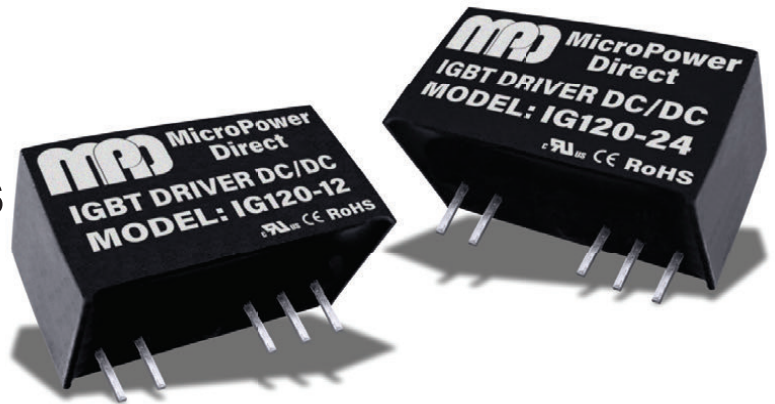


IG120 Series

Asymmetrical Outputs High Isolation, IGBT DC/DC Converters



Key Features:

- Asymmetrical Outputs
- EN 60950 Approved
- 3,000 VAC Isolation
- Very Low Isolation Cap.
- Miniature SIP Case
- Meets EN 55032 B
- -40°C to +70°C Temp Range
- >3.5 MHour MTBF
- Seven Standard Models
- Operates With xx962 Drivers
- **Low Cost**



RoHS



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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
Supply Voltage Range	See Model Selection Guide				
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Line Regulation	For V _{IN} Change of 1%		±1.2	±1.5	%/%
Load Regulation, See Note 1	IG120-09D		12	26	
	All Other Models		8.0	15	%
			10	15	
Ripple & Noise (20 MHz)	See Note 2		100	200	mV P - P
Efficiency		77	80		%
Temperature Coefficient				±0.03	%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	See Note 3	3,000			VAC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance,	1 kHz/0.1V		6.6		pF
Switching Frequency			100	300	kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 4	EN 55032		Class B
Conducted Emissions, See Note 4	EN 55032		Class B
ESD	EN 61000-4-2	B	±8 kV Contact

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+105	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagram (Page 4)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	0.152 Oz (4.3g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours
Safety Standards	UL/cUL 60950-1 recognition (UL certificate)				
Safety Class	Class III				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Max Supply Voltage (1 Sec)	IG120-12			13	VDC
	IG120-12W			15	
	IG100-9, IG100-9D			16	
	IG120-15, IG136-15			16	
	IG120-24			26	
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.

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Model Number	Input				Output 1			Output 2			Capacitive Load (μF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (ma)		Voltage (VDC)	Current (ma)			
	Nominal	Range	Full-Load	No-Load		Max	Min		Max	Min		
IG100-09	15	14.5 - 15.5	84	20	9.0	111	0.0	- - -	- - -	- - -	220	200
IG100-09D	15	14.5 - 15.5	84	20	9.0	55	0.0	-9.0	-55	0.0	220	200
IG120-12	12	11.6 - 12.4	162	20	15.0	80	0.0	-8.7	-40	0.0	220	400
IG120-12W	12	9.0 - 15.0	223	20	15.0	100	0.0	-8.0	-80	0.0	220	500
IG120-15	15	14.5 - 15.5	130	20	15.0	80	0.0	-8.7	-40	0.0	220	300
IG136-15	15	14.5 - 15.5	143	20	17.0	80	0.0	-8.7	-40	0.0	220	400
IG120-24	24	23.3 - 24.7	111	30	15.0	80	0.0	-8.7	-40	0.0	220	200

