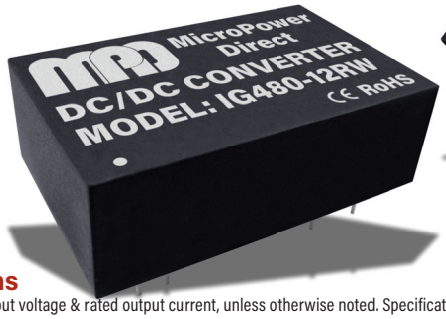
IG480RW Series

High Isolation 4.8W IGBT Driver DC/DC Converters



Key Features:

- Works With IGD962 Drivers
- 4.8W Output Power
- Independent Outputs
- 3,000 VDC Isolation
- Meets EN 55032
- Miniature DIP Case
- >1.0 MHour MTBF
- Short Circuit Protection
- Overvoltage Protection

The IG480 series is designed to operate with the IGD962 IGBT driver.

RoHS

CE

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	IG480-12W	9	12	18	VDC
	IG480-24W	18	24	36	
Input Start Voltage	IG480-12W			9.0	VDC
	IG480-24W			18.0	
Input Filter	Capacitor Filter				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	+15V Output (1)		±1.0	±2.0	%
	-9V Output (2)		±3.0	±5.0	
Line Regulation	For VIN Change of Min to Max		±0.2	±0.5	%
Load Regulation	For IOUT Change of 5% to 100%		±0.5	±1.0	%
Ripple & Noise (20 MHz), See Note 2			100	200	mV P-P
Transient Recovery Time, See Note 3	25% Load Change		0.5	2.0	µS
Transient Response Deviation			±2.5	±5.0	%
Temperature Coefficient				±0.03	%/°C
Output Overvoltage Protection		110	120	140	%VOUT
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	3,000			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz/0.1V		100		pF
Switching Frequency			300		kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 4	EN 55032		Class A
Conducted Emissions, See Note 4	EN 55032		Class A
ESD	EN 61000-4-2	B	±4 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 5	EN 61000-4-4	B	±2 kV
Surge, See Note 5	EN 61000-4-5	B	±2 kV
CS	EN 61000-4-6	A	3 Vrms
Voltage Dips	EN 61000-4-29	B	0% - 70%

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagram (Page 5)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	0.496 Oz (14.0g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.0			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1 Sec)	IG480-12RW			25	VDC
	IG480-24RW			50	
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

MicroPower Direct
292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com

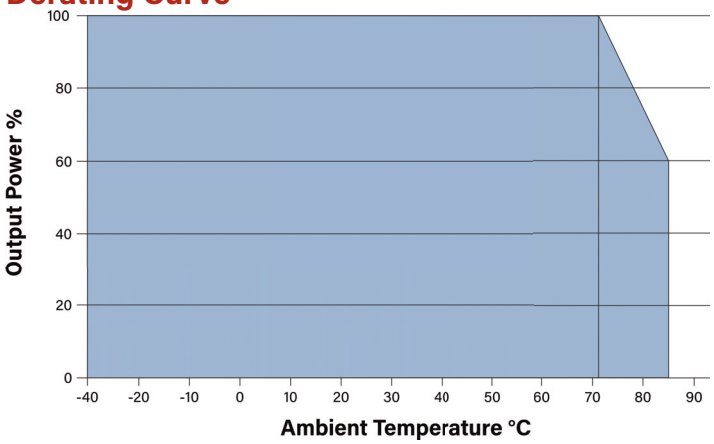
Model Selection Guide

Model Number	Input (Supply)					Output 1			Output 2			Output Capacitive Load (µF Max)	Efficiency (%)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)			Current (mA)		Volt. (VDC)	Current (mA)		Volt. (VDC)	Current (mA)				
	Nom.	Range	Max.	No-Load	Max-Load	Nominal	Max.	Min.	Nominal	Max.	Min.			
IG480-12RW	12	9.0 - 18.0	20.0	16.0	471.0	15.0	200.0	10.0	-9.0	-200.0	-10.0	1,000	85	1,000
IG480-24RW	24	18.0 - 36.0	40.0	8.0	235.0	15.0	200.0	10.0	-9.0	-200.0	-10.0	1,000	85	750

