ANTARES 8

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Antares 8

The Antares 8 is Cosworth's latest generation high-performance control and logging system. It features two microprocessors, one dedicated to control and the other for data collection and data logging. In addition, four Field Programmable Gate Arrays (FPGAs) provide class-leading performance.

Eight configurable GDI injector drivers and 16 configurable injector/PWM drivers, combined with eight IGBT ignition outputs and 12 logic level coil driving outputs make it capable of controlling multiple-pulse GDI fuelling on engines up to eight cylinders, or fully sequential port injection fuelling on engines up to 12 cylinders and 24 Injectors. Combined GDI and PFI fuelling is supported for engines up to eight cylinders.

Dual fly-by-wire capability is included along with provision for Stepper and DC motors.

The Antares 8 crank and camshaft pattern recognition system allows the ECU to be used with virtually any OEM timing wheel. This sophisticated pattern recognition algorithm also facilitates synchronisation during slow and uneven cranking conditions.

The Antares 8 provides multiple functions for many of its pins:

- Unused injector and IGBT ignition outputs can be used as digital outputs.
- Unused digital inputs can be used as 12-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 these features are configurable in software.

For reliability the Antares 8 includes reverse-battery, over-voltage protection as standard. Sensor supply and signal ground pins are also protected against short circuits to battery positive and negative.

Advanced software features include:

- In cylinder pressure monitoring
- Closed loop knock control
- Traction control
- Launch control
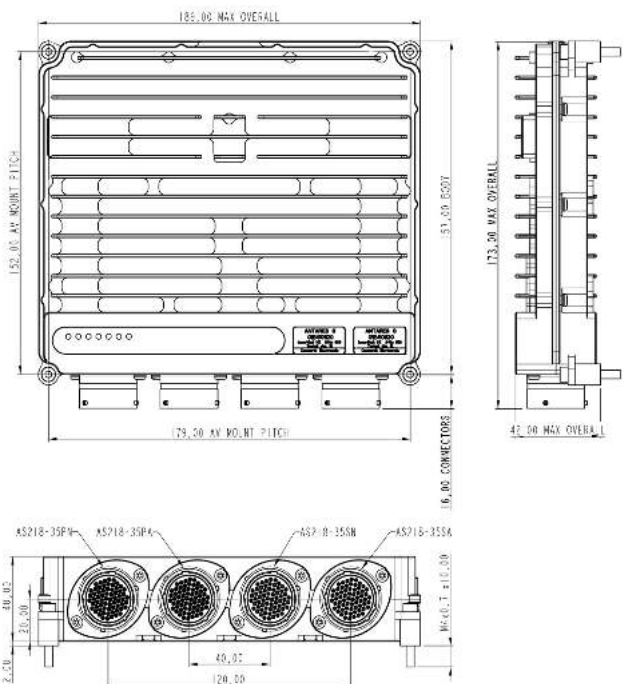
The Antares 8 is designed to function up to a maximum RPM of 16,000rpm when running GDI, or 22,000rpm when running with port fuelling only. There are four lambda sensor inputs, which will accept NTK/Bosch style wideband sensors. There are also eight specialised knock inputs with a software enabled gain stage.

The wide range of functionality makes the Antares 8 capable of working with almost any combination of coil, injector, OEM sensor, and actuator to deliver optimal engine performance.

- Integrated gearshift strategies
- Variable valve timing of up to four camshafts (including BMW VANOS)
- Ultra high speed data logging
- Scrutineering modes for single make championships

Specifications

Electrical Data

Electrical Data	
Supply Voltage	6.0V-16.5V Reverse battery, over-voltage and load dump protection
Ethernet	1x 1000MB/s PC Setup 2 x 100MB/s Ethernet Expansion[1] 1x 100MB/s EtherCat
CAN Ports	Up to 6 CAN ports Max BAUD rate: 1MBit/s 64x message buffers per port Software selectable 120Ω resistor
LIN Ports	Up to 2 LIN Master Ports
Serial Debug Port	1x Bi-directional RS232 Fixed at 115200 BAUD
Serial Ports	1x Bi-directional RS232 Split Function Tx and Rx Logger side Max BAUD rate: 115200 1x Bi-directional RS232 control side Max BAUD rate: 115200
Status LEDs	7x LEDs

Mechanical Data

Mechanical Data	
Material	6082-T6 Anodised Aluminium
Dimensions	189 X 40 X 157MM
Weight	1100g
Electrical Connectors	Deutsch Autosport
Temperature Rating	Operating -20 to +70°C Storage -30 to +80°C
IP Rating	IP65

Ordering Information

Part Number	
01E-501120	Antares 8 Series
60E-501130	Antares 8 Comms Loom (C1 only)
03A-06927	Antares 8 Bench loom
Deutsch AS6-18-35SN	C1 mating connector
Deutsch AS6-18-35SA	C2 mating connector
Deutsch AS6-18-35PN	C3 mating connector
Deutsch AS6-18-35PA	C4 mating connector