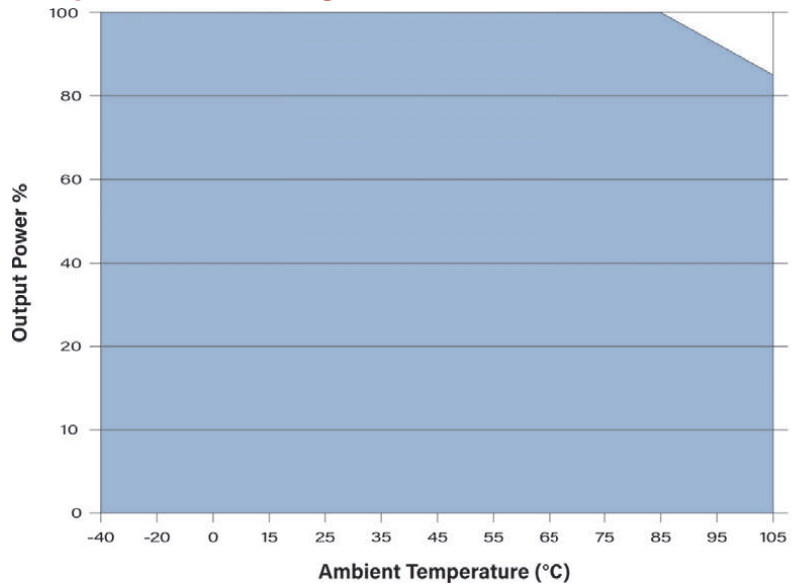
Output Voltage: Min/Max

Model Number	Output 1			Output 2		
	Voltage (VDC)			Voltage (VDC)		
	Min	Nom	Max	Min	Nom	Max
IG100-09	8.46	9.00	9.54	- - -	- - -	- - -
IG100-09D	8.55	9.00	9.45	-8.28	-9.00	-9.72
IG120-12	14.25	15.0	15.75	-8.00	-8.70	-9.40
IG120-12W	14.25	15.0	15.75	-7.36	-8.00	-8.64
IG120-15	14.25	15.0	15.75	-8.00	-8.70	-9.40
IG136-15	16.15	17.0	17.85	-8.00	-8.70	-9.40
IG120-24	14.25	15.0	15.75	-8.00	-8.70	-9.40

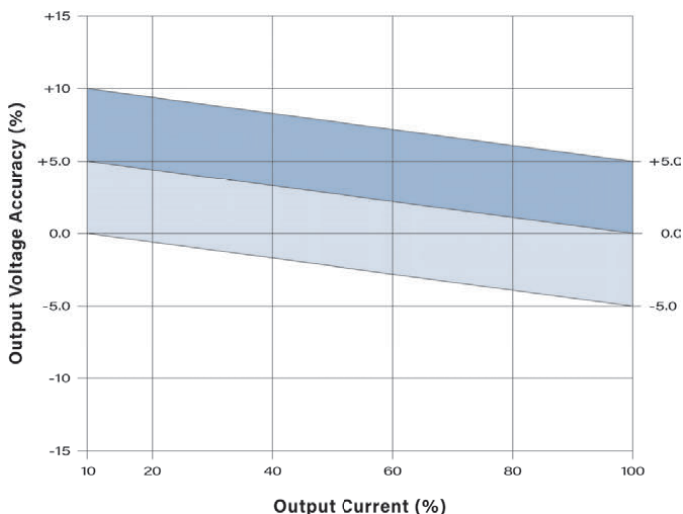
Notes:

1. Load regulation is measured from 10% load to full load. Load regulation is specified for the primary output (Output 1). The load regulation of output 2 may vary slightly.
2. When measuring output ripple, it is recommended that an external 1 μF ceramic capacitor & a 10 μF electrolytic capacitor be placed in parallel from each output to common.
3. Isolation voltage is specified for a period 60S with a leakage current lower than 1 mA.
4. See page 4 for more information on meeting EMI requirements.
5. If output 2 is not used, it should be left open.
6. Operation at no-load will not damage these units. However, they may not meet all specifications.
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.

