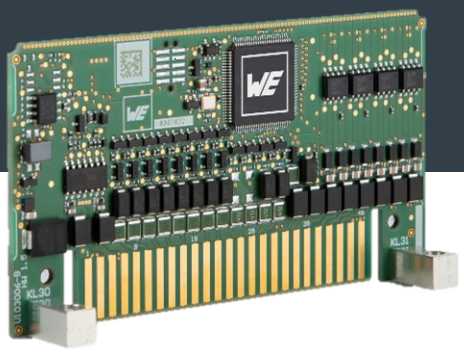
CDM-A16

Control & Diagnostic Module



The CDM-A16 is a pluggable controller for power distribution units of vehicles and extends them with control and diagnostic functions. The module provides up to 16 channels for fuse status monitoring and relay activation. The peak-and-hold function allows to reduce heat generation within the system. Via two CAN ports, the controller can communicate with multiple buses and enables advanced filter/gateway functions.

Functions

- Fuse status monitoring and relay control with peak-and-hold function
- CAN communication with multiple buses, enabling gateway functionality (J1939, RAW CAN bus protocols)
- Logic processing of vehicle functions, programmed with WEcontrol Designer, an IEC61131-3 programming environment (FBD, ST, SFC, etc.)
- Sensor management (current, temperature, etc.) with 5 V supply and sensor acquisition via 8 analog inputs
- Direct load control through 4 digital outputs (2 A / PWM)

Order information	
ICS-104558	CDM-A16 (1) 8x5V_5Vref
ICS-104559	CDM-A16 (2) 4x5V_4x32V_5Vref
ICS-104560	CDM-A16 (3) 8x32V_no5Vref
ICS-104561	CDM-A16 (4) 8x10V_no5Vref
ICS-104562	CDM-A16 (5) 2x5V_6x32V_5Vref
ICS-104563	CDM-A16 (6) 4x10V_4x32V_no5Vref
ICS-103006	CDM-A16 (7) 2x5V_2x10V_2x16V_2x32V_5Vref

Inputs / Outputs overview		
1	Vref 5 V	max 400 mA / switchable
8	Analogue inputs	0 – 5 V or 0 – 16 V or 0 – 30 V (depending on variant)
2	CAN interface	CAN 2.0 high speed
16	Digital outputs	Low side 300 mA (PWM) With diagnosis
4	Digital outputs	High side 2 A (PWM) with current sense (w / o PWM)

Technical data

General information	
Housing	Standard CDM-A16
Connectors	EDAC slide in 50 pins 2 x Powerelements
Dimensions	97.7 x 25.3 x 52 mm (incl. mounting material)
Weight	TBC
Operating temperature	-30 °C to 85 °C
Storage temperature	-40 °C to 85 °C
Ingress protection	IP 20
Operating voltage	9 to 32V
Pre-fusing (recommended)	10 A main supply
Current consumption	active (no output) < 70 mA sleep mode < 2 mA
Processor type	NXP S 32K Cortex M4 32 bit
Clock frequency	80 MHz
Flash memory	2 MB
RAM	256 kB
FRAM	2 kB

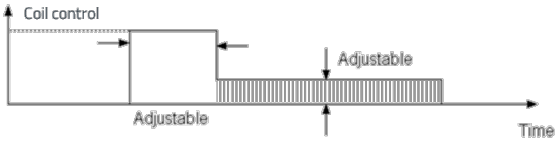
Analogue input configuration depending on module variant (see order information)	
Analogue inputs	**5 V**
Input range	0 – 5.5 V
Resolution	12 bit
Input impedance	200 KΩ (within range)
Analogue inputs	**10 V**
Input range	0 – 11.8 V
Resolution	12 bit
Input impedance	230 KΩ (within range)
Analogue inputs	**16 V**
Input range	0 – 17.5 V
Resolution	12 bit
Input impedance	200 KΩ (within range)
Analogue inputs	**32 V**
Input range	0 – 35.7 V
Resolution	12 bit
Input impedance	170 KΩ (within range)
Analogue inputs	**Vsupply**
Input range	0 – 32V
Analogue inputs	**On-board temperature**
Input range	-40 °C to 150 °C (operating limit -30 °C)
Analogue inputs	**5 V sensor supply output**
Input range	5.9 V
Current limitation	660 mA

Digital inputs / outputs	
Digital input	16 x high active digital input
Max. acceptable voltage	32 V
Threshold levels	Lo → Hi: ≥ 6.5 V Hi → Lo: ≤ 2.5 V
Impedance	(on- & off- state) Operating: ≥ 38 kΩ Standby at Ub: open circuit by MOSFET
Low side output	16 x
Diagnosis	Open load detection Overload detection 2 channels share one diagnosis signal
Max. current	single channel: 700 mA dual channel: 400 mA each depending on loads of system
Frequency	15 kHz recommended up to 30 kHz