Technical Data

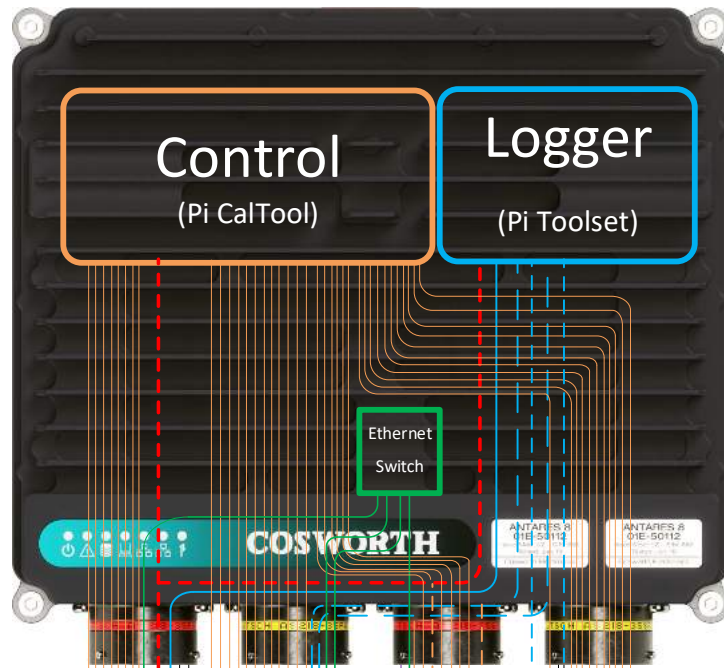| Technical Data	
Engine configuration	1 to 8 Cylinders (GDI) 1 to 12 Cylinders (PFI) 4 stroke, 2 stroke or rotary Natural or forced induction
Digital outputs	12x logic level driven TTL 16x Peak-Hold (all support PWM)
Digital inputs	16x General Purpose, Wheel Speed, Switch or 0-5V analogue alternate function (12 bit, 10kHz cut off)
Data logging	Up to 12GB memory Continuous Logger: 1kHz logging rate 100k samples/s bandwidth Burst logger: 200kHz[2] logging rate TBD
Crank and cam sensors	Dual crank input, Single dedicated cam input, 4x general purpose VCAM Hall effect or Inductive
GDI Injector drivers	8 x GDI outputs with boosted voltage
PFI Injector / PWM drivers	See page 19
Thermocouple inputs	4x Type K (12-bit)
Analogue inputs (Up to 1kHz)	32x (12bit)
Analogue inputs (High speed 200kHz)	Up to 8x (12bit)
Knock Sensor Inputs	8 x 5kHz-30kHz Bandpass filter Software gain (x1 or x30) 200kHz Sample Rate
Lambda Inputs	4 x Wideband Closed Loop Lambda Inputs, Support for NTK, Bosch LSU /ADV
Auxiliary outputs	4 x full H-bridge (10A peak) 1 x full H-bridge (5A peak)
Ignition drivers	8 x IGBT internal clamp (+430V, 20A) 12 x logic level driven
Internal Monitoring	Battery voltage Internal device temperatures Excitation voltages Injector current Ignition current H-Bridge Current H-Bridge Temp

[1] FlexRay support requires custom software development - contact Cosworth Applications Engineer for further details.

[2] Subject to applied Token.

Product Variant Matrix

Variant	Antares 810	Antares 820	Antares 830	Antares 840	Antares 850
AC Customer	Included	Included	Included	Included	Included
AC Developer	N/A	N/A	Optional	Optional	Optional
In cylinder Pressure Monitoring	N/A	N/A	N/A	4x Cylinder @ 200kHz	8x Cylinder @ 200kHz
RLU Logging	YES	YES	YES	YES	YES
Capacity (MiB)	1,024	2,048	8,192	12,280	12,280
Bandwidth Low Speed (bytes/sec)	35,000	50,000	150,000	250,000	500,000
Bandwidth High Speed (bytes/sec)	10000000	10000000	10000000	10000000	10000000
No. of AIN	40	40	40	36 +4 (HS 200kHz)	32 +8 (HS 200kHz)
No. of DIN	16	16	16	16	16
Logging Tables	1	1	2	2 +1	2 +1
HS Burst Tables	1	3	5	5	5
Telemetry Tables	3	3	3	3	3
Math Channels	100	250	250	350	500
Logic Channels	YES	YES	YES	YES	YES
CAN Ports	3	4	6	6	6
Ethernet Displays (48x)	YES	YES	YES	YES	YES
Full Qualifying Mode	YES	YES	YES	YES	YES
I/O Expansion	CAN	CAN/EtherCAT	CAN/EtherCAT	CAN/EtherCAT	CAN/EtherCAT
Ethernet Ports	3	3	3	3	3
EtherCAT Ports	N/A	1	1	1	1
LIN Ports	2	2	2	2	2
Setup Locking	YES	YES	YES	YES	YES
Lambda	4	4	4	4	4
Thermocouple	4	4	4	4	4
Knock Sensors	8	8	8	8	8

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Input/Output Connector Allocation

Control (Pi CalTool)

Logger (Pi Toolset)

Ethernet Switch

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Control (left connector allocation)

- 4x High Side GDI Injectors
- 4x Low Side GDI Injectors
- 8x Low Side Peak/Hold Outputs
- 2x 10A H-Bridge
- 4x Inductive Coils
- 4x TTL Coils
- Serial Port Logger Comms
- Serial Port Control Comms
- Ethernet 1 100BaseT
- CAN3 Shared Logger&Control
- Serial Port Debug Logger
- 12V Battery
- Main GND

- 4x TTL Coils
- 4x Sensor Excitations 5V
- 4x Sensor Excitations 5V / 12V
- 2x Analog Inputs
- 6x Analog Inputs (FBW)
- 2x Thermocouple inputs
- 2x Crank Inputs
- 1x CAM Inputs
- 2x Lambda Inputs
- 4x Knock Inputs
- 12x Digital Inputs
- 3x Sensor Grounds
- CAN 4 Logger only
- CAN 5 Logger only
- Ethernet 2 1000 BaseT
- Ethercat

Logger (right connector allocation)

- 4x High Side GDI Injectors
- 4x Low Side GDI Injectors
- 8x Low Side Peak/Hold Outputs
- 2x 10A H-Bridge
- 1x 3A H-Bridge
- 4x Inductive Coils
- 4x TTL Coils
- 2x Thermocouple inputs
- 2x Lambda Inputs
- 2x LIN Master
- 4x Sensor Grounds
- 12V Battery
- Main GND
- 2x Sensor Excitations 5V / 12V
- CAN 6 Logger only

