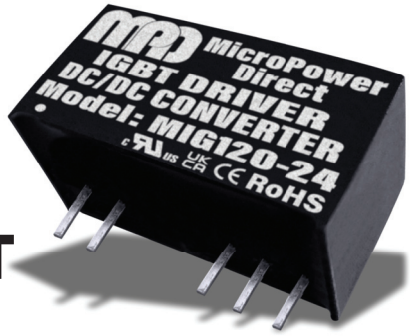
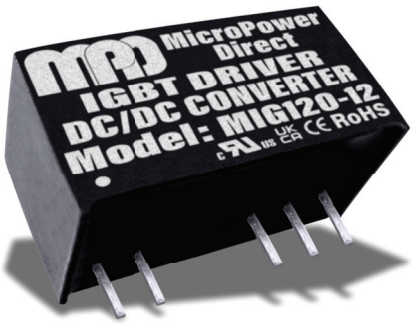
MIG120

Compact, Low Cost, High Isolation, IGBT DC/DC Converters





Key Features:

- Asymmetrical Outputs
- 2 Standard Pin Outs
- EN 62368 Approved
- 5,000 VAC Isolation
- Reinforced Insulation
- Very Low Iso Capacitence
- Miniature SIP Case
- Meets EN 55032 B
- -40°C to +95°C Temp Range
- >2.4 MHour MTBF
- OV2 Overvoltage Category
- Four Standard Models
- Operates With xx962 Drivers

MicroPower Direct
46 Eastman Street
Unit 1
Easton, MA 02375
USA

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

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	See Model Selection Guide				
Input Filter	Internal Capacitor				
Input Reflected Ripple Current	See Note 1		20		mA P-P
Start Up Time	See Note 2		30		mS

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±3.0	±3.0	%
Line Regulation	For VIN Change of 1%		±1.2	±1.2	%
Load Regulation, See Note 3			10	10	%
Cross Regulation			±5.0	±5.0	%
Ripple & Noise (20 MHz)	See Note 4			150	mV P - P
Efficiency	See Model Selection Guide				
Maximum Capacitive Load	See Model Selection Guide				
Temperature Coefficient				±0.03	%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	See Note 5	5,000			VAC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance			10		pF
Leakage Current	250 VAC, 60 Hz		2.0		μA
Clearance/Creepage		6			mm
Switching Frequency		20			kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+95	°C
Maximum Case Temperature				+115	°C
Storage Temperature Range		-55		+125	°C
Thermal Impedance		30			°C/W
Cooling	Natural Convection	30		65	LFM
Humidity	RH, Non-condensing			95	%

Physical

Case Size and Weight	See Mechanical Diagram (Page 4)
Case Material	Non-Conductive Black Plastic (UL94-V0)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.4			MHours
Safety Standards	UL/cUL 62368-1 recognition (UL certificate)				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage	5 VIN			7.0	VDC
	12 VIN			15	
	15 VIN			18	
	24 VIN			28	
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C

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

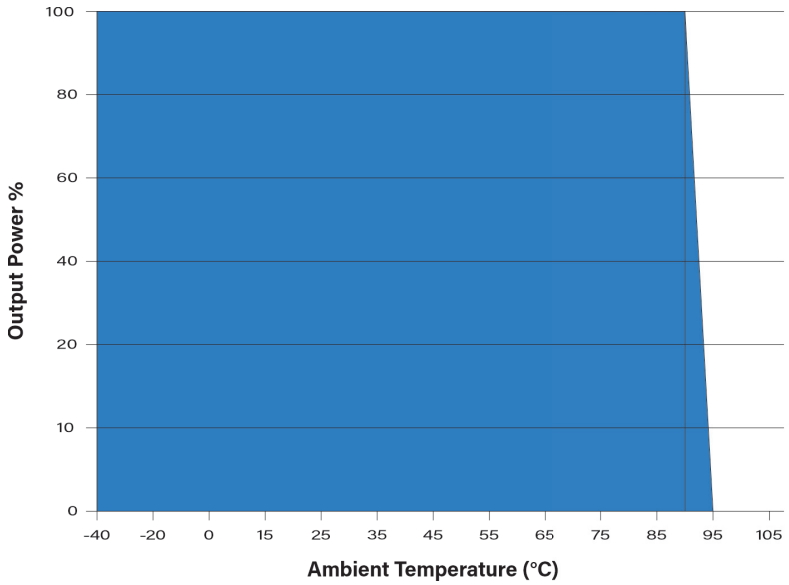
Model Selection Guide

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		
MIG120-05(N)	5	4.5 - 5.5	495	60	15.0	67	0.0	-9.0	-111	0.0	±330	1,000
MIG120-12(N)	12	10.8 - 13.2	196	30	15.0	67	0.0	-9.0	-111	0.0	±330	400
MIG120-15(N)	15	13.5 - 16.5	158	30	15.0	67	0.0	-9.0	-111	0.0	±330	400
MIG120-24(N)	24	21.6 - 26.4	100	25	15.0	67	0.0	-9.0	-111	0.0	±330	200