Digital inputs / outputs	
High side outputs	4 x 2 A
Current	2 A digital / 1 A PWM
Current sense max	5 A
Diagnosis	Overload detection A fault state sets max current to current measurement
Frequency	2 A at 500 Hz / 1 A at 1 KHz
Digital input KL15	1 x high active digital input
Max acceptable voltage	32 V
Threshold levels wake-up from standby	Lo->Hi: ≥ 5.5 V Hi->Lo: ≤ 3.5 V
Threshold levels input state by MCU	Lo → Hi: ≥ 7.0 V Hi → Lo: ≤ 3.0 V
Impedance	≥ 40 kΩ

Intend of use and disclaimer	
Temperature sensors	The temperature sensors are only an indication and are here to give a rough idea about the status of the product, no specific behavior has been designed in, in regards to those sensors value. The final application is free to define some behaviors based on those temperature sensors (NTC resistor type) Sensor is placed next to low side component of pin 36 and 38. Refer to documentation PDF for further information.
Inductive loads	When supplying inductive loads the nominal current should be reduced from half to assure a correct protection, free wheel diodes should be implemented as close as possible to the load and the cable length should be as short as possible (below 5 m if possible), no internal free wheel diode are present on product. Typical micro and mini relays.
PWM outputs	**High side outputs** 4 independent frequencies and duty cycles for each of the 4 outputs. Current feedback in PWM mode is, at most, usable for an open load detection and not for current sensing.
	Low side outputs 1 frequency for outputs 0 – 7. 1 frequency for outputs 8 – 15
	If different frequencies are set, the first activated output sets the frequency for the whole output group, until they are all powered off again. Modification of frequency for one group can only be made when none, or only one output is activated. Duty cycle can be freely adjusted per output at any time.
	For EMC reason it is not recommended to use PWM signals outside of the system (e.g. outside of the REDline Power Box Twin or PCB)

Software possibilities (example)	
High side	On the high side, the current feedback information can be used to detect short circuit or overload. Actions may then be programmed in the main application.
Wake up	4 digital inputs (2 high active, 2 low active) are always wired to activate the device. All inputs need to be in 'OFF' state to allow the device to go to sleep. Sleep mode needs to be programmed / requested in the application.
CAN speed	The allowed CAN speed is 100 / 125 / 250 / 500/ 1000 kBits/s (500 kb/s default)
UDS / CAN 0 port	CAN 0 port is used for WEcontrol Designer debugging interface and for UDS programming. Following IDs are by default reserved for our purpose: 0 x 100 / 0 x 7E0 / 0 x 7DF / 0 x 7E8

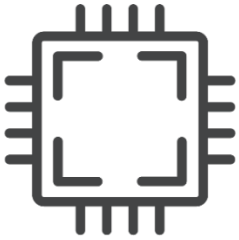
Peak and hold drive	
	
Recommended: 500 ms pick-up time	

Hardware map

25	AI_00	Analog input 12bit Variant depending 0-5V / 0-10V / 0-16V / 00-30V	8x
27	AI_01		
29	AI_02		
31	AI_03		
26	AI_04		
28	AI_05		
30	AI_06		
32	AI_07		

33	DI_KL15_IGN	Wake up	1x
9	DI_00	Digital input 0-Vsupply On : 6,5V Off : 2,5V	16x
11	DI_01		
13	DI_02		
15	DI_03		
17	DI_04		
19	DI_05		
21	DI_06		
23	DI_07		
10	DI_08		
12	DI_09		
14	DI_10		
16	DI_11		
18	DI_12		
20	DI_13		
22	DI_14		
24	DI_15		

8	CAN High 0	CAN bus 0	2x
6	CAN Low 0		
1	CAN High 1	CAN bus 1	
3	CAN Low 1		



NXP S32K148

FLASH	2MB
RAM	256kB
FRAM	2kB

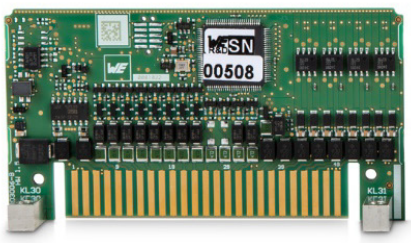
Power Supply 9-32V		AI_VLOAD (32V)	J1
		GND	J2