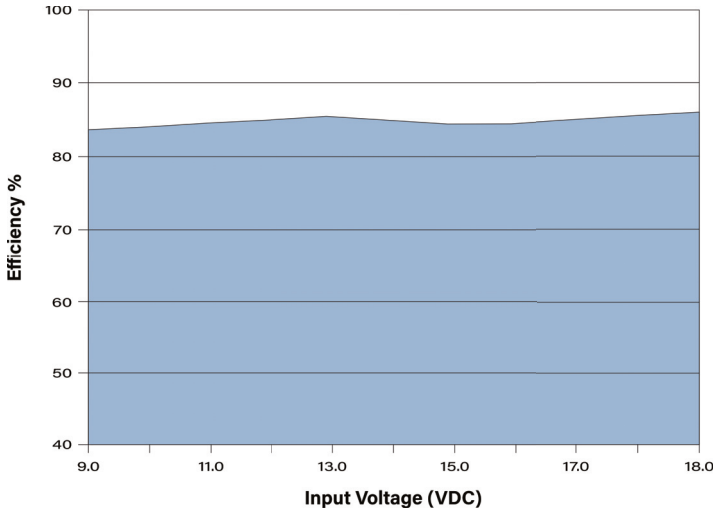
Notes:

1. The input voltage should not exceed the max value given in the table above. Damage to the unit could occur.
2. When measuring output ripple, it is recommended that an external 0.1 µF ceramic capacitor be placed in parallel with a 10 µF electrolytic capacitor from each output to common.
3. Transient recovery is measured to within a 1% error band for a 75-100% load change.
4. To meet the requirements of EN 55032, external filtering components are required on the input. See pages three and four for more information.
5. To meet the requirements of EN 61000-4-4 and EN 61000-4-5, external components are required on the input. See pages three & four for more information.
6. Operation at no-load will not damage these units. However, they may not meet all specifications. It is not recommended that the units be operated with a load under 5%.
7. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

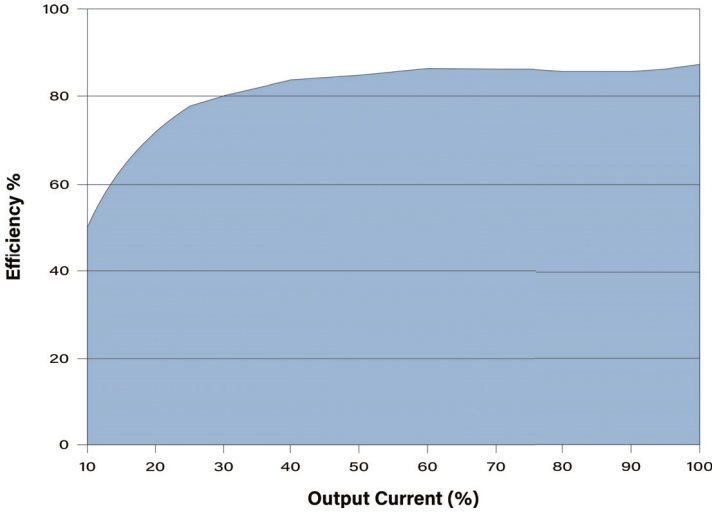
Derating Curve



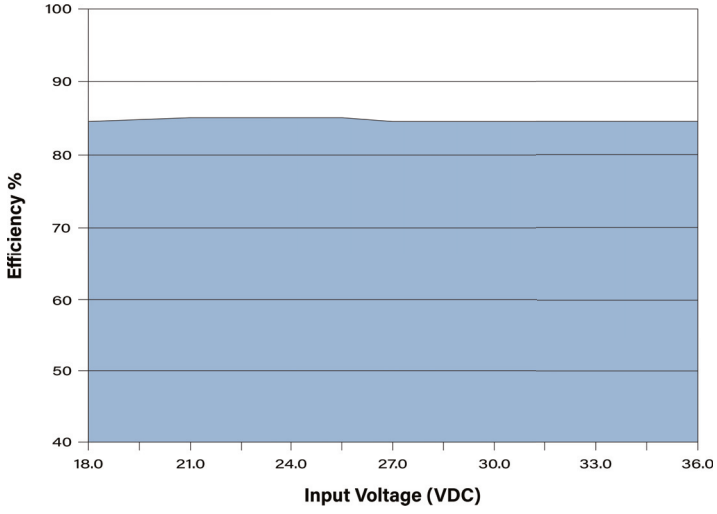
Efficiency vs Input Voltage 12 VDC Input