- CAN 2 Control only
- 6x Sensor Excitations 5V
- 6x Sensor Excitations 5V / 12V
- 32x Analog Inputs
- 4x Sensor Grounds
- CAN 1 Control only
- 4x Knock Inputs
- 2x Digital Inputs 10KHz
- 2x Digital Inputs Turbo Speed
- Ethernet 3 100BaseT /FlexRay
- DAC Outputs

LED Indicator Definitions

Legend	Colour	LED Modes	LED Definitions
	Red	Off Single (1Hz, 250ms On, 750ms Off) Flash Blinking	No Power to the Unit Initialising and looking for clock sync Sync achieved unit operational
	Red	Off On	Normal running condition Logger error or no dataset (logging config) loaded (During startup the LED performs a quick light test)
	Red	Off On	Normal running condition Logger full and overwriting data (During startup the LED performs a quick light test)
	Green	Off On (10Hz 50ms On 50ms Off Flickering	1000Base T Ethernet Port 2, No connection established Connection established Communication active
	Green	Off On10Hz 50ms On 50ms Off Flickering	100Base T Ethernet Port 1, No connection established Connection established Communication active
	Green	Off On 10Hz 50ms On 50ms Off Flickering	100Base T Ethernet Port 3, No connection established Connection established Communication active
	Green	Off On Flickering	EtherCAT Port, no connection established Connection established Communication active

Installation

When you install the Antares 8:

- Make sure that the unit is protected against severe vibrations by mounting using supplied AV mounting kit. Also make sure that the unit is not fouling other structures which may experience severe vibrations. The warranty will be void if mounted differently.

- Make sure that the unit is positioned in an area with an ambient temperature of less than 70°C or with sufficient cooling air flow to prevent over heating.

- Make sure that the unit is mounted away from sources of electrical interference.

- Make sure that the unit is mounted in position where unit will not come into contact with water.

- Do not ground the case. Use the ground pins provided by the Autosport connectors.

Connector Information

All pin outs are grouped in function order, rather than pin order.

C1 Connector

Connector	Mating Connector
AS218-35PN-943B	AS618-35SN

C1 Pinout

| Pin	Signal	Description
C1-18	BATT+	
C1-26	BATT+	
C1-27	BATT+	
C1-29	BATT+	Battery Positive (all pins must be connected— See page 18).
C1-35	BATT+	
C1-36	BATT+	
C1-38	BATT+	
C1-44	BATT+	
C1-61	BATT-	
C1-54	BATT-	
C1-46	BATT-	
C1-37	BATT-	
C1-28	BATT-	Battery Negative (all pins must be connected—See page 18).
C1-20	BATT-	
C1-19	BATT-	
C1-12	BATT-	
C1-11	BATT-	
C1-6	BATT-	
C1-50	ETHTX+1	
C1-42	ETHTX-1	Ethernet 1 Expansion 100BaseT.
C1-41	ETHRX+1	
C1-33	ETHRX-1	
C1-47	CANH3_CTRL-LOG	CAN3—shared CAN port between Logger and Control.
C1-55	CANL3_CTRL-LOG	Software selectable 120Ω termination.
C1-30	SerialDBG_TX_LOG	RS232 serial, Logger side only (debug and alternative firmware loading)
C1-22	SerialDBG_RX_LOG	
C1-24	Serial1_TX_LOG	RS232 serial, Logger side only (auxiliary device comms. For example, Telemetry streams)
C1-32	Serial1_RX_LOG	
C1-13	Serial2_TX_CTRL	RS232 serial, Control side only (firmware loading, auxiliary device comms)
C1-21	Serial2_RX_CTRL	

C1 Pinout (continued)

Pin	Signal/alternative use	Description
C1-5	INJHS1/PWM1	
C1-2	INJHS2/PWM3	4x High Side Injector outputs
C1-43	INJHS3/PWM5	Please refer to capabilities and combinations as shown on page 19
C1-10	INJHS4/PWM7	
C1-4	INJLS1/PWM2	
C1-1	INJLS2/PWM4	4x Low Side Injector outputs for GDI & PF
C1-51	INJLS3/PWM6	Please refer to capabilities and combinations as shown on page 19
C1-17	INJLS4/PWM8	
C1-58	INJLS9/PWM17	
C1-59	INJLS10/PWM18	
C1-25	INJLS11/PWM19	
C1-34	INJLS12/PWM20	8x Low Side Injector general purpose outputs
C1-66	INJLS13/PWM21	Please refer to capabilities and combinations as shown on page 19
C1-62	INJLS14/PWM22	
C1-64	INJLS15/PWM23	
C1-65	INJLS16/PWM24	

Pin	Signal/alternative use	Description		
C1-57 C1-49	HBA1/PWM33	1 x half-H bridge output 50kHz current logging[1]	1x full-H bridge 50kHz[1] current logging	2 Channels may be used to form a stepper motor output (4 pins) Maximum current 10A, Maximum operating frequency 10kHz Current measurement with up to 50kHz[1] is available.
C1-63 C1-56	HBB1/PWM34	1 x half-H bridge output 50kHz current logging[1]		
C1-53 C1-60	HBA2/PWM35	1 x half-H bridge output 50kHz[1] current logging	1x full-H bridge 50kHz[1] current logging	
C1-45 C1-52	HBB2/PWM36	1 x half-H bridge output 50kHz current logging[1]		
C1-16 C1-23	IGN1/PWM43	4 x IGBT outputs **Mode1:** Inductive Ignition high voltage coil drive **Mode2:** PWM output. The driver cannot pull down to 0V. The low voltage level will be around 1.2V. PWM output with limited frequency of 1kHz. (Future) **Mode3:** Analog Input with limited bandwidth 10Hz, and resolution (10bit ADC) (future) **Output capabilities:** 20A peak, 3A continuous, 430V		
C1-9 C1-15	IGN2/PWM44			
C1-8 C1-14	IGN3/PWM45			
C1-3 C1-7	IGN4/PWM46			
C1-39	DOUT1/PWM51	4 x logic level outputs (TTL) **Mode1:** TTL Ignition drive **Mode2:** PWM output with max frequency of 10kHz **Output capabilities:** Source 5V clamped to 25mA with a thermal fuse shutting down if overstressed, auto recovering Sink 0V @ 3.5A		
C1-31	DOUT2/PWM52			
C1-48	DOUT3/PWM53			
C1-40	DOUT4/PWM54			

[1] Hardware arrangements in place, subject to software release

= doubled up pins to split current load. Same function on either pin.

