Specification

Mini Smart Driver Module MSDM-24/10

General Information

Items	
Product type	BLDC Motor Driver
Product name	Micronel MSDM-24/10
Part no.	H353X-024ZX-0
Modification	Standard Product

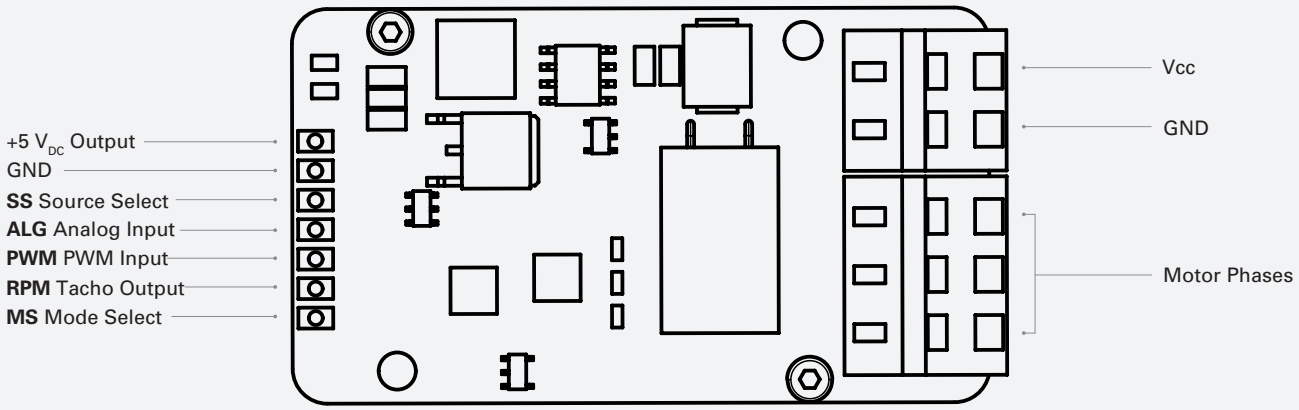
Description

The Mini Smart Driver Module MSDM-24/10 is a 1-quadrant motor driver that can be used for most Micronel driverless blowers using BLDC motors, for sensorless operation up to 240 Watts. The turnkey driver supports several input and output pins and LEDs allowing the user to configure and monitor.

Features

- 12 to 24 V_{DC} supply voltage with 10 A_{RMS} output capacity
- Block commutation with 50 kHz PWM switching frequency
- Motor speed up to 100 000 RPM
- Sensorless operation
- Analog or PWM speed setting
- Speed control loop
- Digital tacho output
- Over current limitation
- Over temperature protection: Shut down at internal temp. of 90 °C
- Locked rotor protection (with automatic restart after 15 seconds)
- Under and over voltage detection
- Catch-up function (stop start behavior without motor standstill)
- Status indications with green and red LEDs

Pins and Connectors



Absolute Maximum Ratings

Parameters	Values
Supply voltage	10.8 - 26.4 V_{DC}
Analog input voltage	0 - 5.2 V_{DC}
Digital input voltage	0 - 5.2 V_{DC}
Tacho output	0 - 5.2 V_{DC}

Stresses at or beyond listed conditions may cause permanent damage to the device!

Handle in power-off conditions only!

Technical Data

Parameters	Operation Conditions / Features
Supply voltage	Nominal 12 to 24 V_{DC}
Output current	10 A_{RMS} (continuous, consider driver temperature range) 16 A_{RMS} (for max. 10 seconds)
Motor driving information	Driver for BLDC motors Maximal 100 000 RPM (with 1-pole pair motor) Speed tolerance ≤ 1.5% Sensorless One quadrant drive (no reverse current) PWM switching frequency: 50 kHz Block commutation
Temperature range	-20 to 70 °C Customer is responsible for additional heat dissipation if needed
Power terminals	For power supply and motor phases For braid or core cables: 0.25 – 1.5 mm^2
Control pins	Soldering vias: Grid: 2.54 mm, hole diameter 1.2 mm (+/-0.1mm) Optional soldering jumper pads to GND for SS (Source Select) and MS (Mode Select) pins on bottom side

