



Low Voltage 8-Channel PWM Dimmer Module, DIM84DIN

- 9 – 32V DC low voltage operation
- 8 independent channels, Universal 0-10V control
- Up to 5A load per channel – 960W at 24V in total
- No minimum load requirement
- Lamp saving soft-start function
- Works with LEDs, incandescent or halogen lamps
- Flickerless dimming of LEDs (240Hz operation)
- Drives the lamp on the high (positive) side
- 16-bit resolution high-accuracy PWM, 256 dimming steps.
- Fully protected and ruggedized

The DIM84DIN is a self-contained high-side 8-channel dimmer module designed to control the brightness of low-voltage incandescent (filament), halogen or LED lamps rated up to 5A. Operating from 9 to 32V DC, and offering a positive output, the modules can be used in a wide variety of applications where DC low-voltage brightness control is desired, such as 12V or 24V automotive or marine lighting, low voltage architectural lighting, electronic signage, smart-building LED lighting, hazardous area lighting, etc.

The unit is controlled by a standard 0-10V analogue voltage and features eight independent channels of lighting control. It employs a very efficient PWM (pulse-width modulation) switching technique to provide excellent operation for high power loads, and is fully protected from intermittent output short-circuits, over-temperature, reverse polarity, and input over/under voltage. Unlike other dimmers on the market, the module will control lamp brightness from 0% (fully off) to 100% (fully on). The unit is presented in a vented 4-unit wide DIN-mount enclosure suitable for mounting to standard DIN-rail.

The module also features our unique cube-law dimming curve which allows finer control of low brightness levels and compensates for the



non-linear response of the human eye. The result is an extremely smooth transition between dimming levels with no steps in the dimming response, and the brightness ramp-up and ramp-down is perceived by the eye to be completely linear. In addition, the module utilises a soft-start feature at power-on, where the lamp brightness increases gradually to the preset brightness setting. This preserves the life of incandescent lamps as the filament is not ‘slammed’ on. The soft-start takes less than half a second.

The DIM84DIN features a ‘Full Brightness’ input designed for emergency lighting applications. When this input is connected to a positive voltage, all eight channels are immediately brought up to full brightness. Please see the applications information section on the following pages for details.

Please note that the PWM dimming technique may not be suitable for some encapsulated LED lamps containing internal driver circuitry, such as low-energy replacements for dichroic lamps. Also, the modules are not suitable for connection to standard household lighting transformers as these supply AC and not DC voltage.

Parameter	DIM84DIN	Comment
Nominal Supply Voltage Range	9 – 32 V DC	
Peak Supply Voltage Range	5.5 – 40V DC	Operation not guaranteed
Quiescent Current, max	80mA	at maximum operating voltage
Maximum Output Current	5A per channel	at <30°C ambient temperature
Maximum Load Power	60W at 12V supply, 120W at 24V supply, per channel	at <30°C ambient temperature
Peak Output Current	30A per channel	<3sec at nominal operating voltage
Control Input Type	0-10V Analogue Voltage	Independent control for all channels
Control Input Impedance	10 kΩ for each 0-10V input, 1.25 kΩ for ‘Full Brightness’ input	Impedance of all control inputs
Efficiency	> 97 %	
Operating Temperature Range	–40 – 70°C (–40 – 160°F)	
PWM Switching Frequency	240 Hz ±3%; 0% – 100% Duty Cycle	
Dimensions	90 × 71 × 58mm – 4-unit wide DIN-mount	L × W × H ±3% excl. fixing tab
Electrical Connection	24× Rising Clamp Terminal Block	
Mechanical Fixing	2× DIN-Mount Clips	

Mounting and Connection Guidelines

The power supply to the unit typically comes from a suitably rated low-voltage DC supply in the range 9 – 32V which must be fused at the total load current or less to protect the module. If using a switched-mode power supply with the module, we recommend the supply be rated at 1.5 times the expected maximum total load current.

The dimmer is packaged in a vented DIN-mount enclosure and will run warm in operation when controlling loads above 3A per channel. It is important therefore to mount the DIM84DIN in a suitably

ventilated enclosure, ensuring the module’s vent holes are unobstructed during use. The unit should be mounted in a cool location, away from external sources of heat. The unit is not water resistant and should be mounted away from sources of moisture.

Connection terminals are high quality rising-clamp terminal blocks capable of receiving up to 4mm² cable. The connectors are spaced 5mm pitch along opposite sides of the enclosure. To maximise the potential of the DIM84DIN, cable rated at currents exceeding the lamp load by 1.5 times should be used to connect the modules, and the use of a bootlace ferrule at the unit’s terminals is recommended.