All pin outs are grouped in function order, rather than pin order.

C2 Connector

Connector	Mating Connector
AS218-35PA-943B	AS618-35SA

C2 Pinout

Pin	Signal/alternative use	Description
C2-24	ETH1000+1	Ethernet Port 2 (high speed) 1000BaseT for high speed PC comms (logger and calibration interface) and download data logging
C2-32	ETH1000-1	
C2-16	ETH1000+2	
C2-23	ETH1000-2	
C2-15	ETH1000+3	
C2-9	ETH1000-3	
C2-3	ETH1000+4	
C2-8	ETH1000-4	
C2-13	CANH4_LOG	CAN4— Logger only Software selectable 120Ω termination.
C2-12	CANL4_LOG	
C2-22	CANH5_LOG	CAN5— Logger only Software selectable 120Ω termination.
C2-14	CANL5_LOG	
C2-1	ECATTX+	EtherCat master for system expansion.
C2-6	ECATTX-	
C2-7	ECATRX+	
C2-2	ECATRX-	
C2-26	EXTPSU1	4x fixed protected 5V supply outputs. Each output is independently protected and clamps the current at 50mA if required.
C2-18	EXTPSU2	
C2-25	EXTPSU3	
C2-17	EXTPSU4	
C2-4	EXTPSU11	4x Software selectable 5V/VBatt supply outputs. When in 5V mode each output is independently protected and clamps the current at 50mA if required. If any of those outputs are used in VBatt mode those outputs are grouped together. The current is clamped at 700mA. If overstressed a thermal shutdown protects and shuts down all outputs which are set to VBatt mode.
C2-5	EXTPSU12	
C2-10	EXTPSU13	
C2-11	EXTPSU14	

C2 Pinout (continued)

Pin	Signal/alternative use	Description
C2-33	DIN1/AIN41	4x general purpose digital inputs **Mode1:** Switch Inputs **Mode2:** Rate measurement (wheel, shaft, etc.)., Software selectable 3kΩ pull-up resistor to 5V **Mode3:** 0-5V analogue alternate function (12 bit, 10kHz cut off) **Mode4:** VCAM capability
C2-41	DIN2/AIN42	
C2-56	DIN3/AIN43	**Capabilities:** Max sampling rate for switch type inputs: 10ms Max sampling rate for specific strategies such as transmission control switch type inputs: 1ms
C2-53	DIN4/AIN44	Thresholds are software configurable between 0V and 5V
C2-55	DIN5/AIN45	4 x general purpose digital inputs **Mode1:** Switch Inputs **Mode2:** Rate measurement (wheel, shaft etc), Software selectable 3kΩ pull-up resistor to 5V **Mode3:** 0-5V analogue alternate function (12 bit, 10kHz cut off) **Mode4:** 220Ω Pull down for current signal based wheel speed sensors (Bosch DF11i)
C2-45	DIN6/AIN46	
C2-52	DIN7/AIN47	**Capabilities:** Max sampling rate for switch type inputs: 10ms Max sampling rate for specific strategies such as transmission control switch type inputs: 1ms Max input pulse train 10KHz
C2-58	DIN8/AIN48	Thresholds are software configurable between 0V and 5V
C2-31	DIN9/AIN49	4 x general purpose digital inputs **Mode1:** Switch Inputs **Mode2:** Rate measurement (wheel, shaft etc), Software selectable 3kΩ pull-up resistor to 5V **Mode3:** 0-5V analogue alternate function (12 bit, 10kHz cut off)
C2-40	DIN10/AIN50	
C2-54	DIN11/AIN51	**Capabilities:** Max sampling rate for switch type inputs: 10ms Max sampling rate for specific strategies such as transmission control switch type inputs: 1ms Max input pulse train 10KHz
C2-59	DIN12/AIN52	Thresholds are software configurable between 0V and 5V
C2-60	PROT-GND2	2x Protected sensor grounds grouped together Driver clamps at 3.5A and eventually shuts down if thermally overloaded
C2-65	PROT-GND2	
C2-64	PROT-GND1	1x Protected GND reserved, but not exclusively for cam and crank, Driver clamps the current at 3.5A and eventually shuts down if thermally overloaded.

C2 Pinout (continued)