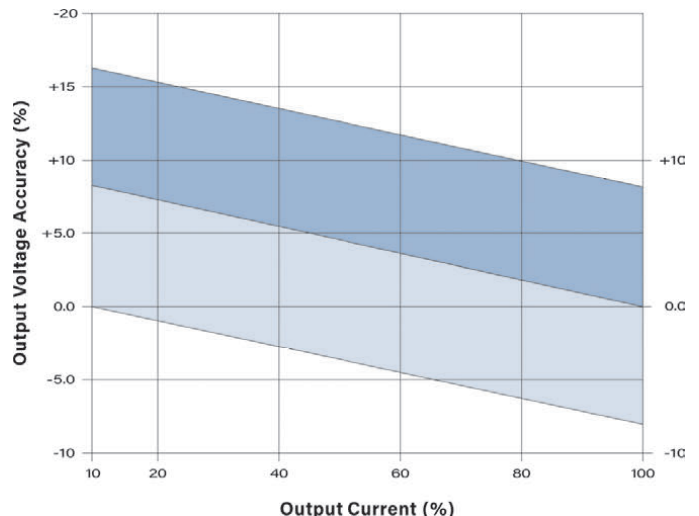
Temperature Derating Curve



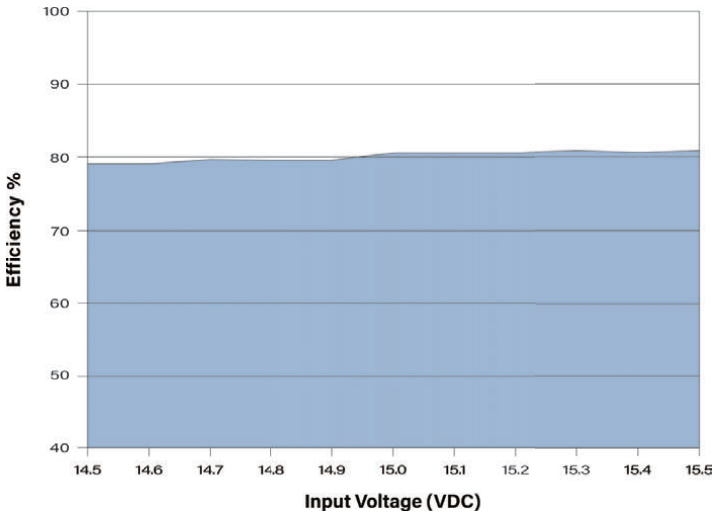
Output Voltage Tolerance: VOUT 1 (+)



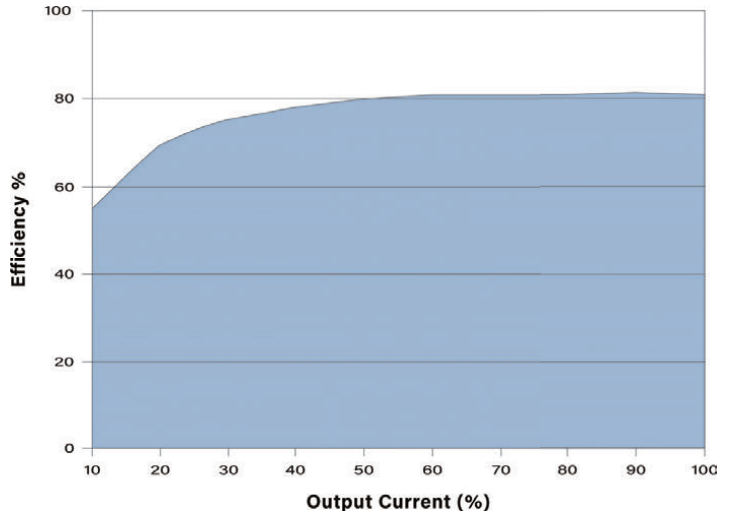
Output Voltage Tolerance: VOUT 2 (-)



