

OEM Manual



www.aptechnologies.co.uk

AP Technologies Limited The Coach House Watery Lane Bath BA2 1RL
T: +44 (0) 1225 780 400 F: +44 (0) 8701 266 449 E: info@aptechnologies.co.uk

PhotoniQ

PhotoniQ Series

*IQSP480M / IQSP580M / IQSP482M / IQSP582M
Multichannel OEM Data Acquisition Systems*



Vertilon Corporation, 66 Tadmuck Road, Westford, MA 01886 / Tel: (978) 692-7070 / Fax: (978) 692-7010 / www.vertilon.com

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General Safety Precautions

Warning – High Voltages

The PhotoniQ Models IQSP480M, IQSP580M, IQSP482M, and IQSP582M interface to sensor interface boards (SIB) through high voltage cable assemblies. The PhotoniQ, SIB, and SIB power cable are energized with potentially harmful high voltages (up to 2000 Volts) during operation.

Use Proper Power Source

The IQSP480M, IQSP580M, IQSP482M, and IQSP582M are supplied with a +5V desktop power source. Use with any power source other than the one supplied may result in damage to the product.

Operate Inputs within Specified Range

To avoid electric shock, fire hazard, or damage to the product, do not apply a voltage to any input outside of its specified range.

Electrostatic Discharge Sensitive

Electrostatic discharges may result in damage to the PhotoniQ and SIB board set. For these reasons, the board set is intended to be operated in a user's conductive instrument enclosure.

Do Not Operate in Wet or Damp Conditions

To avoid electric shock or damage to the product, do not operate in wet or damp conditions.

Do Not Operate in Explosive Atmosphere

To avoid injury or fire hazard, do not operate in an explosive atmosphere.

Product Overview

The PhotoniQ Models IQSP480M / IQSP580M are the OEM versions of Vertilon's IQSP480 / IQSP580 thirty-two channel data acquisition systems and similarly models IQSP482M / IQSP582M are the OEM versions of Vertilon's IQSP482 / IQSP582 sixty-four channel data acquisition systems. Implemented on a single printed circuit board without an enclosure, these units interface to multianode PMTs, silicon photomultipliers, and APD arrays, and are easily integrated with other electronics to build more sophisticated electro-optical instruments. Other than for mechanical interface differences, the PhotoniQ OEM models are identical in function and performance to their non-OEM counterparts.

This guide is intended to be used as a supplement to the PhotoniQ User Manual. It mainly contains information and specifications relating to internal connectors and additional functionality not found in the non-OEM versions of the described products. The user should refer to the PhotoniQ User Manual for all other information such as performance specifications, functionality descriptions, software interfaces, and file formats.

Included Components and Software

The IQSP480M, IQSP580M, IQSP482M, and IQSP582M come equipped with the following standard components and software:

- Main printed circuit board assembly
- PhotoniQ Control and Acquisition Interface Software CD-ROM
- DC power supply (+5V, 2A) with power cord
- Two SMB to BNC cables
- USB 2.0 cable (15')

Ordering Information

The PhotoniQ multichannel OEM data acquisition systems are available in two speed/dynamic range versions and two channel count configurations as shown in the table below.

Model Number	Dynamic Range	Number of Channels	Event Pair Resolution	Maximum Trigger Rate	Maximum Signal	Noise (RMS)
IQSP480M	16 bit	32	6.0 usec	150 KHz	2000 pC	30 fC
IQSP580M	14 bit	32	2.5 usec	390 KHz	500 pC	55 fC
IQSP482M	16 bit	64	7.0 usec	120 KHz	2000 pC	30 fC
IQSP582M	14 bit	64	3.2 usec	250 KHz	500 pC	55 fC

Table 1: Ordering Information

Hardware

The photo below shows the PhotoniQ multichannel OEM data acquisition system and its components. Some optional accessories are shown for reference.