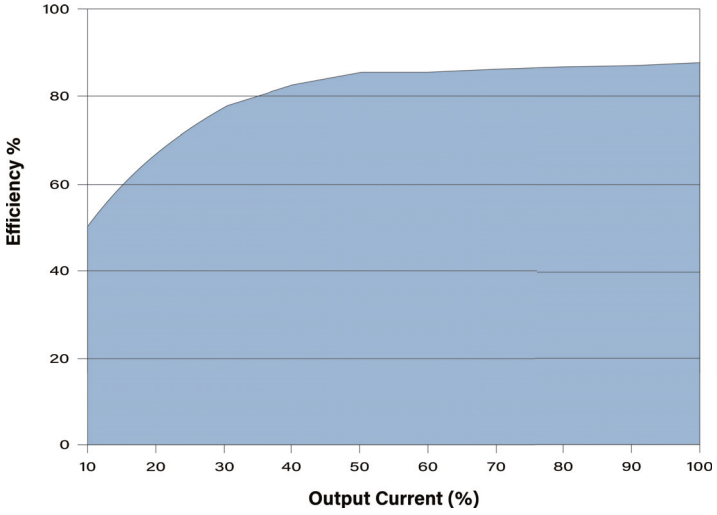
Efficiency vs Output Load 12 VDC Input



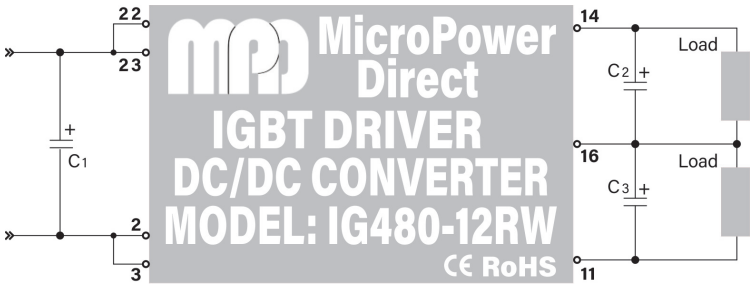
Efficiency vs Input Voltage 24 VDC Input



Efficiency vs Output Load 24 VDC Input



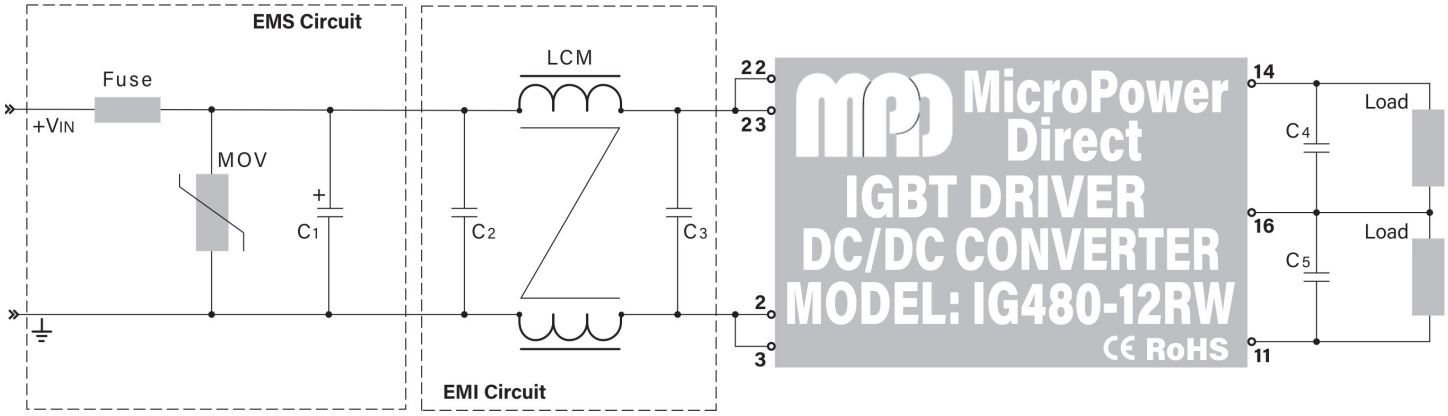
Simple Connection



The diagram at left illustrates a typical connection of the **IG480** series. Capacitors C1, C2 and C3 are filtering components and are required to meet the datasheet specifications. For many applications, this setup will be sufficient. The recommended component values are given in the table below.