Pin	Signal/alternative use	Description
C2-47	KNOCK1	4x Dedicated Knock inputs, 5kHz-30kHz Bandpass filter Software controlled gain (x1 or x30)
C2-50	KNOCK2	
C2-48	KNOCK3	
C2-46	KNOCK4	
C2-49	LAMIP1	Lambda 1 Wideband sensor input (see page 20) Only use PWM29 for Lambda Sensor 1 Heater control for CL Heater Resistance mode Only use AIN29 for connecting to Lambda 1 Trim (Bosch) or Label resistors (NTK)
C2-42	LAMVS1	
C2-63	LAMIP2	Lambda 2 Wideband sensor input (see page 20) Only use PWM30 for Lambda Sensor 2 Heater control Only use AIN30 for connecting to Lambda 2 Trim (Bosch) or Label resistors (NTK)
C2-57	LAMVS2	
C2-66	CAM	Hall effect or inductive engine position inputs
C2-62	CRANK1	
C2-61	CRANK2	
C2-44	TCPOS1	2x Type K thermocouple inputs, voltage range –4.5mV to +45mV
C2-51	TCNEG1	
C2-43	TCPOS2	
C2-34	TCNEG2	
C2-28	AIN1	6x Analogue inputs (12 bit) with redundant ADC processing to be used for FBW related sensors (PPS, TPS) **Mode1:** general purpose analogue input with software selectable 3kΩ pull-up resistor to 5V, 250 Hz low pass filter
C2-27	AIN2	
C2-39	AIN3	
C2-29	AIN4	
C2-37	AIN5	
C2-38	AIN6	
C2-36	AIN29/LamTrim1	2x Analogue inputs (12 bit) **Mode1:** general purpose analogue input with software selectable 3KΩ pull-up resistor to 5V, 250 Hz low pass filter **Mode2:** Lambda trim inputs for compensation Resistors (Bosch LSU)
C2-35	AIN30/LamTrim2	
C2-30	DOUT5/PWM55	4 x logic level Digital outputs (TTL) **Mode1:** TTL Ignition drive **Mode2:** PWM output with max frequency of 10kHz **Output capabilities:** Source 5V clamped to 25mA with a thermal fuse that shuts down if overstressed, auto-recovering Sink 0V @ 3.5A
C2-20	DOUT6/PWM56	
C2-21	DOUT7/PWM57	
C2-19	DOUT8/PWM58	

All pin outs are grouped in function order, rather than pin order.

C3 Connector

Connector	Mating connector
AS218-35SN-943B	AS618-35PN

C3 Pinout

Pin	Signal/alternative use	Description
C3-59	EXTPSU5	6x fixed protected 5V supply outputs.
C3-60	EXTPSU6	
C3-61	EXTPSU7	Each output is independently protected and will clamp the current at 50mA if required.
C3-64	EXTPSU8	
C3-65	EXTPSU9	
C3-66	EXTPSU10	
C3-62	EXTPSU15	6x Software selectable 5V/VBat supply outputs.
C3-50	EXTPSU16	When in 5V mode each output is independently protected and will clamp the current at 50mA if required.
C3-63	EXTPSU17	If any of those outputs are used in VBat mode those outputs are grouped together. The current is clamped up 700mA. If overstressed a thermal shutdown protect and shuts down all outputs which are set to VBat mode.
C3-49	EXTPSU18	
C3-2	EXTPSU19	When in 12V mode the following grouping applies: Group 2: EXTPSU15, EXTPSU16, EXTPSU17 and EXTPSU18
C3-6	EXTPSU21	Group 3: EXTPSU19, EXTPSU20, EXTPSU21 and EXTPSU22
C3-16	CANH1_CTRL	CAN1— Control only Software selectable 120Ω termination.
C3-15	CANL1_CTRL	
C3-14	CANH2_CTRL	CAN2— Control only Software selectable 120Ω termination.
C3-13	CANL2_CTRL	
C3-7	ETH2_TX+/FP1	Mode1: Ethernet port 3, 100BaseT, connected to internal Ethernet Hub
C3-3	ETH2_TX-/FM1	
C3-9	ETH2_RX+/FP2	Mode2: FlexRay[1]
C3-8	ETH2_RX-/FM2	
C3-44	PROT-GND3	2x individually Protected sensor ground groups
C3-51	PROT-GND3	
C3-52	PROT-GND4	Driver clamps at 3.5A and eventually shuts down if thermally overloaded
C3-58	PROT-GND4	
C3-34	KNOCK5	4x Dedicated Knock inputs
C3-25	KNOCK6	
C3-43	KNOCK7	Software controlled gain (x1 or x30)
C3-35	KNOCK8	

[1] FlexRay support requires custom software development - contact Cosworth Applications.

C3 Pinout (continued)

Pin	Signal/alternative use	Description
C3-53	AIN7	2x Analogue inputs (12 bit) with redundant ADC processing to be used for FBW related sensors (PPS, TPS)
C3-45	AIN8	**Mode1:** general purpose analogue input with software selectable 3KΩ pull-up resistor to 5V, 250 Hz low pass filter
C3-41	AIN9	20x Analogue inputs (12 bit) **Mode1:** general purpose analogue input with software selectable 3KΩ pull-up resistor to 5V, 250 Hz low pass filter
C3-42	AIN10	
C3-32	AIN11	
C3-33	AIN12	
C3-23	AIN13	
C3-24	AIN14	
C3-47	AIN15	
C3-39	AIN16	
C3-31	AIN17	
C3-22	AIN18	
C3-46	AIN19	
C3-38	AIN20	
C3-29	AIN21	
C3-30	AIN22	
C3-37	AIN23	
C3-28	AIN24	
C3-21	AIN25	
C3-1	AIN26	
C3-5	AIN27	
C3-11	AIN28	
C3-20	AIN31/LamTrim3	2x Analogue inputs (12 bit) **Mode1:** general purpose analogue input with software selectable 3KΩ pull-up resistor to 5V, 250 Hz low pass filter **Mode2:** Lambda trim inputs for compensation Resistors (Bosch LSU series)
C3-12	AIN32/LamTrim4	
C3-4	AIN33/CPM1	8x Analogue inputs (12 bit) **Mode1:** general purpose analogue input with software selectable 3KΩ pull-up resistor to 5V, 30kHz low pass filter **Mode2:** High speed Cylinder pressure sensors, 200kHz logging rate
C3-18	AIN34/CPM2	
C3-10	AIN35/CPM3	
C3-17	AIN36/CPM4	
C3-26	AIN37/CPM5	
C3-19	AIN38/CPM6	
C3-27	AIN39/CPM7	
C3-36	AIN40/CPM8	

C3 Pinout (continued)