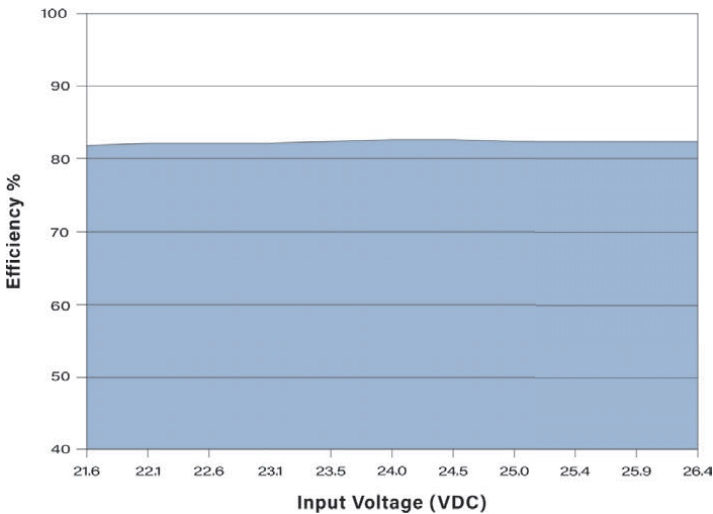
Efficiency vs Input Voltage IG120-15



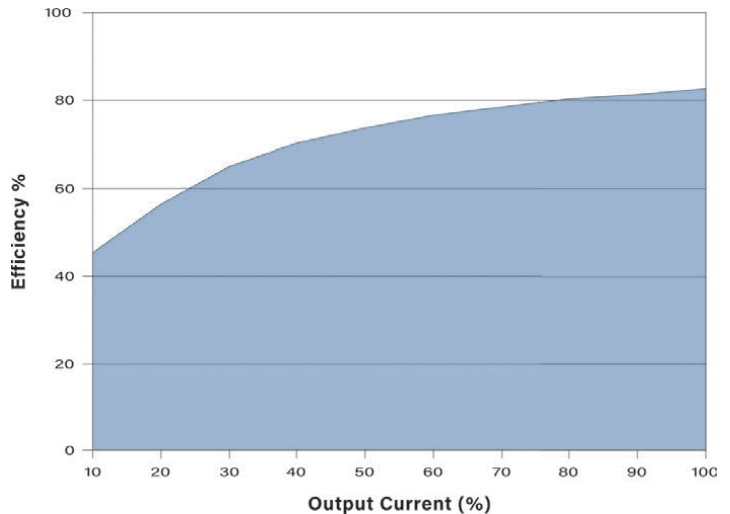
Efficiency vs Output Load IG120-15



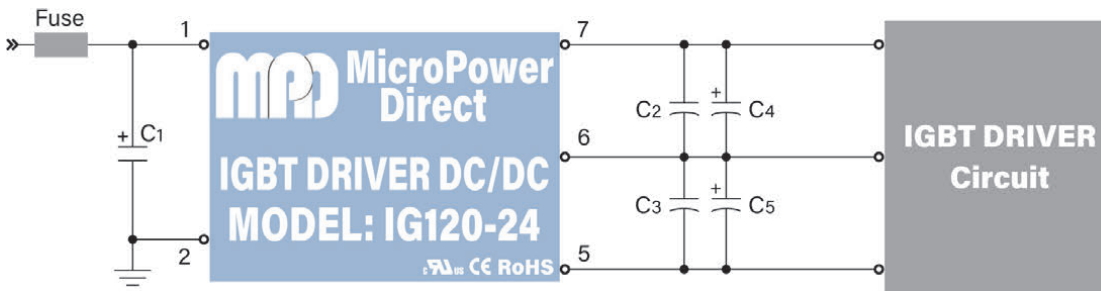
Efficiency vs Input Voltage IG120-24



Efficiency vs Output Load IG120-24



Simple Connection



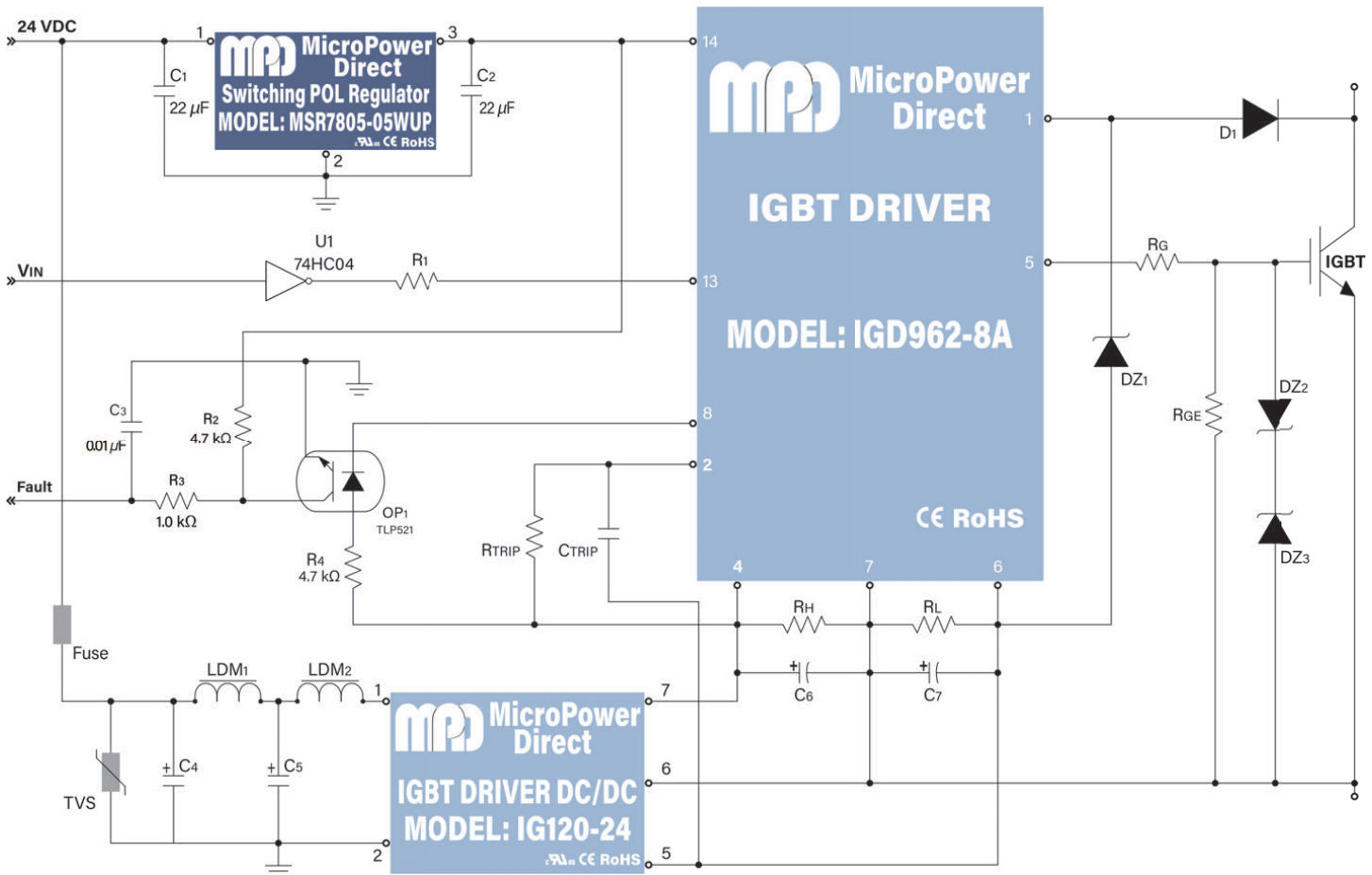
The IG120 series may be used in a wide variety of on-board power distribution applications. However, with asymmetrical outputs, an isolation barrier specified at 3 kVAC very low isolation capacitance and a wide operating temperature range; they are an ideal choice for IGBT drive & control circuits.

The diagram above illustrates a simple connection of the IG120-24 to a gate drive circuit. The outputs of +15V and -8.7V make it easier to set the positive/negative switching rails for the gate drive circuit.

For applications that do not require the circuit to meet EMI/EMC specifications, the capacitors (C1 - C5) will reduce input/output ripple and improve the converter stability over time and temperature. All capacitors should be low ESR and sufficient voltage derating should be used.

The recommended component values are given in the table below.