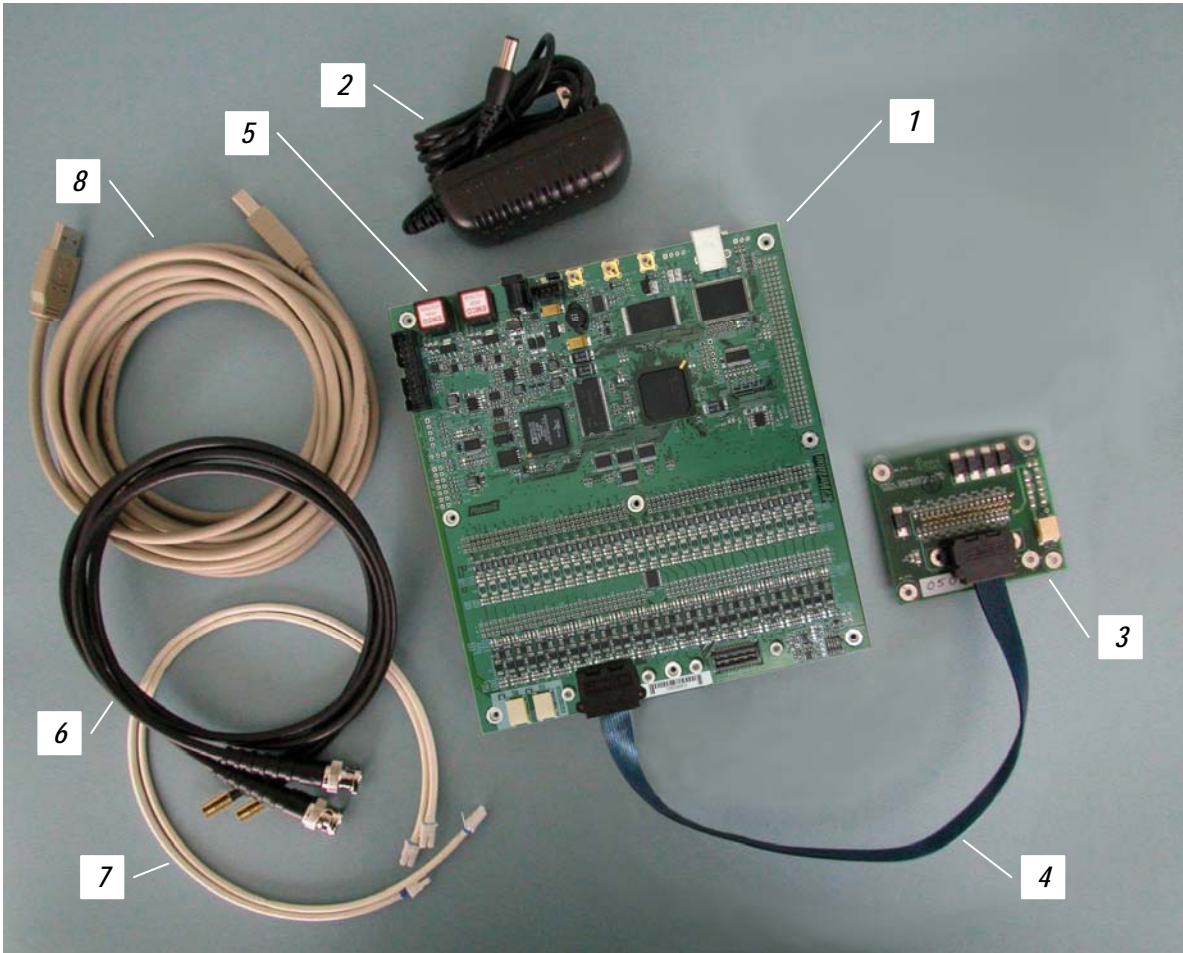


Figure 1: Hardware Components

1. PhotoniQ Main Board
2. DC Power Supply
3. Optional Sensor Interface Board (SIB032)
4. Optional Sensor Interface Board Cable
5. Optional High Voltage Bias Modules (2)
6. SMA to SMB Cables (2)
7. Optional High Voltage Cables (2)
8. USB 2.0 Cable
9. System Software CD-ROM (not shown)

Accessories

Accessories are ordered separately and can include a sensor interface board, sensor interface board cable, high voltage bias supply, and high voltage cable. See individual data sheets for details. In addition to the accessories available for the PhotoniQ non-OEM multichannel data acquisition systems, the following items are also available.