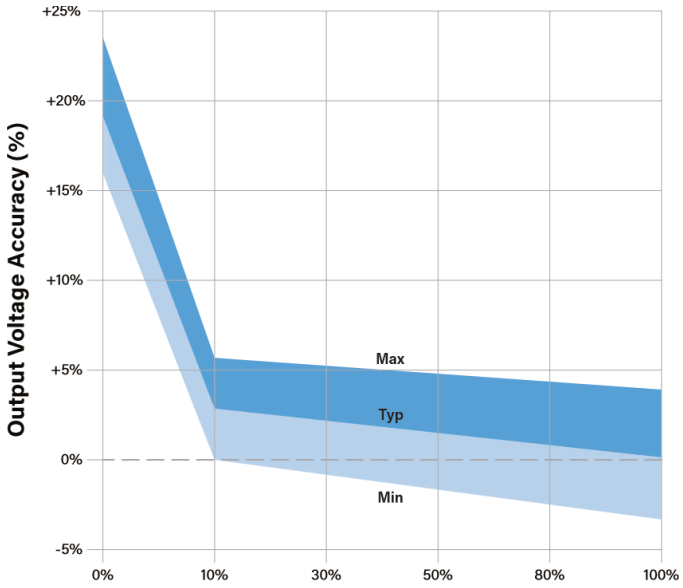
Notes:

1. Measured with a simulated source inductance of 22 µH and a source capacitor (47 µF, ESR <1.0Ω at 100kHz.
2. Start up time is measured at nominal VIN with a constant resistive load.
3. 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.
4. 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.
5. Isolation voltage is specified for a period 60S with a leakage current lower than 1 mA.
6. See page 3 for more information on meeting EMI requirements.
7. If output 2 is not used, it should be left open.
8. Operation at no-load will not damage these units. However, they may not meet all specifications.
9. 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.

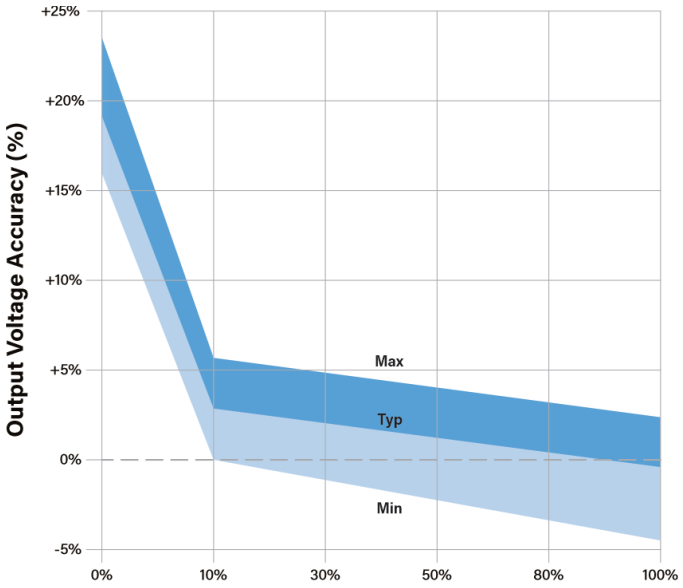
Temperature Derating Curve



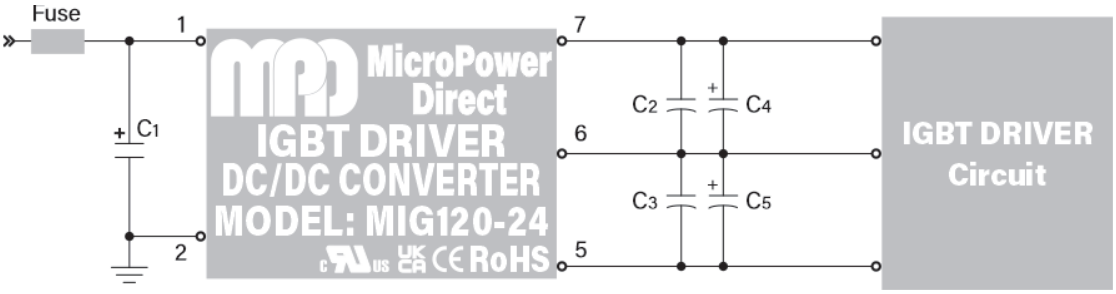
Output Voltage Tolerance: +15 VOUT



Output Voltage Tolerance: -9 VOUT



Simple Connection



The **MIG120** series may be used in a wide variety of on-board power distribution applications. However, with asymmetrical outputs, an isolation barrier specified at 5 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 **MIG120-24** to a gate drive circuit. The outputs of +15V and -9.0V make it easier to set the positive/negative switching rails for the gate drive circuit.

