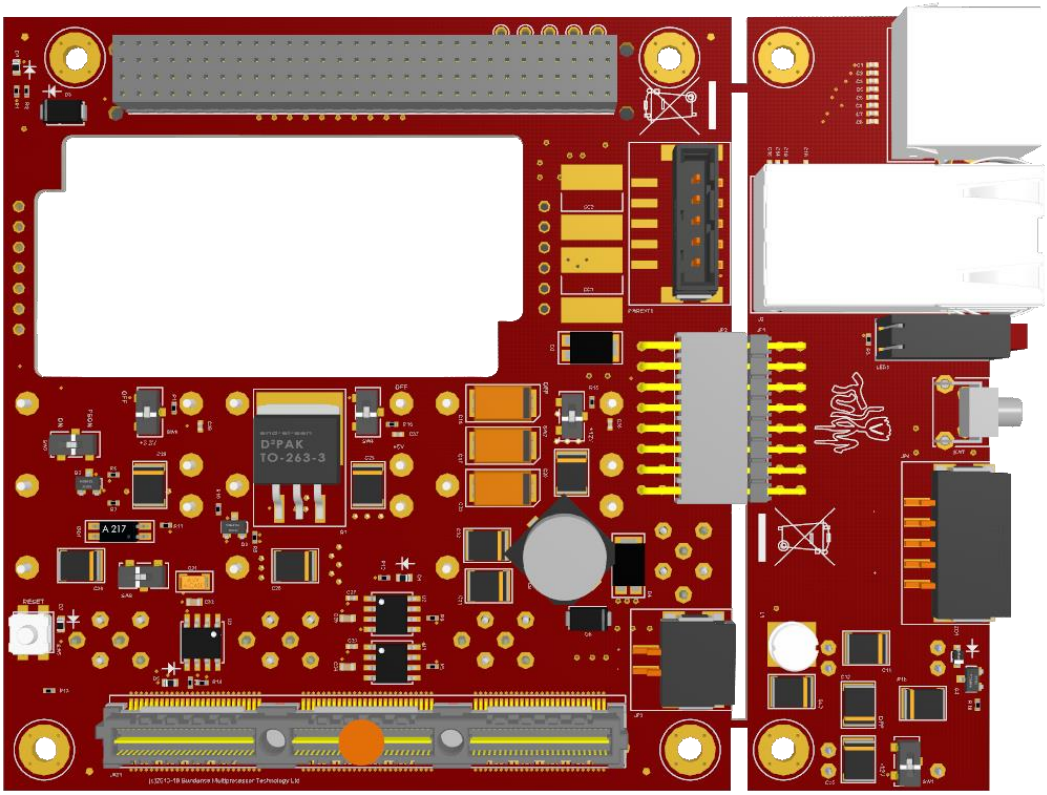
Component placement notes:

All DC/DC converters are located on the bottom and can therefore be heatsinked by the enclosure's base plate.