VIN	C1 (μF)	C2 (μF)	C3 (μF)
12 VDC	100	100	100
24 VDC	100	100	100

Typical Connection - 12V Input



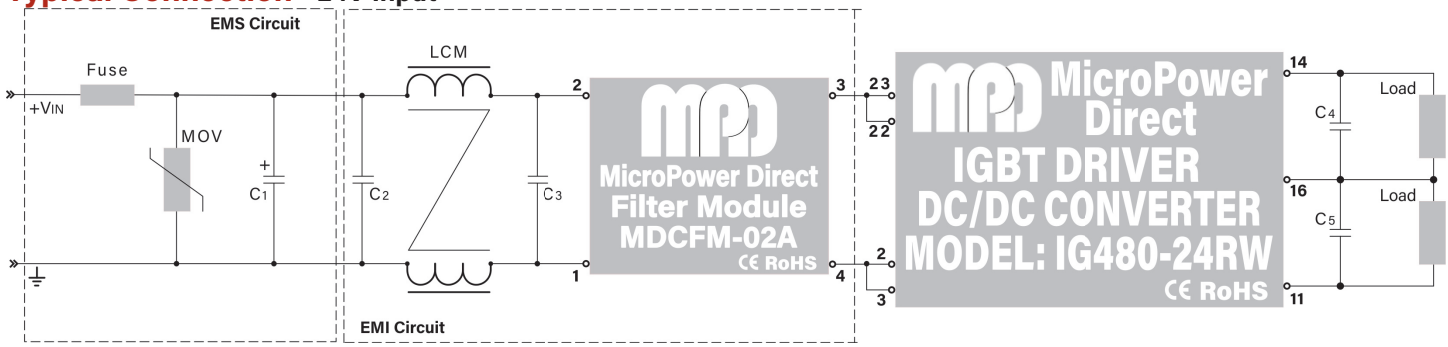
The diagram above illustrates a typical connection of the **IG480-12** for an application that requires compliance to input surge and EMC standards EN 55032 and EN 61000 (as specified on page 1). Some notes on these components are:

1. It is recommended that an external fuse be used. The recommended fuse is shown in the model chart on page 2.
2. An external MOV is recommended on the input to protect the unit in the event of a transient. A recommended value is given in the table at right.
3. The output filtering capacitors (C4 & C5) are high frequency, low resistance electrolytic capacitors. Care must be taken in choosing these capacitors not to exceed the capacitive load specification for the unit. Voltage derating of capacitors should be 80% or above.
4. Suggested component values are:

Component	VIN: 12V
MOV	14D390K
C1	680 μF/25V
C2, C3	4.7 μF/50V
C4, C5	100 μF/35V
LCM	1.0 mH

5. In many applications, simply adding input/output capacitors will enhance the input surge protection & and reduce output ripple sufficiently. In this case, capacitors C1, C2 and C3 could be connected as shown above, without the other filter components. Recommended capacitor values are given in the table for the simple connection.