The capacitors (C_1 - C_5) 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. See the table at right.

Component	Input Voltage			
	5 VDC	12 VDC	15 VDC	24 VDC
C_1	680 µF/100V	680 µF/100V	680 µF/100V	680 µF/100V
C_2, C_3	1 µF - 10 µF	1 µF - 10 µF	1 µF - 10 µF	1 µF - 10 µF
C_4, C_5	100 µF/35V	100 µF/35V	100 µF/35V	100 µF/35V

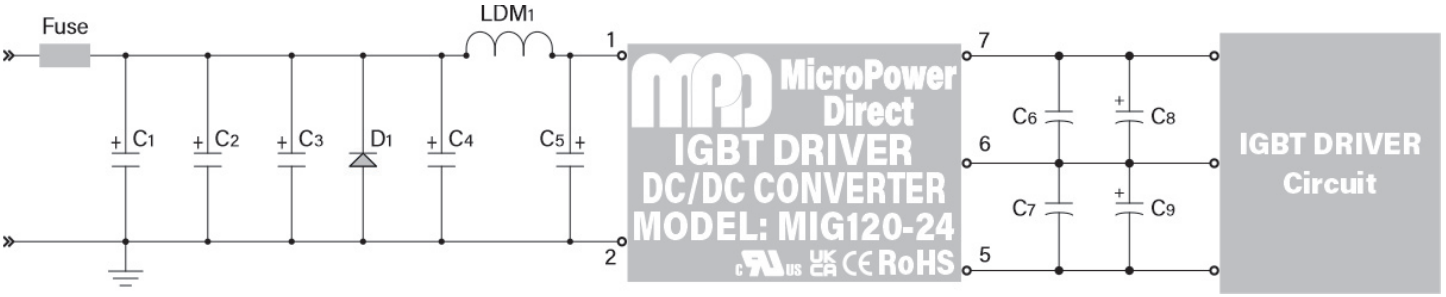
EMI/EMC Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See note at right	EN 55032		Class B
Conducted Emissions, See note at right	EN 55032		Class B
ESD	EN 61000-4-2	A	±6 kV Contact ±15 kV Air
RS	EN 61000-4-3	A	10V/m
EFT, See note at right	EN 61000-4-4	A	±2 kV
Surge, See note at right	EN 61000-4-5	A	±2 kV
CS	EN 61000-4-6	A	10 Vrms
PFMF	EN 61000-4-8	A	100 A/m

These converters will meet the requirements of EN 55032, Class B conducted emmisions with external components.

The connection diagram below shows a suggested circuit to meet the Surge, EFT and EMI requirements. Contact the factory for more information.

EMC Connection



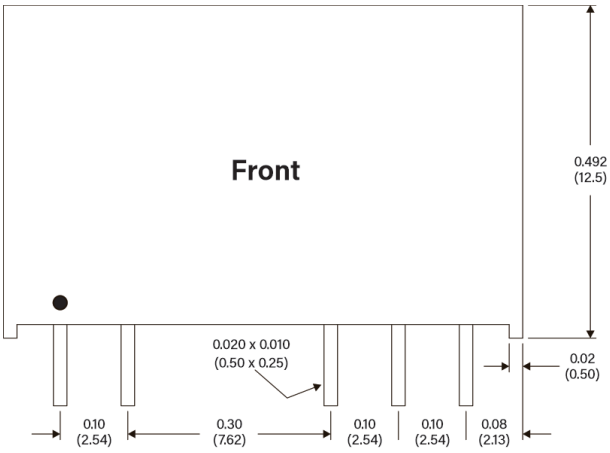
The **MIG120** series features asymmetrical outputs, an isolation barrier specified at 5 kVAC, very low isolation capacitance and a wide operating temperature range; making them an ideal choice for IGBT drive & control circuits.

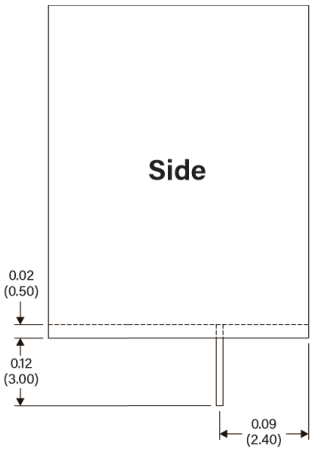
The diagram above illustrates a connection of the **MIG120-24** that will meet most surge, EFT and EMI requirements. The outputs of +15V and -9.0V make it easier to set the positive/negative switching rails for the gate drive circuit.