Control Pins

Parameters	Operation Conditions / Features
+5 V_{DC} output pin	5 V_{DC} voltage output to power a customers circuit e.g. a potentiometer for set speed. Regulated supply output: 5 V_{DC} +/- 3 % Max. drive current: 50 mA
GND Pin	Directly connected to internal ground
SS Source select input pin	Select between 'PWM input' or 'Analog input' for set speed. Digital input: Low level: 0.0 – 0.6 V: PWM input signal is used High level: 2.7 – 5.0 V: Analog input signal is used Internal pullup resistor of 100 kΩ to internal +5 V_{DC} Input state is checked during power on only
ALG Analog input pin	Analog Input: 0.0 – 5.0 V_{DC} Internal pullup resistor of 100 kΩ to internal +5 V_{DC} If 'throttle mode' (mode select input pin = 'high') 0.0 – 0.5 V_{DC} = stop 0.5 – 4.5 V_{DC} = 0 … 100 % output power 4.5 – 5.0 V_{DC} = max. output power (100 %) If 'speed control' (mode select input pin = 'low') 0.0 – 0.5 V_{DC} = stop 0.5 – 4.5 V_{DC} = 5000[1] – 60000 RPM 4.5 – 5.0 V_{DC} = 60000 RPM
PWM PWM input pin	Digital Input: Low level: 0.0 – 0.6 V_{DC}: 'PWM low' High level: 2.7 – 5.0 V_{DC}: 'PWM high' Frequency range: 1.0 – 10 kHz Internal pullup resistor of 100 kΩ to internal +5 V_{DC} If 'throttle mode' (mode select input pin = 'high') 0 – 5 % = stop 5 – 95 % = 0…100 % output power 95 – 100 % = max. output power (100 %) If 'speed control' (mode select input pin = 'low') 0 – 5 % = stop 5 – 95 % = 5000[1] – 60000 RPM 95 – 100 % = 60000 RPM
RPM Tacho output pin	Digital output: Open collector Low level: 0.0 – 0.6 V_{DC} High level: 2.8 – 5.0 V_{DC} Max. sink current: 2 mA Internal pullup resistor of 10 kΩ to internal +5 V_{DC} Output frequency = RPM / 20 (for 1-pole pair motors)
MS Mode select input pin	Select 'speed control loop' or 'throttle mode' [2]. Digital input: Low level: 0.0 – 0.6 V_{DC}: Speed control is used High level: 2.7 – 5.0 V_{DC}: Throttle mode is used Internal pullup resistor of 100 kΩ to internal +5 V_{DC} Input state is checked during power on only

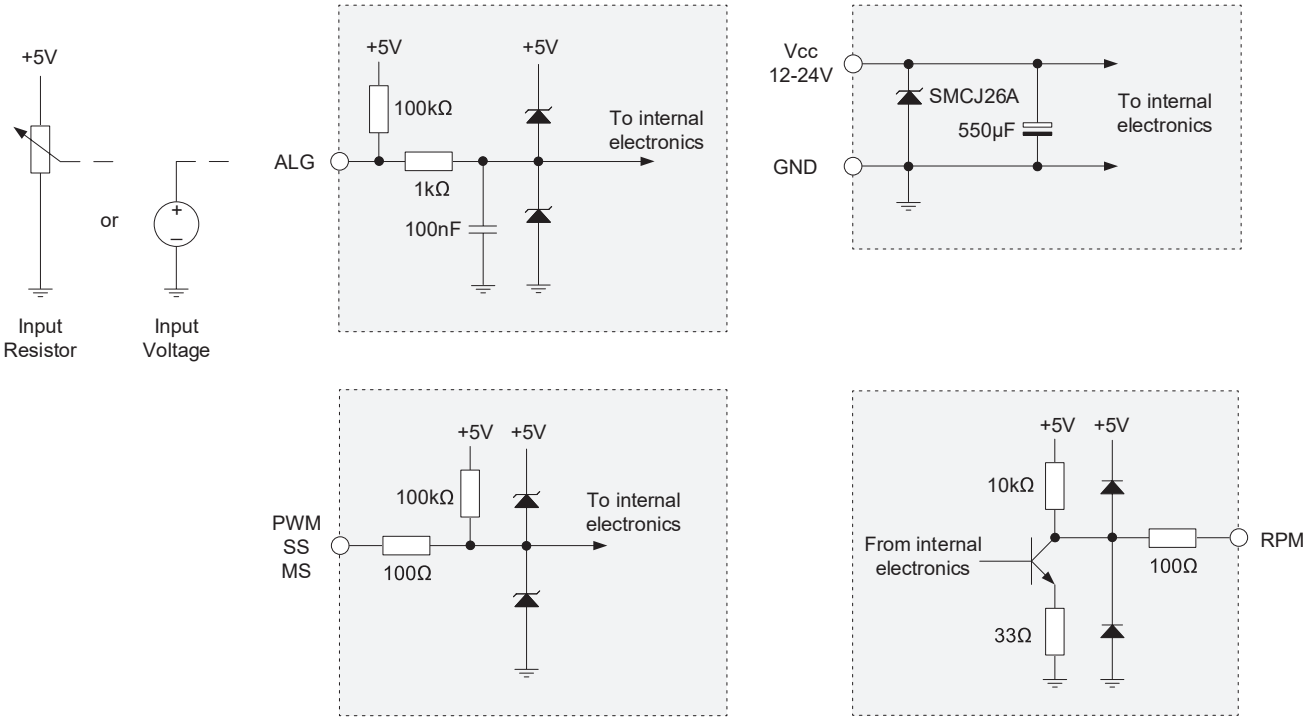
[1] Starting respectively minimum speed depends on blower type.

[2] For better understandig of these two settings: 'speed control loop' corresponds to 'cruise control' in a car (constant speed), and 'throttle mode' corresponds to the 'throttle pedal' in a car (speed can vary at a constant pedal position).