Typical Connection - 24V Input



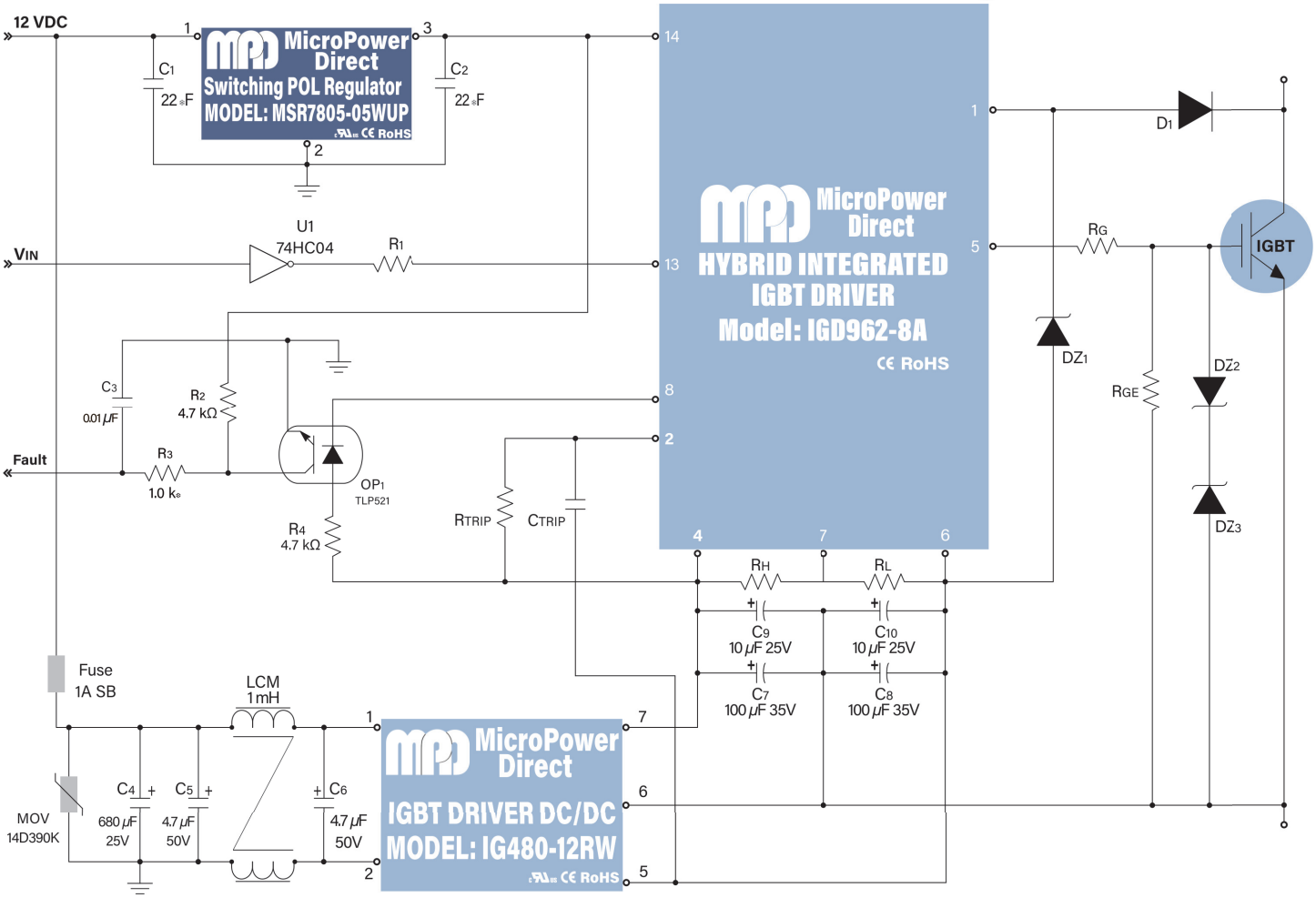
The diagram above illustrates a typical connection of the **IG480-24** for an application that requires compliance to with input surge and EMC standards EN 55032 and EN 61000 (as specified on page 1). Some notes on these components are:

1. It is recommended that an external fuse be used. The recommended fuse is shown in the model chart on page 2.
2. An external MOV is recommended on the input to protect the unit in the event of a surge. A recommended value is given in the table at right.
3. The output filtering capacitors (C4 & C5) are high frequency, low resistance electrolytic capacitors. Care must be taken in choosing these capacitors not to exceed the capacitive load specification for the unit. Voltage derating of capacitors should be 80% or above.
4. Suggested component values are:

Component	VIN: 24V
MOV	14D560K
C1	330 μF/50V
C2, C3	4.7 μF/50V
C4, C5	100 μF/35V
LCM	3.3 mH
MDCFM-02A	Filter Module

5. The **MDCFM-02A** is an EFT suppresor module available from MicroPower Direct. Contact the factory for a full datasheet or visit our website.
6. In many applications, simply adding input/output capacitors will enhance the input surge protection & and reduce output ripple sufficiently. In this case, capacitors C1, C2 and C3 could be connected as shown above, without the other filter components. Recommended capacitor values are given in the table for the simple connection.