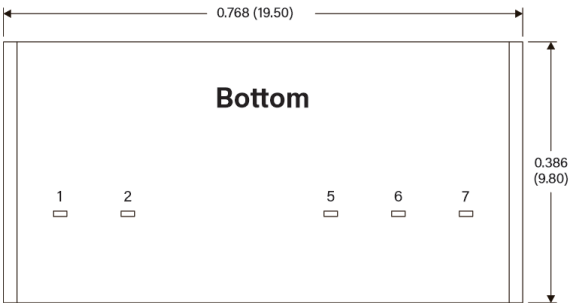
All capacitors should be low ESR and sufficient voltage derating should be used. The recommended component values are given in the table at right.

Component	Input Voltage			
	5 VDC	12 VDC	15 VDC	24 VDC
C_1, C_2	680 µF/100V	680 µF/100V	680 µF/100V	680 µF/100V
C_3	680 µF/100V	DNP	DNP	DNP
D_1	SMDJ8.0A	SMDJ16.0A	SMDJ18.0A	SMDJ28.0A
C_4	MLCC 4.7 µF/50V	MLCC 10 µF/50V	MLCC 10 µF/50V	MLCC 10 µF/50V
L_1	6.8 µH	6.8 µH	6.8 µH	6.8 µH
C_5	DNP	MLCC 4.7 µF/50V	MLCC 4.7 µF/50V	MLCC 4.7 µF/50V

Mechanical Dimensions: Standard Models







Pin Connections

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

Notes:

- All dimensions are typical in inches (mm)
- Pin Dimension Tolerance = ±0.0020 (±0.05)
- Pin Pitch/Length Tolerance = ±0.014 (±0.35)
- Recommended pin hole size (on the application PC Board) is Ø 0.031 (Ø0.80)
- Pin 1 is marked by a "dot" or indentation on the unit
- Weight (Typ) = 0.152 Oz (4.3g)

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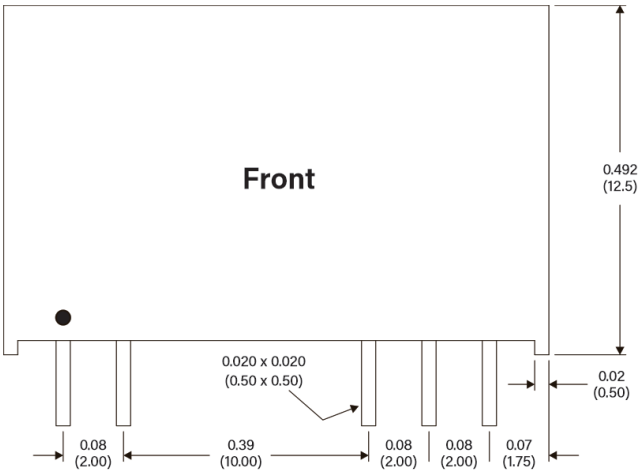
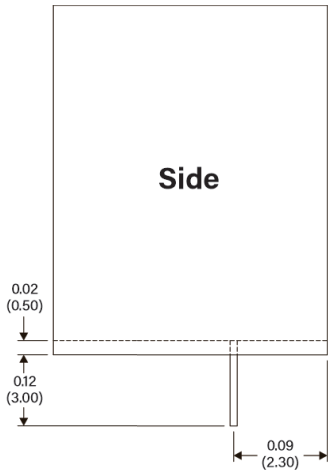
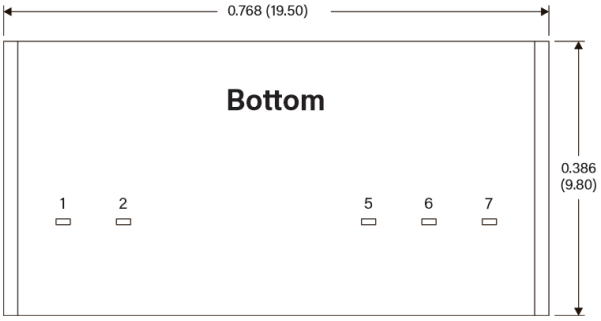
Mechanical Dimensions: "N" Models







Pin Connections

Pin	Function
1	+VIN
2	-VIN
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 Ø 0.035 (Ø0.90)
- Pin 1 is marked by a "dot" or indentation on the unit
- Weight (Typ) = 0.152 Oz (4.3g)

MPD MicroPower Direct
46 Eastman Street, Unit 1, Easton, MA 02375 • TEL: (781) 344-8226 • FAX: (781) 344-8481 • E-Mail: sales@micropowerdirect.com