Component	Input Voltage		
	12 VDC	15 VDC	24 VDC
C1	100 μ F/35V	100 μ F/35V	100 μ F/35V
C2, C3	1 μ F - 10 μ F	1 μ F - 10 μ F	1 μ F - 10 μ F
C4, C5	100 μ F/35V	100 μ F/35V	100 μ F/35V



As stated, the **IG120** series may be used in a wide variety of on-board power distribution applications. They are particularly suited for IGBT drive & control circuits.

The **IG120** is ideal for use with 962 type IGBT drivers. A typical connection to the **IGD962-8A** (also available from MPD) is shown in the diagram above. When combined, the **IGD962** & **IG120** provide the isolated gate drive required for controlling high power IGBT modules. The **IGD962** 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** converts logic level control signals into a fully isolated gate drive of +15V/-8.5V. Gate drive current is 8A peak. Gate drive power isolation is provided by the **IG120** series DC/DC converters (see connection diagram below with the **IG120-24**). Control signal isolation is provided by an internal high speed optocoupler. Desaturation detection is used for short circuit protection.

Some notes on this circuit (starting with the **IG120-24** input) are:

- 1.The **IG120-24** 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 **IG120** series does not include overload protection (typical of most low power DC/DC's). It is recommended that an external fuse be used. The recommended fuse value is shown in the model chart on page 2.
- 3.The **IG120** series does not include internal protection against voltage transients that might occur on the power line (again, this is typical of most low power DC/DC's). It is recommended that an external suppressor be used. We have included a TVS placed in front of the input filtering components. The recommended value is shown in the chart at right.

- 4.The addition of the input filter components (C4, C5, LDM1 & LDM2) will typically bring the circuit to within the limits of EN 55032 Class B. The recommended values for these components are shown in the table below.

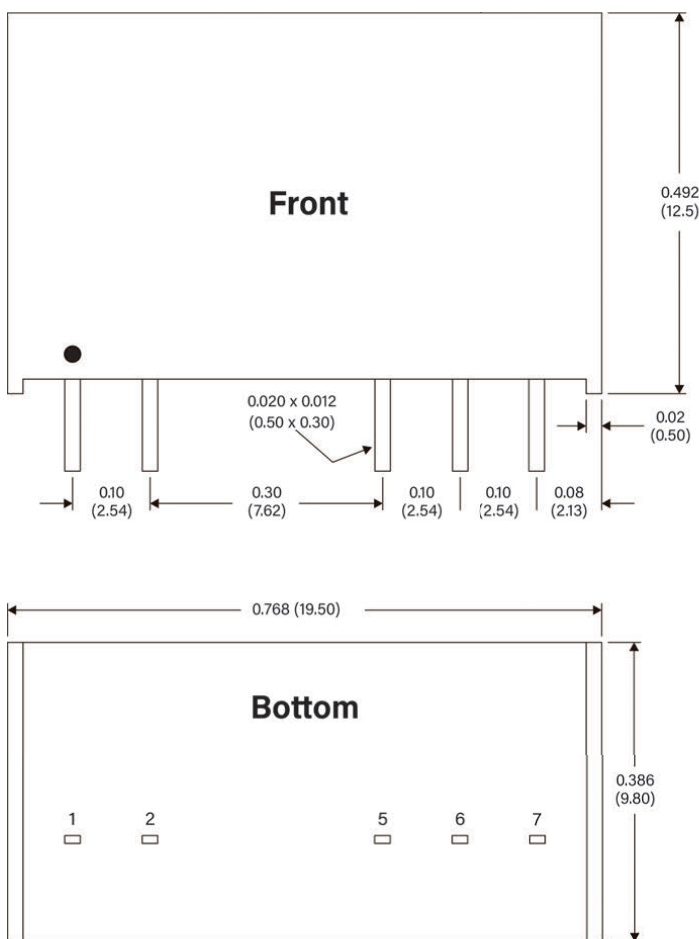
If meeting EN 55032 class B is not a concern, the inductors (LDMx) and C5 can be eliminated. In this case, the recommended value for C4 is 100 μ F/35V.