Pin	Signal/alternative use	Description
C3-57	ScopeOut1	Programable digital scope outputs, for CAM, Crank, and Knock. (Requires custom firmware, contact Cosworth for details).
C3-56	ScopeOut2	
C3-54	DIN13/AIN53	2 x general purpose digital inputs **Mode1:** Switch Inputs **Mode2:** Rate measurement (wheel, shaft etc), Software selectable 3kΩ pull-up resistor to 5V **Mode3:** 0-5V analogue alternate function (12 bit, 10kHz cut off) **Capabilities:** Max sampling rate for switch type inputs: 10ms Max sampling rate for specific strategies such as transmission control switch type inputs: 1ms Thresholds are software configurable between 0V and 5V
C3-55	DIN14/AIN54	
C3-48	DIN15/AIN55	2 x general purpose high speed digital inputs e.g. Turbospeed (no cut off Filter) **Mode1:** Switch Inputs **Mode2:** Rate measurement (wheel, shaft etc), Software selectable 3kΩ pull-up resistor to 5V **Mode3:** 0-5V analogue alternate function (12 bit, no low pass filtering) **Capabilities:** Max sampling rate for switch type inputs: 10ms Max sampling rate for specific strategies such as transmission control switch type inputs: 1ms Maximum pulsetrain 100kHz Thresholds are software configurable between 0V and 5V
C3-40	DIN16/AIN56	

All pin outs are grouped in function order, rather than pin order.

C4 Connector

Connector	Mating Connector
AS218-35SA-943B	AS618-35PA

C4 Pinout

Pin	Signal/alternative use	Description
C4-4	INJHS5/PWM9	4x high side injector outputs Please refer to capabilities and combinations as shown on page 19
C4-1	INJHS6/PWM11	
C4-51	INJHS7/PWM13	
C4-17	INJHS8/PWM15	
C4-10	INJLS5/PWM10	4x low side injector outputs for GDI &PFI Please refer to capabilities and combinations as shown on page 19
C4-5	INJLS6/PWM12	
C4-58	INJLS7/PWM14	
C4-25	INJLS8/PWM16	
C4-59	INJLS17/PWM25	4x low side injector general purpose outputs Please refer to capabilities and combinations as shown on page 19
C4-64	INJLS18/PWM26	
C4-34	INJLS19/PWM27	
C4-43	INJLS20/PWM28	
C4-62	INJLS21/PWM29	4x low side injector general purpose outputs. Please refer to capabilities and combinations as shown on page 19
C4-63	INJLS22/PWM30	
C4-65	INJLS23/PWM31	
C4-66	INJLS24/PWM32	

Pin	Signal/alternative use	Description		
C4-60 C4-54	HBA3/PWM37	1 x half-H bridge output 50kHz[1] current logging	1x full-H bridge 50kHz[1] current logging	2 Channels may be used to form a stepper motor output (4 pins) Maximum current 10A, Maximum operating frequency 10kHz Current measurement with up to 50kHz[1] is available.
C4-46 C4-53	HBB3/PWM38	1 x half-H bridge output 50kHz[1] current logging		
C4-41 C4-32	HBA4/PWM39	1 x half-H bridge output 50kHz[1] current logging	1x full-H bridge 50kHz[1] current logging	
C4-31 C4-40	HBB4/PWM40	1 x half-H bridge output 50kHz[1] current logging		
C4-36	HBA5/PWM41	1x full-H bridge 10kHz. Max current 5A		
C4-18	HBB5/PWM42			
C4-2 C4-6	IGN5/PWM47	4 x IGBT outputs **Mode1:** Inductive Ignition high voltage coil drive **Mode2:** PWM output. The driver cannot pull down to 0V. The low voltage level is around 1.2V. PWM output with limited frequency of 1kHz. **Mode3:** Analog Input with limited bandwidth, and resolution (10bit ADC) **Output capabilities:** 20A peak, 3A continuous		
C4-3 C4-7	IGN6/PWM48			
C4-8 C4-14	IGN7/PWM49			
C4-9 C4-15	IGN8/PWM50			
C4-24	DOUT9/PWM59	4 x logic level outputs (TTL) **Mode1:** TTL Ignition drive **Mode2:** PWM output with max frequency of 10kHz **Output capabilities:** Source 5V @ 25mA with a thermal fuse that shuts down if overstressed, auto-recovering Sink 0V @ 1A PWM61 May be used for CRANK Signal Output PWM62 May be used for CAM Signal Output		
C4-16	DOUT10/PWM60			
C4-23	DOUT11/PWM61			
C4-22	DOUT12/PWM62			

[1] Hardware arrangements in place, subject to software release

= double the amount of pins to relief current draw per pin.

| Pin	Signal/alternative use	Description
C4-55	TCPOS3	2x Type K thermocouple inputs, voltage range −4.5mV to +45mV
C4-38	TCNEG3	
C4-61	TCPOS4	
C4-47	TCNEG4	
C4-29	LAMIP3	Lambda 3 Wideband sensor input (see page 20)
C4-30	LAMVS3	Only use PWM31 for Lambda Sensor 3 Heater control for CL Heater Resistance mode Only use AIN31 for connecting to Lambda 3 Trim (Bosch) or Label resistors (NTK)
C4-37	LAMIP4	Lambda 4 Wideband sensor input (see page 20)
C4-21	LAMVS4	Only use AIN32 for connecting to Lambda 4 Trim (Bosch) or Label resistors (NTK) Only use PWM32 for Lambda Sensor 4 Heater control for CL Heater Resistance mode
C4-33	EXTPSU20	2x Software selectable 5V/VBat supply outputs. When in 5V mode each output is independently protected and will clamp the current at 50mA if required. If any of those outputs are used in Vbat mode those outputs will be grouped together. The current will be clamped up 700mA. If overstressed a thermal shut down will protect and therefor shutdown all outputs together which are set to 12V mode.
C4-42	EXTPSU22	Only when set to 12V mode the following grouping will apply: Group 1: EXTPSU11, EXTPSU12, EXTPSU13 and EXTPSU14 Group 2: EXTPSU15, EXTPSU16, EXTPSU17 and EXTPSU18 Group 3: EXTPSU19, EXTPSU20, EXTPSU21 and EXTPSU22
C4-35	BATT+	Battery Positive (all pins must be connected—See page 7)
C4-44	BATT+	
C4-45	BATT+	
C4-52	BATT+	
C4-11	BATT-	Battery Negative (all pins must be connected—See page 7)
C4-12	BATT-	
C4-13	BATT-	
C4-19	BATT-	
C4-26	BATT-	
C4-27	BATT-	
C4-49	PROT-GND5	2x individually Protected sensor ground groups Driver clamps at 3.5A and eventually shuts down if thermally overloaded
C4-50	PROT-GND5	
C4-56	PROT-GND6	
C4-57	PROT-GND6	
C4-48	CANH6_LOG	CAN6— Logger only Software selectable 120Ω termination.
C4-39	CANL6_LOG	
C4-20	LIN1	LIN Bus Master 1&2
C4-28	LIN2	

