LifeRacing

Professional Electronics for Automotive and Motorsport
6 Repton Close | Basildon | Essex | SS13 1LE | United Kingdom
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F88 ECU

The **F88 ECU** is an extremely high level of precision engine management control. The twin processor unit uses a high speed **RISC** processor for code execution and an additional large **FPGA** for high speed engine position tracking, allowing the scheduling of code to be independent of signal patterns, increasing flexibility, efficiency and accuracy under transient conditions. This powerful combination also allows advanced control algorithms but yet remains easy to calibrate for the end user.

Processing
Powerful RISC CPU for advanced strategy execution
Custom synchronous FPGA processor for engine position tracking up to 25,000 rpm

Outputs
28 user configurable general purpose Pulse Width Modulated power outputs, including:
- 8 ignition coil outputs IGBT or TTL (Software configurable)
- 16 fuel injector outputs
- 2 full bridges also configurable as 4 half bridges or 4 PWMs

Inputs
24 user configurable general purpose analogue sensor inputs, including 16 bipolar, inductive or hall effect speed / engine position inputs

6 dedicated inputs, including:
- 2 acoustic knock sensor inputs
- 2 wideband (NTK UEGO) lambda sensor interfaces
- 2 K-type thermocouple sensor interfaces

Interfaces
100 MHz full duplex Ethernet for calibration, configuration and data download
2 CAN 2.0B interfaces for communication with other controllers or logging systems
RS232 serial interface for communication with other controllers or logging systems

Memory
128MB battery backed internal logging memory
Ultra Fast data download via Ethernet
Time/Date stamped data via real time clock

Power Supply
6V to 32V input voltage range with reverse polarity protection
2 regulated 5V sensor supply outputs with individual short circuit protection
Software configurable (5 to 12V) sensor supply output (eg for 10V load cells)
Unregulated sensor supply output which tracks the ECU supply voltage with nominal 17V clamp
5 separately protected sensor and communication ground inputs

Physical
88 Way Bosch / AMP sealed connector
CNC machined, 'O' ring sealed, black anodised aluminium case
Maximum dimensions including the connectors are 178 x 122 x 36 mm
Total mass is ~485 grams

Upgrades
12 Ignition Outputs
Adaptive Knock Control
Direct Injection Pump Control
Direct Motor Control
Gearbox Control
Traction Control

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F88 ECU Pinout

Mating Connector: 88Way Connector Kit

PIN	FUNCTION	PIN	FUNCTION
1	POWER GROUND	45	LAMBDA V #02 / CAN LO #03 [2]
2	IGNITION #08	46	INPUT #22 (TH)
3	IGNITION #07	47	FUEL #16
4	IGNITION #06	48	RS232 RX
5	IGNITION #05	49	FUEL #08
6	FUEL #10 / IGNITION #10 [7]	50	FUEL #06
7	KNOCK #02 [3]	51	FUEL #04
8	INPUT #16 (5V/TH/BI/FREQ)	52	FUEL #03
9	INPUT #14 (5V/TH/BI/FREQ)	53	FUEL #02
10	INPUT #12 (5V/TH/BI/FREQ)	54	FUEL #01
11	INPUT #10 (5V/TH/BI/FREQ)	55	POWER GROUND
12	THERMO - #02	56	BATTERY SUPPLY
13	THERMO + #02	57	BATTERY SUPPLY
14	INPUT #07 (5V/TH/BI/FREQ)	58	H-BRIDGE #01 [5]
15	INPUT #05 (5V/TH/BI/FREQ)	59	H-BRIDGE #02 [5]
16	INPUT #03 (5V/TH/BI/FREQ)	60	H-BRIDGE #03 [5]
17	INPUT #01 (5V/TH/BI/FREQ) [1]	61	H-BRIDGE #04 [5]
18	LAMBDA V #01	62	10V OUT [4]
19	INPUT #21 (TH)	63	5V OUT #02
20	FUEL #15	64	5V OUT #01
21	RS232 TX	65	KNOCK GROUND
22	FUEL #07	66	INPUT #20 (5V) / KNOCK #04 [3]
23	FUEL #05	67	SENSOR GROUND #02
24	IGNITION #04	68	INPUT #19 (5V) / KNOCK #03 [3]
25	IGNITION #03	69	SENSOR GROUND #01
26	IGNITION #02	70	THERMO + #01
27	IGNITION #01	71	INPUT #18 (5V)
28	POWER GROUND	72	SENSOR GROUND #02
29	POWER GROUND	73	INPUT #17 (5V)
30	FUEL #14	74	SENSOR GROUND #01
31	FUEL #13	75	LAMBDA I #02 / CAN HI #03 [2]
32	FUEL #12 / IGNITION #12 [7]	76	LAMBDA I #01
33	FUEL #11 / IGNITION #11 [7]	77	LAMBDA GROUND
34	FUEL #09 / IGNITION #09 [7]	78	COMMS GROUND
35	KNOCK #01 [3]	79	CAN LO #02 [6]
36	INPUT #15 (5V/TH/BI/FREQ)	80	CAN HI #02 [6]
37	INPUT #13 (5V/TH/BI/FREQ)	81	CAN LO #01
38	INPUT #11 (5V/TH/BI/FREQ)	82	CAN HI #01
39	INPUT #09 (5V/TH/BI/FREQ)	83	INPUT #24 (TH)
40	THERMO - #01	84	INPUT #23 (TH)
41	INPUT #08 (5V/TH/BI/FREQ)	85	LAN RX +
42	INPUT #06 (5V/TH/BI/FREQ)	86	LAN RX -
43	INPUT #04 (5V/TH/BI/FREQ)	87	LAN TX +
44	INPUT #02 (5V/TH/BI/FREQ)	88	LAN TX -