- 5.The low ESR decoupling capacitors C6 and C7 should be mounted as close to the **IGD962** driver as possible. Small ceramic capacitors (about 5 μ F) can be added in parallel with C6 and C7 if further decoupling is required.
- 6.Input filtering components (C4, C5, LDM1 & LDM2) should be mounted as close to the unit as possible. The trace (or wire) between the DC/DC and the driver circuit should be as short as possible.
- 7.The μ C of the IGBT module should be 2 or less. For IGBT modules with a μ C greater than 2, we recommend our **IG480** DC/DC series.
- 8.Recommended values for components are:

Component	Input Voltage		
	12 VDC	15 VDC	24 VDC
TVS	SMBJ15	SMBJ20	SMBJ30
C4	4.7 μ F/50V	4.7 μ F/50V	4.7 μ F/50V
C5	4.7 μ F/50V	4.7 μ F/50V	4.7 μ F/50V
LDM1	12 μ H	12 μ H	12 μ H
LDM2	47 μ H	47 μ H	47 μ H
C6	100 μ F/35V	100 μ F/35V	100 μ F/35V
C7	100 μ F/35V	100 μ F/35V	100 μ F/35V

Mechanical Dimensions

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Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ± 0.02 (± 0.50)
- Pin 5 on the **IG100-09** has no connection

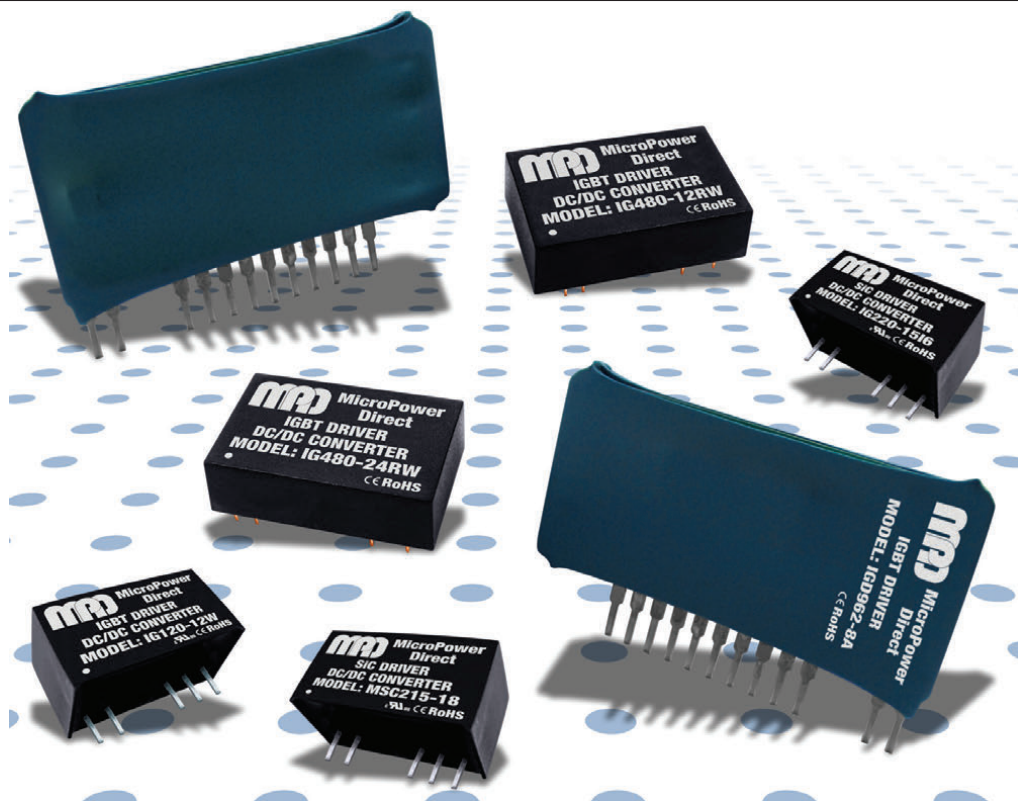
Pin Connections

Pin	Function
1	+VIN
2	Gnd
5	-VOUT
6	Common
7	+VOUT

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 $\varnothing 0.039$ ($\varnothing 1.00$)
- Pin 1 is marked by a "dot" or indentation on the unit

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 asymmetrical 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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