Injector Wiring Guide

The ECU provides a highly flexible level of connectivity for fuel injectors.

- 8x High Side GDI injector, which are distributed over two connectors (C1&C4), must be used with one of the 8 corresponding low side output if GDI is desired (Mode1).
- Up to 24x high or low impedance PFI injectors are supported if PFI-only mode is chosen.
- GDI and PFI can be combined with 8 GDI and 16 PFI injectors.
- Alternatively the output of every injector can be used for general purpose PWM functions including Lambda heater.

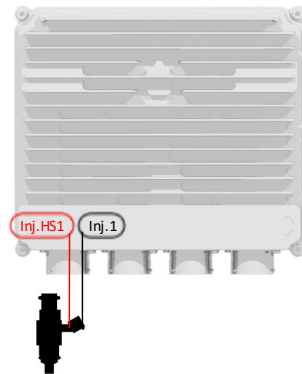Please refer to the limits for each mode as shown below.

Mode 1: GDI, Boost supply + Control
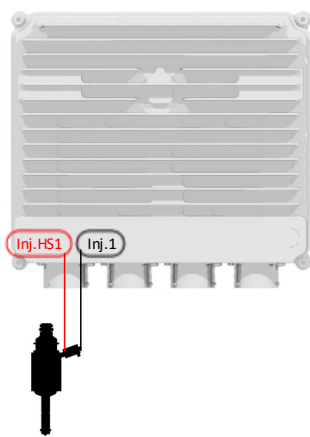
-Connected in Pairs

-Max. Boost Current 14A

-Max. Boost Voltage 90V

-Max. Peak Current 7A

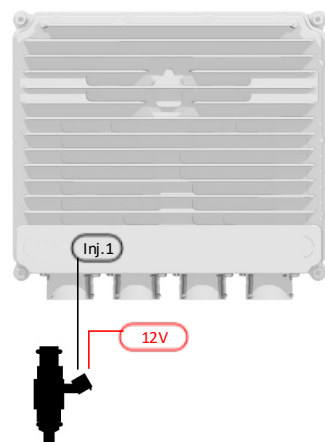-Max. Hold Current 5A

-50kHz Current Logging[1]

Availability: 8x

Mode 2: PFI, 12V supply + Control

-Connected in Pairs

-Max. Peak Current 7A

-Max. Hold Current[2] 5A

-50kHz Current Logging[1]
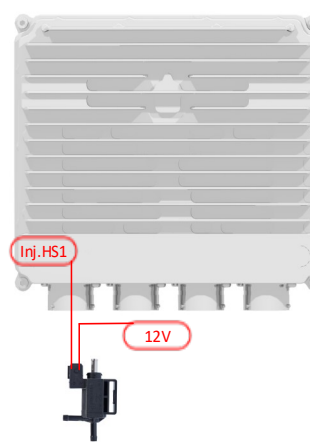
-High and Low Impedance Support

Availability: 8x

Mode 3: PFI, control only

-Max. Peak Current 7A

-Max. Hold Current[2] 5A

-No High Speed Current Logging
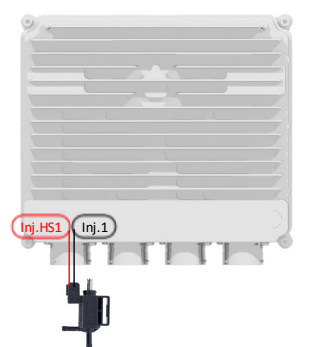
-High and Low Impedance Support

Availability: 24x

Mode 4: PWM, control using high side pins

-Max. Frequency 10kHz

-No Peak and Hold available

-No high speed current Logging

-Max. Current 3A

Availability: 8x
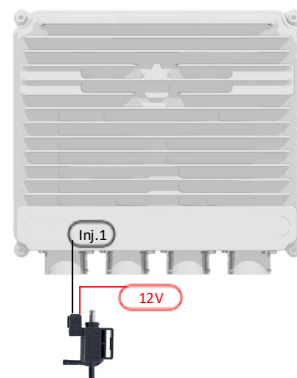
Mode 5: PWM, 12V supply and control

