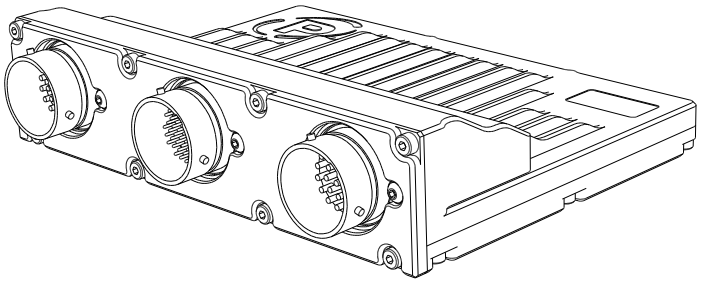
Pectel SQ6M12 ECU



Introduction

The Pectel SQ6M12 sets the benchmark for high-performance engine management systems. Its Motorola MPC565 microprocessor and dedicated timer co-processor bring class leading performance in a cost-effective package. No other ECU offers the same combination of price, power, performance and flexibility.

Twelve configurable injector drivers combined with twelve IGBT ignition outputs AND four logic level coil driving outputs make this ECU capable of fully sequential ignition and fuelling on normally aspirated, turbo and supercharged engines from one to twelve cylinders. Fly-by-wire capability is included, with Stepper and DC motors catered for.

Put all of this functionality in one small light box and you have an ECU capable of working with almost any combination of coil, injector, OEM sensor and actuator.

An all new crank and camshaft pattern recognition system allows the SQ6M12 to be used with virtually any OEM timing wheel. This sophisticated pattern recognition algorithm also facilitates synchronisation during slow and unevencranking conditions.

Hugely flexible, the SQ6M12 has two, and sometimes three functions on many of its pins:

- unused injector and IGBT ignition outputs can be used as digital outputs;
- unused digital inputs can be used as 10 bit analogue inputs;
- H-bridge outputs can be used in either full or half bridge mode, H-bridge outputs can be combined to drive a stepper motor or used to provide additional high or low-side drive capability.

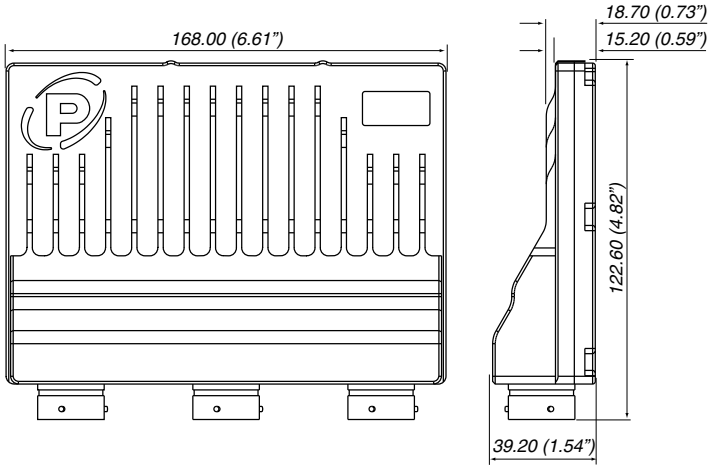
All of these features are enabled by software—there are NO hardware build options. Designed to be robust, the SQ6M12 has reverse-battery, over-voltage and load dump protection built in as standard. Sensor supply and signal ground pins are also protected against shorts to battery positive and negative.

Advanced software features include traction control, launch control, gearshift strategies, variable valve timing of up to four camshafts (including BMW VANOS), high speed data logging and scrutineering modes for single make championships.

The ECU has optional highly advanced control strategies for semi-automatic/paddle-shift gearboxs which include FBW throttle blip and over rev protection. Customers who have used this have extended gearbox life by 100%.

OE Calibrated with calibration support available on quotation.