- High voltage interconnect cable, PCB mount, 30 cm, 60 cm, and 90 cm (HVC030P, HVC060P, HVC090P)
- Sensor interface board cable, PCB mount, 30 cm, 60 cm, and 90 cm (SBC030P, SBC060P, SBC090P)

Electrical Interface

The photo below shows the sensor, trigger, power, and interface connectors available to the user on the PhotoniQ board.

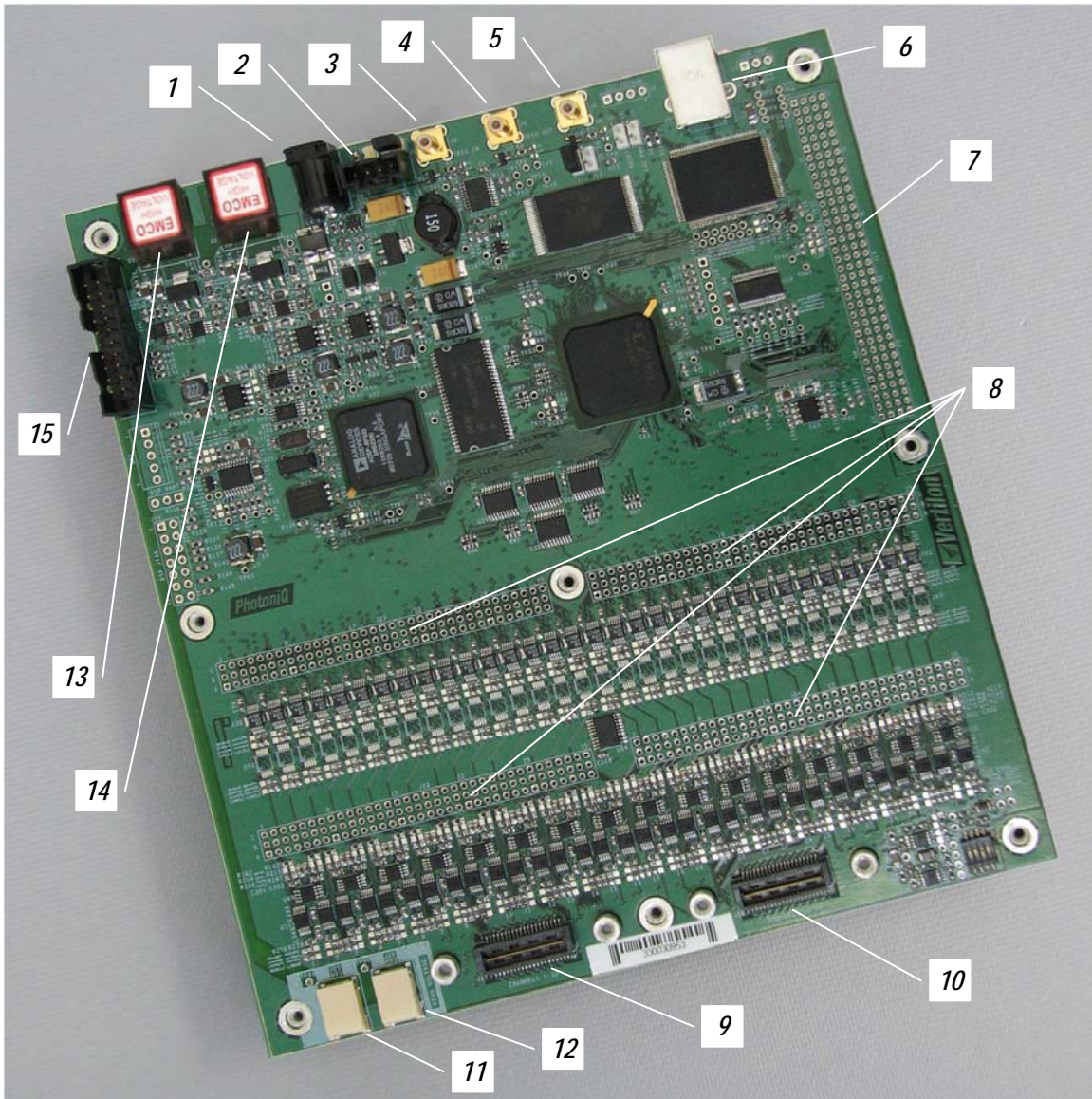


Figure 2: Main Board

1. **Power Connector (J7):** Main power input to the PhotoniQ from the +5V DC power supply.
2. **Alternate Power Connector (J9):** Unused
3. **Trigger Input (J4):** Main trigger input to the PhotoniQ. The input is positive edge sensitive.
4. **Trigger Output (J5):** Main trigger output from the PhotoniQ. When in edge or internal trigger mode, the output from this connector is the integration window used by the PhotoniQ to integrate the signal. If cross bank triggering is enabled, this output is the integration window from the main trigger bank(s). There are no trigger outputs associated with the secondary bank(s). In input trigger and pre-trigger modes, the trigger output indicates the trigger point shifted by the programmable delay time.
5. **Auxiliary Output (J6):** Configurable general purpose output.
6. **USB Connector (J8):** Connector for USB cable to PC.
7. **Expansion Interface Connector for Optional Daughtercard (J17):** Interface connector location to optional custom daughtercard. Contact Vertilon for details.
8. **Mating Connectors for Optional FEM (J21 – J24):** Connector locations for stackable Front End Module. An additional 64 input channels are added with each stacked module.
9. **Sensor Interface Board (SIB) Connector (J27) for Channels 1 to 32:** Connector to SIB cable for connection to the Sensor Interface Board. The cable carries the first 32 input channels over individual coaxial lines. Control and monitor lines are also on the cable.
10. **Sensor Interface Board (SIB) Connector (J28) for Channels 33 to 64:** Connector to SIB cable for connection to the Sensor Interface Board. The cable carries the second 32 input channels over individual coaxial lines. Control and monitor lines are also on the cable.
11. **High Voltage Bias Supply Output #1 (J25):** Cable connector for optional high voltage bias supply #1. Typically used in conjunction with a MAPMT, APD, or silicon photomultiplier.
12. **High Voltage Bias Supply Output #2 (J26):** Cable connector for optional high voltage bias supply #2. Typically used in conjunction with a second MAPMT, APD, or SiPM.