Terminals and Connections

The DIM84DIN features terminal block connectors on opposite sides of the enclosure. Some terminals have duplicate names. Connections sharing duplicate names are internally connected together within the module – all four '+Supply' terminals are internally connected together, both 'GND' terminals are internally connected together, and both 'Full Brightness' terminals are internally connected together. This method serves two purposes; it allows easy daisy-chaining of multiple modules sharing the same DIN rail, and, as in the case of the +Supply connection, allows the effective current rating of the terminal to be increased.

Throughout this datasheet connections sharing duplicate names are sometimes mentioned in the singular for clarity – they are effectively one connection despite the presence of more than one terminal.

Power Connections

All eight channels of the DIM84DIN are fully independent except for the power supply and 'Full Brightness' connections – each channel has its own 0-10V analogue control input. However, the +Supply terminals are shared among the channels and precautions must be taken to ensure the power supply and the DIM84DIN's terminals are not overloaded.

The DIM84DIN is capable of controlling loads of up to 5A per channel. It is an 8-channel unit so the total current draw from the power supply when each channel is fully loaded is 40A. For this reason a total of four +Supply terminals are provided on the module, all are internally connected together. Each *terminal* is rated at 10A. So if using the module to its maximum capacity of 40A total, *all four* +Supply terminals need to be connected to the power supply positive with separate lengths of cable.

We recommend always connecting all four +Supply terminals to the power supply positive, no matter what the total load on the module is. This will minimise cable losses and connection resistance and will

Applications Information

Each channel of the DIM84DIN is controlled by a universal 0-10V analogue voltage input. The control inputs are current-sink types with a maximum draw of 1mA. The inputs are designed to accept analogue 0-10V control signals from a PLC, lighting controller, Crestron™/Lutron™ controller, or similar. As the input signal is varied between 0 and 10V the connected lamp changes in brightness. An input of less than 0.2V turns the lamp fully off, and more than 9.8V turns the lamp fully on. For best performance the control input must be connected to a low impedance source of less than 100Ω. PLCs, Crestron™ controllers and other lighting controllers fulfil this requirement. An application note for our 0-10V single channel dimmer DIM14 shows how best to connect the control voltage input to minimise electrical noise and lighting flicker. The application note is available at www.abeltronics.co.uk/products/dim14. The control voltage and Full Brightness inputs should never exceed the module's supply voltage. The control voltage input and the DIM84DIN supply voltage are not electrically isolated from each other and share a common earth.

When the 'Full Brightness' input is connected to +Supply, all channels are simultaneously brought up to full brightness

improve the total efficiency of the system. Each +Supply terminal should have its own cable leading directly to the power supply or system fuse. These four cables are then in parallel, as are the +Supply terminals of the DIM84DIN, reducing cable and connection resistance without resorting to overly thick and cumbersome cable.

The cable leading to the +Supply terminals should be rated according to the formula below. The total load on the power supply is the sum of the loads connected to all the channels.

$$I_r = \frac{1.5 \times (L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 + L_8)}{n_s}$$

I_r is the cable current rating in amps,
 L_1 to L_8 are the loads on each of the channels 1 to 8,
 n_s is the number of +Supply terminals connected (4)

The GND (ground) terminals on the module are internally connected together and should be connected to the power supply negative. Negligible current flows through this terminal and only one GND terminal needs to be connected irrespective of the total load current.