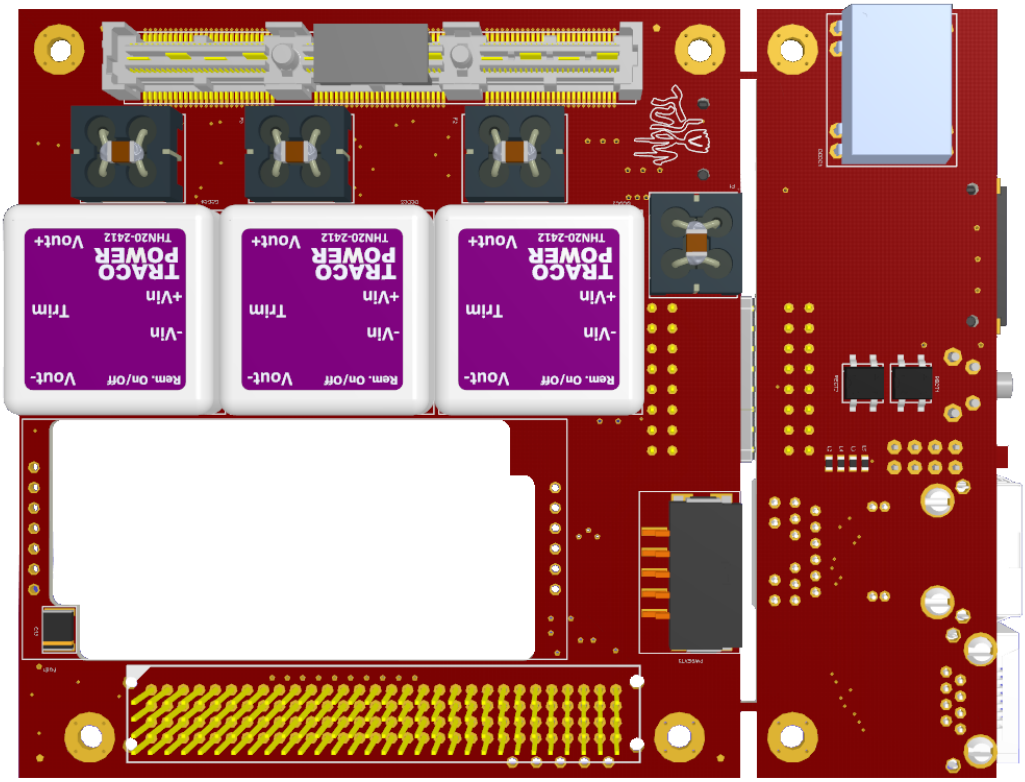
The PoE module is mounted inverted on the top and hence its componentry fits through the cut-out. This can also be heatsinked by the base plate.

7 Top/bottom view

Below it can be seen a top view of the board:



Below it can be seen a bottom view of the board:



8 Physical Properties

Dimensions	90.17	95.89	mm
Weight		g	

Input Supply Voltage[1]	10-36V[3]

Output Supply Power	Voltage	Power	Efficiency[2]
	+12V	30W	89%
	+5V	30W	89%
	+3.3V	15W	86%
	-12V	3W	82%

MTBF		hours

[1] Input voltage can also be supplied via the PoE module. In this case the output power is limited to 24W max continuous.

[2] When using external DC input. Typically 75% using PoE.

[3] A DC voltage can be applied directly to the PoE using the 0.1" right-angle header. The voltage range is 36 to 57V. But note that the maximum output power is then limited to 24W.

9 Safety

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

10 EMC

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

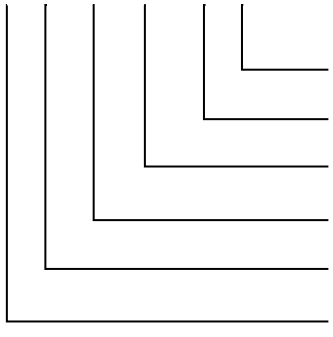
This module is protected from damage by fast voltage transients originating from outside the host system which may be introduced through the output cables.

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

11 Ordering Information

Part number:

SMT1024-xx-yy-zz-abc-def-g



1	EN 61000-4-5
PCI	PCI connector and -12V DC/DC
POE	Power over Ethernet
33	+3.3V DC/DC
05	+5V DC/DC
12	+12V DC/DC

Standard options:

SMT1024 Default	Base module with I/O board and all DCDC convertors but no PoE components. 10-36V DC input.
SMT1024-POE	Base module with I/O board, all DCDC convertors, and PoE. Can be used with 48V DC input.
SMT1024-EV Extended voltage	Base module with I/O board and all DCDC convertors but no PoE components. 19-75V DC input.

Custom option examples:

SMT1024-12-05-POE	Base module with I/O board and Power over Ethernet. +5V and +12V outputs only.
SMT1024-12-05-33-PCI	Base module with PCI connector. +5V, +12V, +3.3V and -12V outputs.