Dimensions



Dimensions in millimetres (and inches)

Specifications

Description	Value
Processor	Motorola MPC565 @ 56MHz, 5 MB flash memory and 4MB non-volatile RAM
Supply Voltage	8V to 18V reverse battery, over-voltage and load dump protection
Engine Configuration	1 to 12 cylinders. 2/4 stroke or rotary. Natural/Forced induction
Digital Outputs	6 PWM dedicated. (10A peak) 8 PWM alternate. (5A peak) 8 Relay alternate function
Digital Inputs	10 dedicated
Data Logging	4MB standard 2000 samples/second
Crank & Cam Sensor	3 Hall Effect/Inductive
Injector Drivers	12 peak and hold (0-5A)

Quoted currents are peak rating

Description	Value
Analogue Inputs	12 dedicated (12 bit) 2 x Wide band lambda (12 bit) 2 x Knock sensor (12 bit) 2 x K-type thermocouple (12 bit) 10 alternate function (10 bit)
Internal Sensors	ECU Internal Temperature x 4 Battery Voltage
Ignition Drivers	12 IGBT Internal Clamp (450V 20A) 4 Logic Level driven
Auxiliary Outputs	1 Full Bridge (7A peak) 2 Full Bridge (4A peak) **OR** 1 Stepper Motor alternate function
Communication	1 RS232 3 CAN 2.0B 1 Ethernet (10MBit)
Case Operating Temp.	-25°C to +70°C
Weight	590 grams

Ordering Information

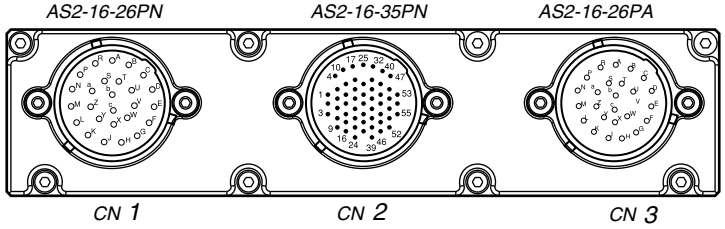
Product	Part number
Pectel SQ6M12 ECU	01E-500913
Pectel SQ6M12 ECU with gearbox upgrade	01E-500913-E011
Pectel download, Autosport to Ethernet 1.5m	60E-500905
Pectel download, Autosport to Ethernet 10m	60E-500906
Pectel download, Autosport to Serial COM port	60E-500909

Connector Details

ECU Connector	Mating Connector
AS2-16-26PN	AS6-16-26SN
AS2-16-26PA	AS6-16-26SA
AS2-16-35PN	AS6-16-35SN

See below for pinout information.

Pinout Details



SQ6M12 connectors

AS216-26PN Pin information

Pin	Dir	Function	Function	Notes
L	Battery	VBAT	ECU Battery Positives	10A cont.
M	Battery	VBAT		
Y	Battery	ECU GND	ECU Battery Negatives	10A cont. Must be Engine Ground
Z	Battery	ECU GND		
a	Battery	ECU GND		
K	O	IGN1	Ignition Coils	IGBTs clipped to 450V. 20A peak
J	O	IGN2		
H	O	IGN3		
G	O	IGN4		
F	O	IGN5		
E	O	IGN6		
X	O	INJ1	Injector Outputs	Low side drivers clipped to 45V. 5A peak, 2.5A hold
W	O	INJ2		
A	O	INJ3		
R	O	INJ4		
B	O	INJ5		
T	O	INJ6		
C	O	INJ7		
U	O	INJ8		
D	O	INJ9		
V	O	INJ10		
b	O	PWM1	PWM Outputs	Low side drivers. 10A peak 10k Ohms pullup to VBAT. Recirculation diode to VBAT.
c	O	PWM2		
P	O	PWM3		
S	O	PWM4		
N	O	PWM5		