-Max. Peak Current 7A

-Max. Hold Current[2] 5A

-Max. Frequency 10kHz
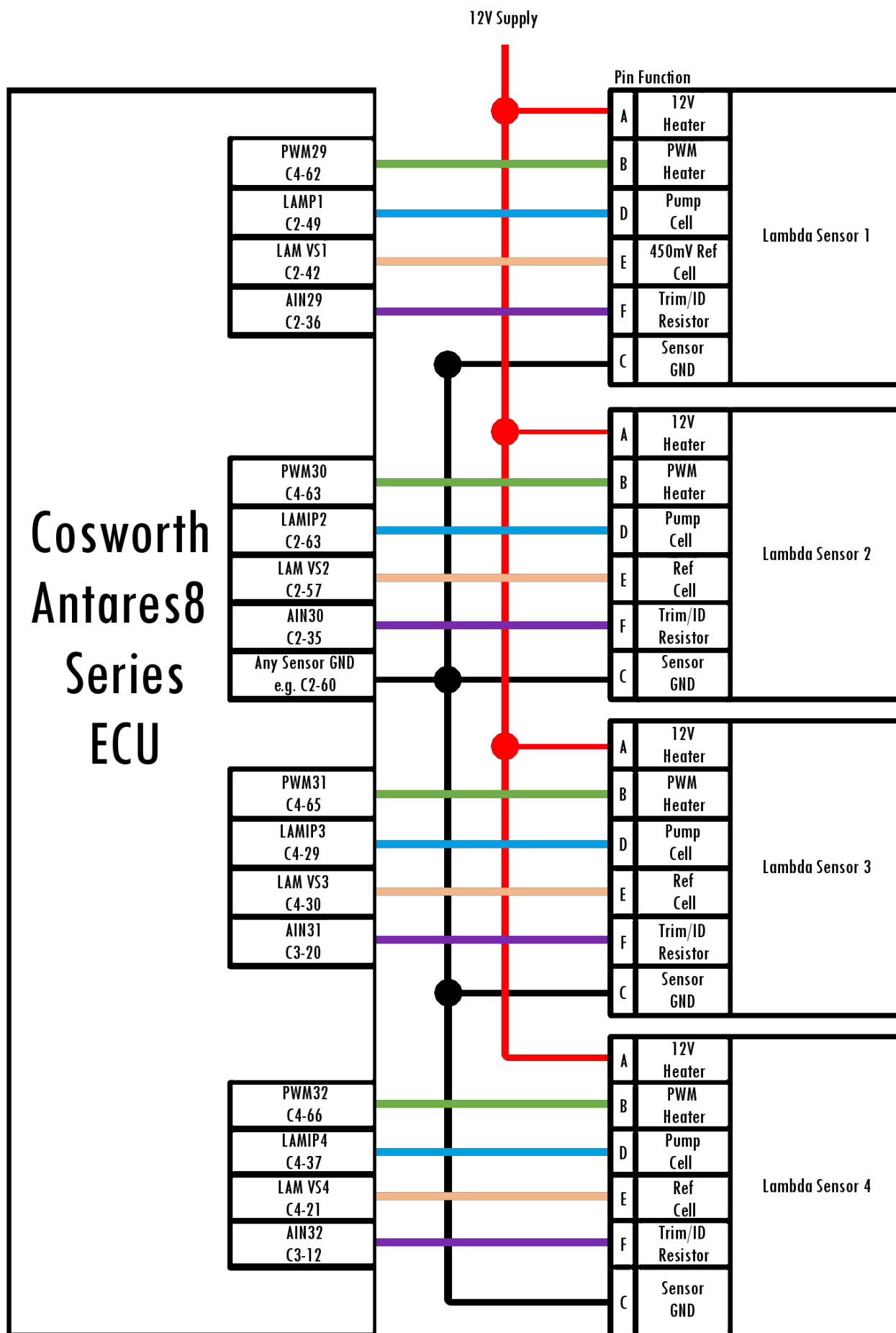
-50kHz Current Logging[1]

-Current Control available

Availability: 8x

Mode 6: PWM, control low side only

-Max. Peak Current 7.5A

-Max. Hold Current[2] 5A

-Max. Frequency 10kHz

-No High Speed 50kHz Logging

-Current Control available

Availability: 24x

12V Supply

Pin Function

Cosworth Antares8 Series ECU

ECU Pin	Wire	Pin	Function	Sensor
		A	12V Heater	
PWM29 C4-62		B	PWM Heater	
LAMP1 C2-49		D	Pump Cell	
LAM VS1 C2-42		E	450mV Ref Cell	Lambda Sensor 1
AIN29 C2-36		F	Trim/ID Resistor	
		C	Sensor GND	
		A	12V Heater	
PWM30 C4-63		B	PWM Heater	
LAMIP2 C2-63		D	Pump Cell	
LAM VS2 C2-57		E	Ref Cell	Lambda Sensor 2
AIN30 C2-35		F	Trim/ID Resistor	
Any Sensor GND e.g. C2-60		C	Sensor GND	
		A	12V Heater	
PWM31 C4-65		B	PWM Heater	
LAMIP3 C4-29		D	Pump Cell	
LAM VS3 C4-30		E	Ref Cell	Lambda Sensor 3
AIN31 C3-20		F	Trim/ID Resistor	
		C	Sensor GND	
		A	12V Heater	
PWM32 C4-66		B	PWM Heater	
LAMIP4 C4-37		D	Pump Cell	
LAM VS4 C4-21		E	Ref Cell	Lambda Sensor 4
AIN32 C3-12		F	Trim/ID Resistor	
		C	Sensor GND	

Recycling and Environmental Protection

Cosworth Electronics is committed to conducting its business in an environmentally responsible manner and strive for high environmental standards.

Manufacture: Cosworth products comply with the appropriate requirements of the Restriction of Hazardous Substance (RoHS).

Battery: This equipment contains a rechargeable battery (Lithium 6.5mAh) for the Real Time Clock.
To maintain battery health especially when the ECU is not in use for long periods of time, please power on the device for a minimum of 6 hours every 12 months. In typical use the battery should last > 5 years.

Service: Should the battery need replacing the equipment may be returned to Cosworth Electronics for a battery replacement. (A charge will be made for this service).
Removal of the battery by the user may void any warranty on the equipment.

Disposal: Electronic equipment should be disposed of in accordance with the regulations in force and in particular in accordance with the Waste in Electrical and Electronic Equipment directive (WEEE).

To remove the battery for recycling:
Remove the case cover(s).
Remove the printed circuit boards from the case.
Remove the battery from the printed circuit board.
Dispose of the battery in accordance with regulations in force.

Document: 29E-501120-P

Rev: 4.0

All Information in this document is correct as of 20/12/2024

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