13. **High Voltage Power Supply Module #1 (U1):** Power supply module for optional high voltage bias supply #1.
14. **High Voltage Power Supply Module #2 (U2):** Power supply module for optional high voltage bias supply #2.
15. **User I/O Header (J14):** General purpose analog I/O header connector for interface to the on-board DAC and ADC. The DAC output is located on pin 1, ADC input on pin 5, and Ground on pin 2. Additional logic and control signals are available. Contact Vertilon for details.

Daughtercard Interface

The daughtercard interface is used by OEMs to add custom and semi-custom hardware and processing to the PhotoniQ. Typically, system functionality is expanded by adding a daughterboard to the main board that includes analog I/O, control and status signals, and special purpose hardware for increased data processing capabilities. Through the daughtercard connector, power, triggering, and control signals are provided along with direct access to the system's high speed synchronous and asynchronous data buses. The sections below describe the standard signal set available on the daughtercard connector. The table on the following page summarizes the standard signal set. OEMs wishing to utilize the more advanced features on this interface should contact Vertilon.

Power

Raw, unfiltered, +5V power is present on the daughtercard connector. Since it is unprotected for excessive current, care should be taken when utilizing this power source. The maximum current drawn by peripheral circuitry that operates on this supply should be limited to 100mA.

Trigger Interface

The trigger functionality available on SMB connectors J4, J5, and J6 (Trigger Input, Trigger Output, and General Purpose Output) is replicated on the daughtercard interface. Unlike their SMB counterparts which are protected against overvoltage and ESD, these trigger signals connect directly to the PhotoniQ internal circuitry and are thus completely unprotected. For the few applications where the user wishes to interface the system triggering directly through the daughtercard connector, special attention should be paid towards keeping these signals within their specified operating range. Note that the SMB trigger input and daughtercard connector trigger input are effectively OR'd together by the PhotoniQ.

Trigger Interface Voltage Levels

The following table summarizes the voltage levels for the digital trigger interface on the daughtercard connector.