AS216-35PN Pin information

Pin	Dir	Function	Function	Notes
20	I	AIN1	12bit Analogue Inputs	Software pullups 3k Ohms & 33k Ohms
6	I	AIN2		
27	I	AIN3		
2	I	AIN4		
19	I	AIN5		
7	I	AIN6		
18	I	AIN7		
3	I	AIN8		
24	I	AIN9	12bit Analogue Inputs	Software pullups 3k Ohms & 240 Ohms
8	I	AIN10		
23	I	AIN11		
9	I	AIN12		
11	I	TC1 POS	Thermocouples Positive (12bit)	
4	I	TC2 POS		
13	I	TC NEG	Themocouple Negative	
12	I	LAMV1	Lambda	
17	O	LAMI1	Lambda Current Pump	
5	I	LAMV2	Lambda	
10	O	LAMI2	Lambda Current Pump	
39	I	DET1	Knock Sensor	
38	I	DET2		
40	I	CRANK1	Crank Inputs	Software Pullup 3k Ohms
31	I	CRANK2		
41	I	CAM	CAM Input	
49	I	DIN1	Digital Inputs	Software Pullup 3k Ohms
53	I	DIN2		
50	I	DIN3		
54	I	DIN4		
47	I	DIN5		
44	I	DIN6		
42	I	DIN7		
48	I	DIN8		
35	I	DIN9		
51	I	DIN10		
29	O	RS232TX	RS232 port	
36	I	RS232RX		
21	O	ETHER TXPOS	Ethernet PC comms	
28	O	ETHER TXNEG		
22	I	ETHER RXPOS		
14	I	ETHER RXNEG		

Pin	Dir	Function	Function	Notes
45	I/O	CAN1 LOW	CAN Communication ports	Terminated
52	I/O	CAN1 HIGH		
26	I/O	CAN2 LOW		
32	I/O	CAN2 HIGH		
33	O	OUT 5V0 / 12V	Programmable Sensor Supply Output 1	5V, 50mA or 12V, 1A
55	O	OUT 5V0 / 12V		
15	O	OUT 5V0 / 12V	Programmable Sensor Supply Output 2	5V, 50mA or 12V, 1A
16	O	OUT 5V0 / 12V		
46	-	Unused		
1	I/O	ANG GND	Protected Sensor Grounds	1A cont.
37	I/O	ANG GND		
25	I/O	CRANK/CAM GND		
30	I/O	DIG GND		
34	I/O	DIG GND		
43	I/O	COMMS GND		

AS216-26PA Pin information

Pin	Dir	Function	Function	Notes
A	Battery	VBAT	ECU Battery Positives	20V, 10A cont.
B	Battery	VBAT		
S	Battery	ECU GND	ECU Battery Negatives	20V, 10A cont. Must be Engine Ground
T	Battery	ECU GND		
U	Battery	ENG GND		
C	O	IGN7	Ignition Coils	400V, 20A peak
D	O	IGN8		
M	O	IGN9		
N	O	IGN10		
L	O	IGN11		
Z	O	IGN12		
V	O	INJ11	Injector Outputs	60V, 5A peak, 2.5A hold
W	O	INJ12		
c	O	PWM6	PWM Output	20V, 10A peak 10k Ohms pullup to VBAT
F	O	HB3A	DC Motor driver	20V, 10A peak
E	O	HB3B		
P	O	HB1A	2 Full Bridge (5A) **OR** 1 Stepper Motor alternate function	20V, 5A peak
R	O	HB1B		
a	O	HB2A		
b	O	HB2B		
K	O	IGNT5	“TTL” Ignitions	5V, 20mA cont.
Y	O	IGNT6		
J	O	IGNT7		
X	O	IGNT8		
G	I/O	CAN3 LOW	CAN Communication port	
H	I/O	CAN3 HIGH		

Declaration of Conformity

We, the undersigned,

Pi Research
Brookfield Motorsports Centre,
Cottenham,
Cambridgeshire, CB4 8PS
United Kingdom

Certify and declare under our sole responsibility that the following equipment:

SQ6M12 ECU – part number 01E-500913

An ECU for use only in motorsport applications

Conforms to the following EC directives including applicable amendments:

EMC Directive 89/336/EEC, 72/245/EEC (last amended 2004/104/EC)

The following standards have been applied:

2004/104/EC

Cottenham, 04 September 2007

George Lendrum - Director of Motorsport