Full Brightness Input

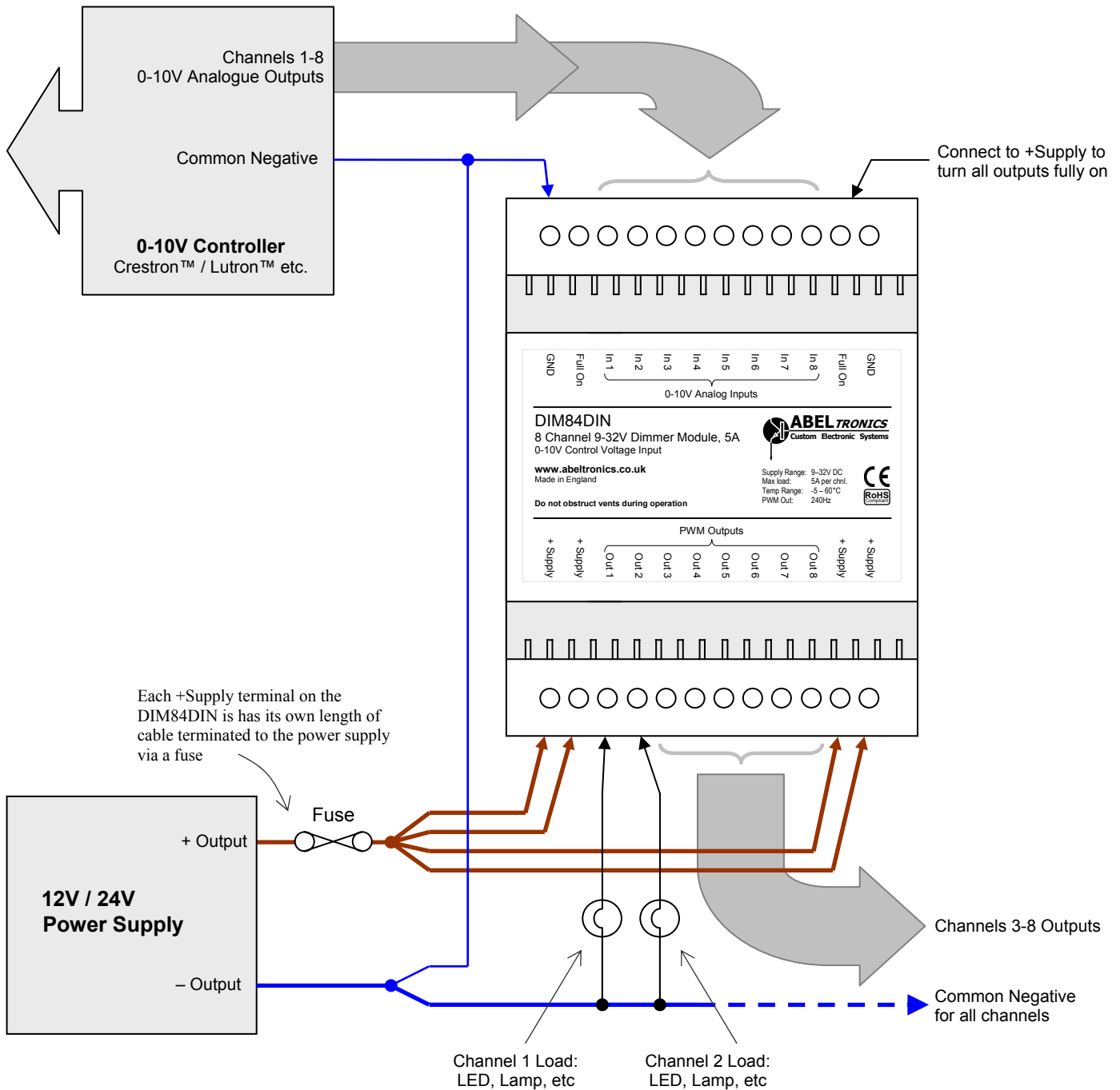
The DIM84DIN features a 'Full Brightness' input connection. When this input is connected to a positive voltage above 4V all eight channels are brought up to full brightness immediately, irrespective of the voltage present at any of the 'In' terminals. This is useful for emergency lighting applications where, in the event of a fire or other alarm trigger, all dimming needs to be overridden and all connected lamps need to be fully on. **Please note, this is not a substitute for a suitably approved, redundant, emergency lighting system.** These terminals should be left unconnected if this feature is not required.

immediately. Leave these terminals unconnected if this feature is not required, or connect to +Supply through a switch relay contact if the feature is desired.

The DIM84DIN connection diagram is shown on the following page. The power supply can be any power supply capable of providing enough current to drive the total load of all the channels of the DIM84DIN. If using a switched-mode power supply, we recommend overrating the power supply by 1.5 times the total load. For example, if the total load of all the channels is 200W, use a 300W power supply. Note the four cables leading from each +Supply terminal to fuse on the power supply positive output. This is necessary to ensure the DIM84DIN can control the load with maximum efficiency as mentioned above.

The DIM84DIN is suitable for direct connection to automotive or marine systems of 12V or 24V nominal. The configuration is similar to the diagram below, except the 12V/24V power supply is substituted for the vehicle's, or vessel's, battery.

The Fuse shown in the diagram in the positive output of the power supply should be rated at the total load of the DIM84DIN.



Further Information

For more information, links to other products and to download the most current datasheet, please visit www.abeltronics.co.uk/dimmers. If you have any questions or queries, or require one of our dimmers to be modified to fit your application, please contact us by visiting www.abeltronics.co.uk

Also Available

DIM10 – Power booster for DIMxx Modules
DIM15 – Radio Controlled remote dimmer
DIM12-2DIN – Dual Output DIM12, DIN-Mount
DIM13-2DIN – Dual Output DIM13, DIN-Mount

Please visit www.abeltronics.co.uk/dimmers for more information.