1x	Temperature sensor	-30°C to 105°C	

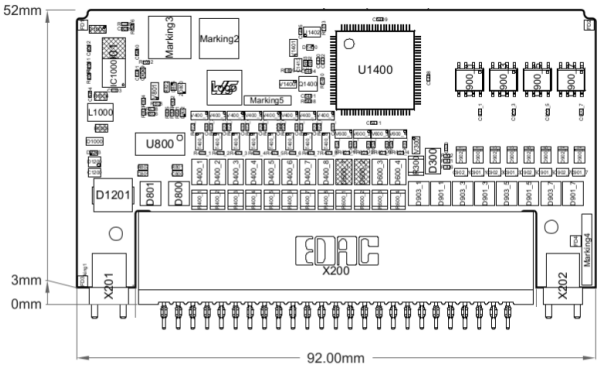
16x	Digital output Lowside 500mA Bank1 PWM up to 15KHz	DO_LSD_00	37
		DO_LSD_01	35
		DO_LSD_02	36
		DO_LSD_03	38
		DO_LSD_04	41
		DO_LSD_05	39
		DO_LSD_06	40
		DO_LSD_07	42
	Digital output Lowside 500mA Bank2 PWM up to 15KHz	DO_LSD_08	45
		DO_LSD_09	43
		DO_LSD_10	44
		DO_LSD_11	46
		DO_LSD_12	49
		DO_LSD_13	47
		DO_LSD_14	48
		DO_LSD_15	50

4x	Digital output Highside 2Amp PWM up to 500Hz With current sense	DO_HS_00	7
		DO_HS_01	5
		DO_HS_02	2
		DO_HS_03	4

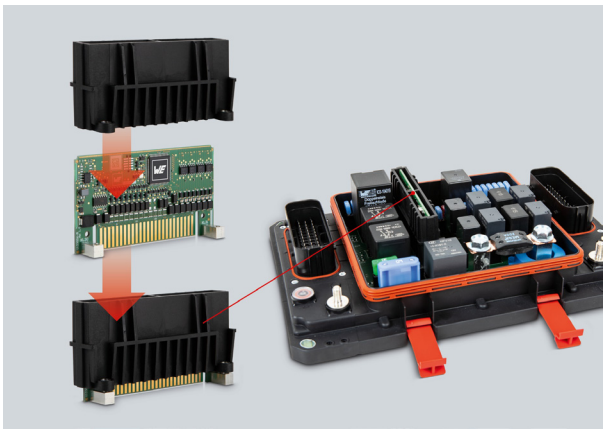
1x	5V Vref 400mA	Vref_5V	34
		AI_5Vref	
		DO_5V_ref_activation	



Dimensions



Mounting



Programming

CDM-A16 is supported by the WEcontrol Designer programming environment and by the complementary WE Flasher Tool. The set of powerful text and graphic editors for IEC-61131-3 languages supports the following programming types:

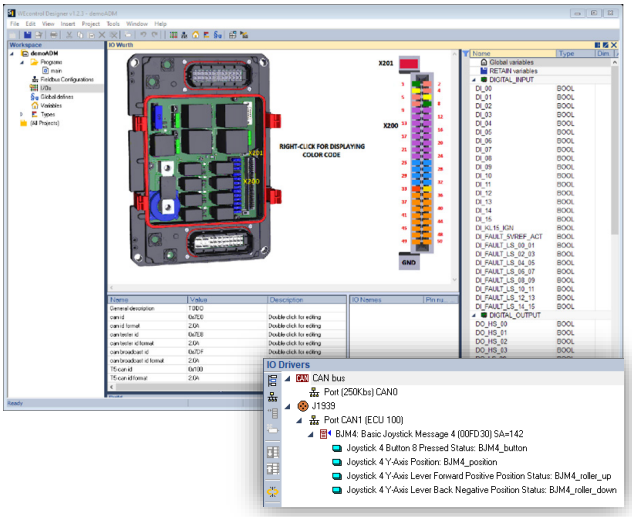
Supported programming type are:

- Sequential Flow Chart (SFC)
- Function Block Diagram (FBD)
- Ladder Diagram (LD)
- Structured Text (ST)

The WEcontrol Designer additionally offers a wide range of functions such as:

- Safe and optimised application creation
- Simulation and online data access / modification over CAN bus
- Automated language conversion
- Graphical I/O mapping and configuration
- User Defined Function Blocks (UDFB) for specific / repetitive functions
- Automated HTML documentation of project
- Easy creation of graphical debug interface (based on application)
- CAN communication database import from Vector and Peak systems

We will also be happy to create your application, based on your requirements.



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