Typical Connection: To IG962 Driver



The **IG480RW** series is a good match for the **IGD962-8A** IGBT driver. When combined, the **IGD962-8A** & **IG480RW** provide the isolated gate drive required for controlling high power IGBT modules. The **IGD962-8A** features an internal high speed optocoupler, high transient immunity, short circuit protection and a fault signal output. It is packaged in a compact single-in-line (SIP) package that minimizes the required printed circuit board space. The **IGD962-8A** requires an external supply to power its internal circuits and set up VCC and VEE. Our example uses the **IG480-12RW**.

The **IGD962-8A** converts logic level control signals into a fully isolated gate drive of +14V/-9V. Gate drive current is 8A peak. In our example, illustrated above, gate drive power isolation is provided by the **IG480-12RW** DC/DC converter. Control signal isolation is provided by an internal high speed optocoupler. Desaturation detection is used for short circuit protection.

The **IG480RW** series may be used in a wide variety of on-board power distribution applications. However, with asymmetrical outputs, an isolation barrier specified at 3 kVDC, low isolation capacitance and a wide operating temperature range; they are an ideal choice for IGBT drive & control circuits. They are specifically designed for use with 962 type IGBT drivers.

Some notes on this circuit (starting with the **IG480-12RW** input) are:

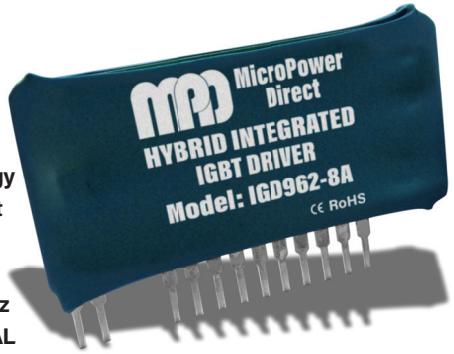
1. The **IG480-12RW** DC/DC should be mounted as close to the IGBT driver as possible, to minimize the length of connecting board traces or wires.
2. The **IG480RW** series includes overload protection. But, it is still recommended that an external fuse be used. The recommended fuse for the 12 VOUT model is a 1A slow-blow.
3. Typical of most low power DC/DC's, the **IG480** series does not include protection against transients that might occur on the power line. The input MOV is recommended to provide this protection.
4. To meet the requirements of EN 55032 and EN 61000, the input filter (as shown in the Electrical Specifications chart on page 1) the addition of the input filter shown in circuit above is required. The filter components (C4, C5, LCM and C6) should be mounted as close to the **IG480RW** as possible. The capacitors should be low ESR electrolytics.
5. The traces (or wires) that connect the **IG480RW** to the driver circuit should be as short as possible.
6. The recommended value for the electrolytic decoupling capacitors C7 and C8 is 100 µF electrolytic. They should be selected for low impedance and a maximum allowable ripple current that is sufficient for the application. Capacitors C9 and C10 are low ESR ceramic components. The decoupling capacitors should be mounted as close to the **IGD962** driver as possible.
7. If the µC of the IGBT module is 2 or less, the IG120.may be substituted for the IG480 series.

Please applications engineering at **MPD** with any questions.

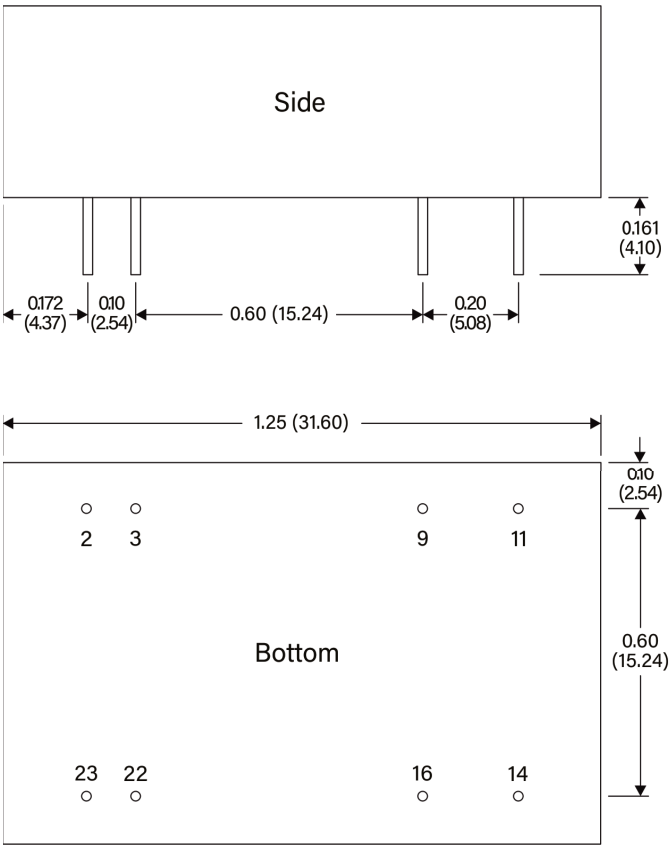
Also Available: IGD962-8A

Key Features:

- **Shielded OptoCoupler**
- **30 kV/µS CMR**
- **VISO = 3,750 VAC**
- **± 8A Output**
- **Two Supply Drive Topology**
- **TTL, CMOS Comp. Input**
- **Short Circuit Protected**
- **Fault Signal Output**
- **Switching Freq. to 40 kHz**
- **Compatible With M57962AL**



Mechanical Dimensions



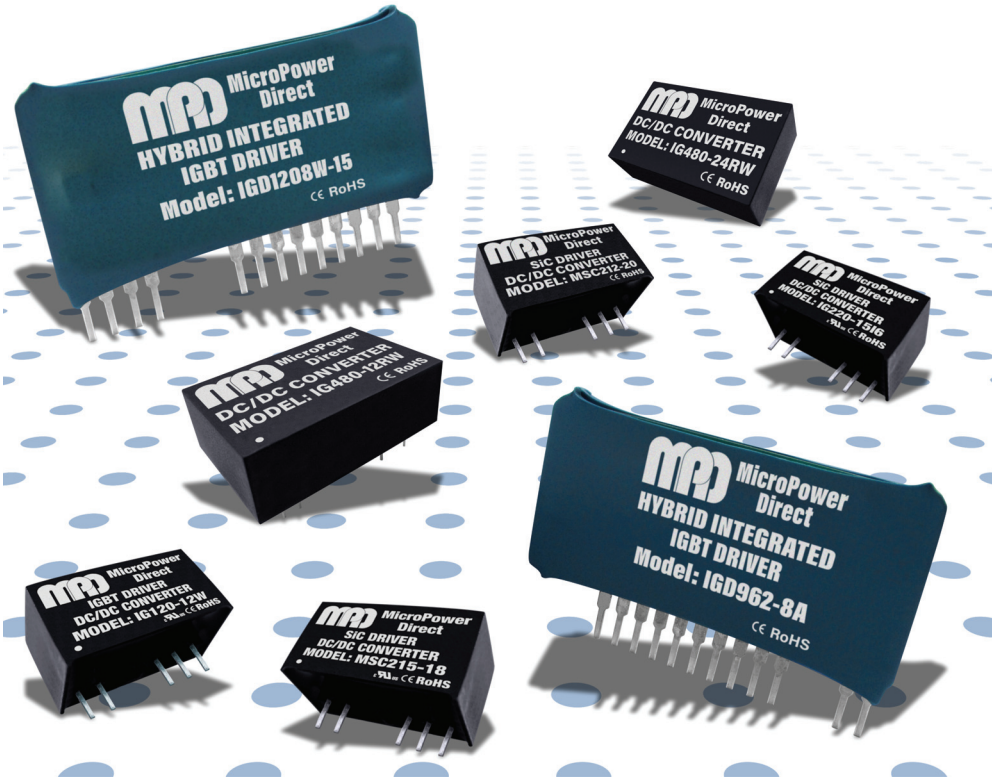
Pin Connections

Pin	Function	Pin	Function
2	-VIN	14	+VOUT
3	-VIN	16	Common
9	Common	22	+VIN
11	-VOUT	23	+VIN

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance = ±0.020 (±0.50)
- Pin Tolerance = ±0.004 (±0.10)
- Recommended pin hole size (on the application PC Board) is Ø 0.039 (Ø1.00)
- Pin 1 is marked by a "dot" or indentation on the unit
- Weight (Typ) = 0.496 Oz (14.0g)

MPD offers a very wide range of products specifically designed for use in high power, high speed gate drive circuits. Products include miniature DC/DC converters with asymetrical outputs that fit the specific requirements of IGBT and SiC semiconductors. Also available are IGBT driver circuits that include much of the control circuit in a small SIP package. For full information, go to our website or contact the factory.



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