FOOTNOTES:

[1] INPUT #01 TH utilises a 47K pull-up, all other TH inputs utilise a 3K pull-up
[2] Build-time choice of Lambda #02 or CAN #03
[3] "Adaptive Knock Control" upgrade required for use otherwise DO NOT CONNECT
[4] Variable voltage supply pin - maximum current capability of 15mA
[5] "Direct Motor Control" upgrade required for use as "Full-Bridge" otherwise "Half-Bridge" or "Low-side" only
[6] Master/Slave link only, not for general use
[7] "12 Ignition Outputs" upgrade required for a build-time choice of IGNITION9-12 instead of FUEL9-12

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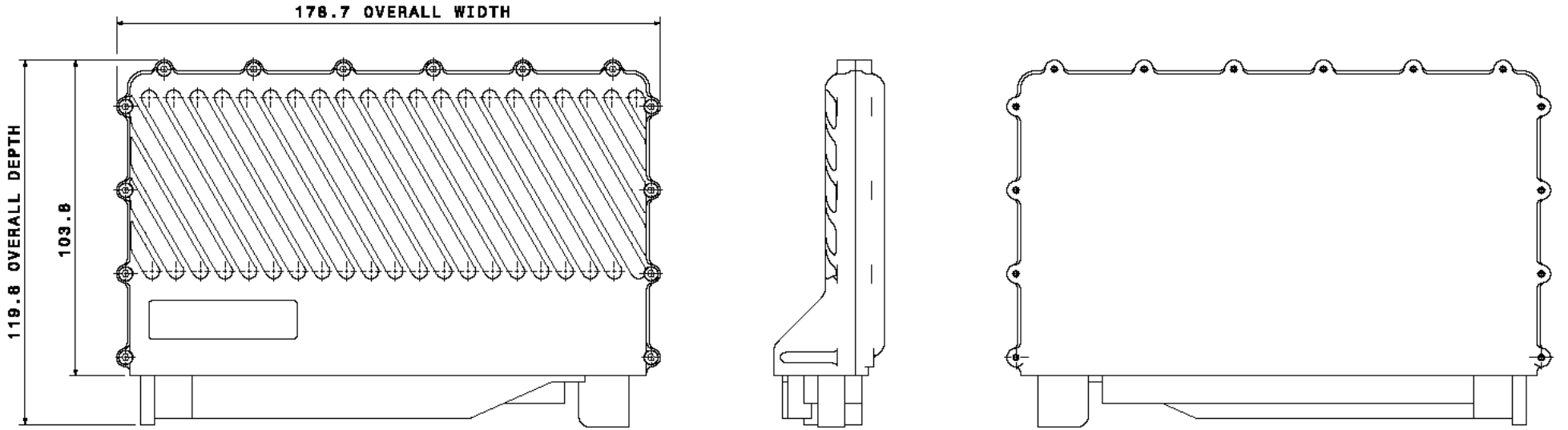
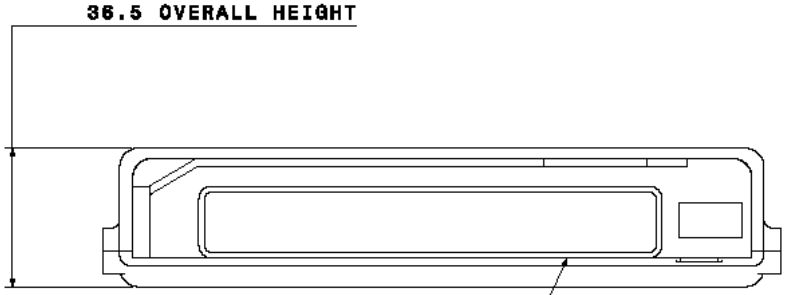
LFR-275-01A

THIRD ANGLE PROJECTION





88 PIN AUTOMATIVE CONNECTOR

GENERAL TOLERANCES:	
LINEAR AND RADIAL	0.00 ±0.05 0.0 ±0.2 0 ±0.5
ANGULAR	±1°

NOTES: UNLESS OTHERWISE STATED

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm)
2. THREADS: ISO COARSE TO CLASS 6H/6g U.O.S
3. GENERAL FINISH $\sqrt{}$ REMOVE BURRS & LIGHTLY BREAK SHARP EDGES
4. DO NOT SCALE

Issue	Ref.	Details	Drn.	App'd.	Date
01A	-	RELEASED FOR MANUFACTURE	TGB	TGB	14062013
00A	-	RELEASED FOR INFORMATION & LAYOUT ONLY	TGB		14062013

Title	F88 ECU - Installation Assembly	Date	Drawn by	
Dwg. No.	LFR-275-01A			
Matl.	N/A			
Heat Treat.	N/A			
Surface Finish	N/A			
Scale 1:1	Size A2	Sheet 1 of 1	Qty per Assy 1	

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