Symbol	Parameter	Min	Typ	Max	Units
V _{IH}	High Level Input Voltage	+2.0		+3.0	V
V _{IL}	Low Level Input Voltage	0		+0.8	V
V _{OH}	High Level Output Voltage (I _{OUT} = -2mA)	+2.9			V
V _{OL}	Low Level Output Voltage (I _{OUT} = 2mA)			+0.4	V

Table 2: Daughtercard Trigger Interface Voltage Levels

Absolute Maximum Rating

The absolute maximum voltage range referenced to ground on any of the daughtercard interface digital I/O pins is -0.3V to +3.6V.

Daughtercard Connector

The part number for the daughtercard connector, J17, is Samtec P/N SQT-135-03-L-Q. Only a small subset of the signals on this connector is supported as part of the standard daughtercard signal set. The +3.3V, +1.2V, and RSVD pins are shown for reference only and should under all circumstances remain unconnected. The pins labeled N/C are not used by the PhotoniQ.

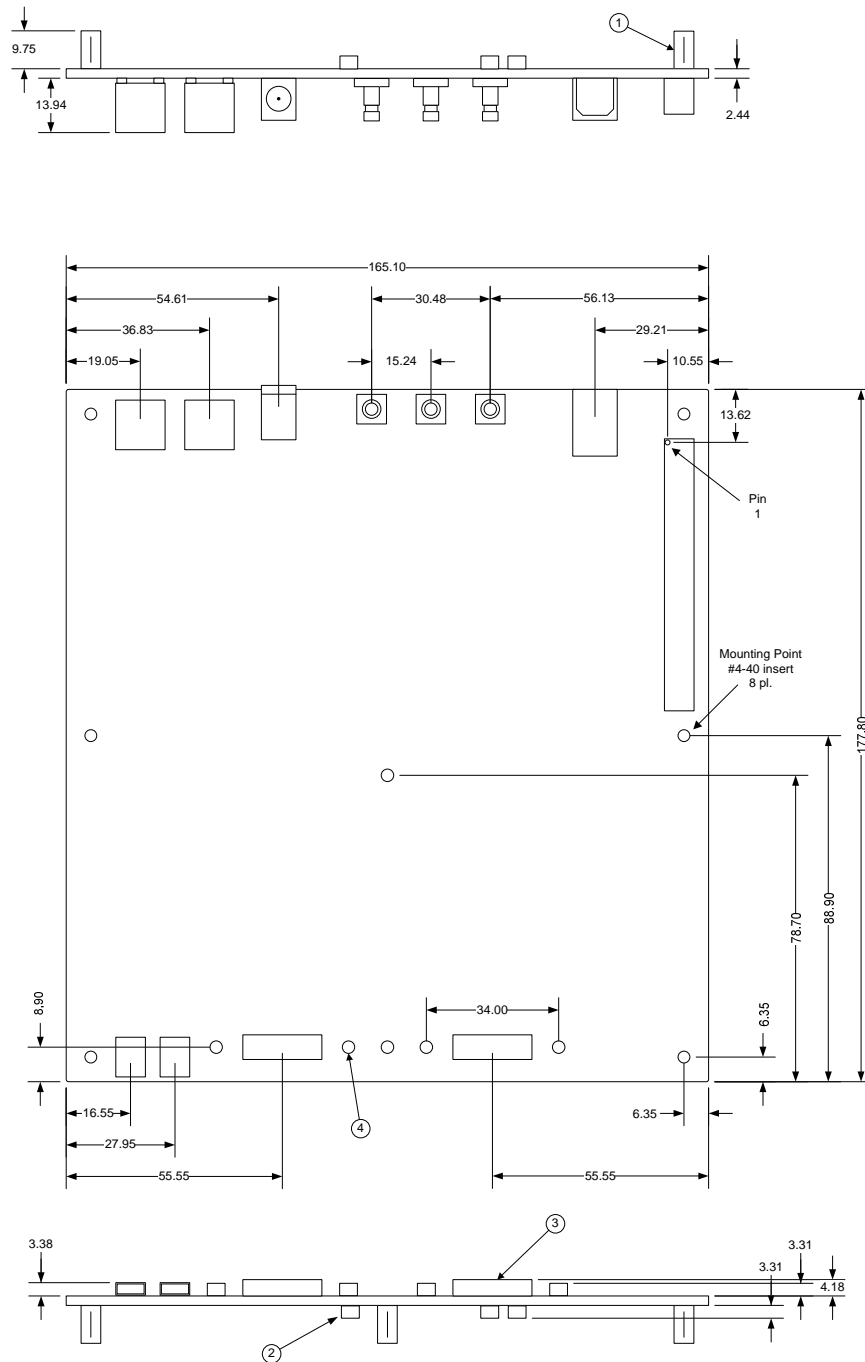
Signal Name	Row A Pin #	Signal Name	Row B Pin #	Signal Name	Row C Pin #	Signal Name	Row D Pin #
GND	1	GND	2	GND	3	GND	4
+5V_RAW	5	+5V_RAW	6	+5V_RAW	7	+5V_RAW	8
RSVD	9	RSVD	10	RSVD	11	RSVD	12
RSVD	13	RSVD	14	RSVD	15	RSVD	16
RSVD	17	RSVD	18	RSVD	19	RSVD	20
RSVD	21	RSVD	22	RSVD	23	RSVD	24
RSVD	25	RSVD	26	RSVD	27	RSVD	28
RSVD	29	RSVD	30	RSVD	31	RSVD	32
RSVD	33	RSVD	34	RSVD	35	RSVD	36
RSVD	37	RSVD	38	RSVD	39	RSVD	40
N/C	41	RSVD	42	RSVD	43	RSVD	44
N/C	45	RSVD	46	RSVD	47	RSVD	48
N/C	49	RSVD	50	RSVD	51	RSVD	52
N/C	53	RSVD	54	RSVD	55	RSVD	56
RSVD	57	RSVD	58	RSVD	59	RSVD	60
RSVD	61	RSVD	62	RSVD	63	RSVD	64
RSVD	65	RSVD	66	RSVD	67	RSVD	68
N/C	69	RSVD	70	RSVD	71	RSVD	72
+3.3VD	73	+3.3VD	74	+3.3VD	75	+3.3VD	76
GND	77	GND	78	GND	79	GND	80
RSVD	81	RSVD	82	RSVD	83	RSVD	84