LED Indications

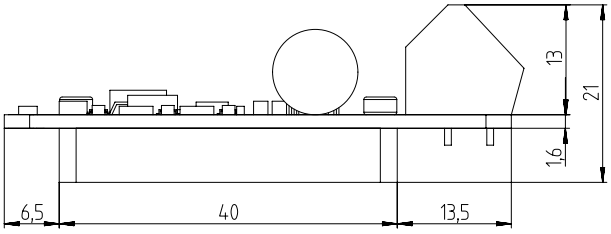
LED Color	Indication
Green LED	'Constant on' if stopping or stopped 'Blinking' if running
Red LED	'Constant on' if analog input is selected 'Constant off' if PWM input is selected 'Slow blinking' (1 Hz) if supply voltage is out of range 'Fast blinking' (4 Hz) if locked motor or motor stalled 'Double pulse blinking' if over temperature

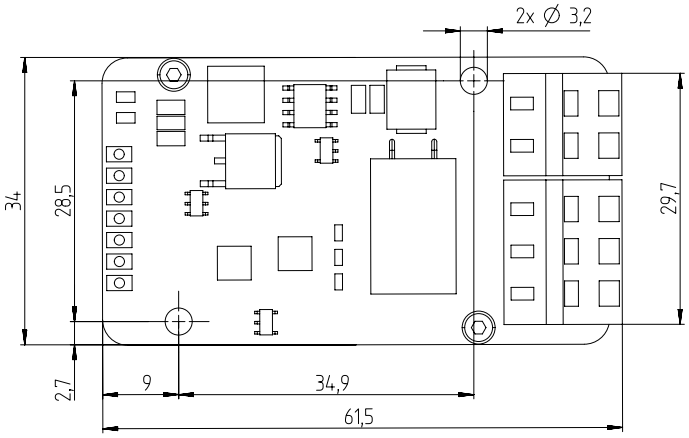
Internal Circuits

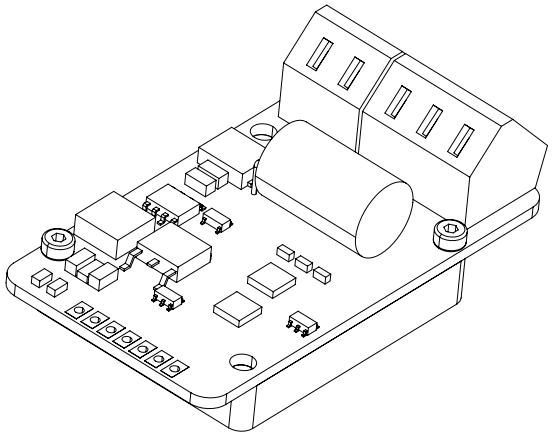


Drawings

Dimensions in mm







Disclaimer

- While we may provide application assistance personally, through literature and website, it is the sole responsibility of the customer/user to determine the suitability of the product for the application, regulations and legal requirements.
- Do not use the MSDM in any application where failure of the product could result in personal injury.
- Customers should ensure that any necessary fail-safe or back-up systems are utilised alongside the driver as necessary.

Tested Blowers

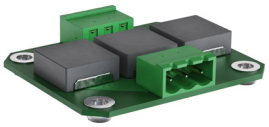
- The listing of blowers only indicates that Micronel has tested operation with the MSDM driver and does not imply suitability.
- Startup of below listed Micronel products was tested and shown to be successful with high likelihood but 100% startup cannot be guaranteed.
- In the rare event that a Micronel Blower does not start immediately, the MSDM will abort the start attempt and make further attempts until the blower starts. Up to 15 seconds may elapse between these start attempts.

Micronel Radial Blowers

U51DX-012KK-5	U65ML-012KS-5	U65H4-024KX-6	U85HL-024KH-5
U51DX-024KK-5	U65ML-024KS-5	U71HL-024KM-5	U85MX-024KE-5
U51D2-024KX-6	U65ML-024KT-5	U71HN-024KX-6	U85MX-024KX-5
U65HN-024KS-6	U65MN-024KS-5	U71HX-024KX-6	U85MN-024KX-5

Accessories

Not included!



Micronel Choke Module MCM-33/10
S0500-00001

In order to run a low inductance motor with the MDB-48/10 it is advisory to use the Choke Module to reduce ripple currents. The module comes with mating connectors.

Properties
- 3 coils with 33 µH inductance for each phase, Currents: 10.7 A_{RMS} / 15 A_{Sat}
- Reduction of ripple currents
- Raises system efficiency
- Reduces unwanted power dissipation and heat generation in the internals of the motor
- Improves EMC
- Extends lifetime of the fan
- Two Amphenol Anytek 20020110-H031A01LF PCBA terminal blocks
- Two Amphenol Anytek 20020006-H031B01LF mating connectors included

Parameters

Size	60 x 50 x 13 mm	
Recommended for the blowers	Micronel Radial Blower	U65HN-024KS-6, U71HN-024KX-6

Notice

Handle in power-off conditions only!

Please see separate accessories list or contact Micronel Sales for a full list of options and accessories.

All data are subject to change without advanced notice.
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