RSVD	85	RSVD	86	RSVD	87	RSVD	88
RSVD	89	RSVD	90	RSVD	91	RSVD	92
RSVD	93	RSVD	94	RSVD	95	RSVD	96
RSVD	97	RSVD	98	RSVD	99	RSVD	100
RSVD	101	RSVD	102	RSVD	103	RSVD	104
RSVD	105	RSVD	106	RSVD	107	RSVD	108
RSVD	109	RSVD	110	RSVD	111	RSVD	112
RSVD	113	RSVD	114	RSVD	115	RSVD	116
RSVD	117	RSVD	118	RSVD	119	RSVD	120
RSVD	121	RSVD	122	RSVD	123	RSVD	124
TRIG IN	125	TRIG OUT	126	RSVD	127	RSVD	128
RSVD	129	GP OUT	130	RSVD	131	RSVD	132
+1.2V	133	+1.2V	134	+1.2V	135	+1.2V	136
GND	137	GND	138	GND	139	GND	140

Table 3: Daughtercard Connector

Sensor Interface Board Connector

The connections to separate sensor interface boards (SIB) that hold the sensors (i.e. multianode PMTs, silicon photomultipliers, or avalanche photodiode arrays) are made through specialized cables that connect between the SIB boards and SIB connectors J27 and J28 on the PhotoniQ. Thirty-two (32) low noise, parallel coaxial connections are provided through each of these small form factor connectors (Samtec part number: QTE-020-01-L-D-A). The pinout for these connectors is found in the PhotoniQ User Manual.

Mechanical Information



- Notes: Item #1: Threaded spacer, #4-40, 8 places.
 Item #2: Represents tallest component on bottom of PCB.
 Item #3: Height is 9.65mm with cable installed (2 pl.).
 Item #4: SIB cable mounting point, #4-40 threaded inserts (4 pl.).
 All dimensions in millimeters.

Figure 3: Printed Circuit Board Mechanical Assembly



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AP Technologies Limited The Coach House Watery Lane Bath BA2 1RL
T: +44 (0) 1225 780 400 F: +44 (0) 8701 266 449 E: info@aptechnologies.co.uk

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