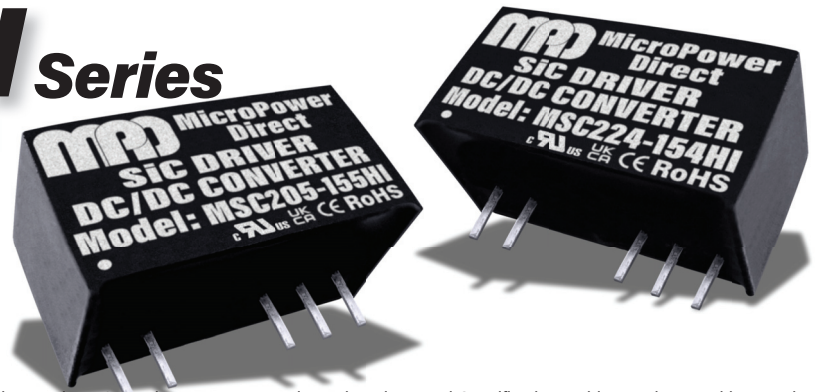


MSC200HI Series

Compact, 5.0 kV ISO SiC MOSFET Driver DC/DC Converters



Key Features:

- 5, 12, 15 & 24 VDC Inputs
- EN 62368 Approved (UL)
- 5,000 VAC I/O Isolation
- Asymmetrical Outputs
- Up to 87% Efficiency
- -40°C to 105°C Operation
- 2,200 μ F Max Cap Load
- Reinforced Insulation
- >3.5 MHour MTBF
- Miniature SIP Case
- Industry Standard Pin-Out

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	5 VDC Input	4.50		5.50	VDC
	12 VDC Input	10.80		13.20	
	15 VDC Input	13.50		16.50	
	24 VDC Input	21.60		26.40	

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	See Tolerance Graphs Starting On Page 3				
Line Regulation, See Note 1	VIN = 5VDC	+ VOUT	±1.1	±1.4	%
		- VOUT	±1.1	±1.4	
	All Other Models	+ VOUT	±1.1	±1.5	%
		- VOUT	±1.1	±1.5	
Load Regulation, See Note 2	VIN = 5VDC	+ VOUT	8.0	15	%
		- VOUT	10	15	
	All Other Models	+ VOUT	6.0	15	%
		- VOUT	8.0	15	
Output Ripple & Noise (20 MHz)	See Note 3	50	150	mV P - P	
Temperature Coefficient	Full Load	±0.04	±0.10	%/°C	
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds, See Note 4	5,000			VAC
Continuous Barrier Withstand Voltage	Input-Output (Per 61800-5-1)	1,700			V
CMTI	Input-Output	±200			kV/ μ S
Isolation Resistance	500 VDC	1,000			M Ω
Isolation Capacitance	100 kHz/0.1V		3.5	5.0	pF
Switching Frequency			200		kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 5	EN 55032		Class B
Conducted Emissions, See Note 5	EN 55032		Class B
ESD	EN 61000-4-2	B	±6 kV Contact

Environmental

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

Physical

Case Size and Weight	See Mechanical Diagram (Page 9)				
Case Material	Non-Conductive Black Plastic (UL94-V0)				

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours
Safety Standards	UL/cUL 62368-1 recognition (UL certificate)				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	5 VDC Input			9.0	VDC
	12 VDC Input			18.0	
	15 VDC Input			21.0	
	24 VDC Input			30.0	
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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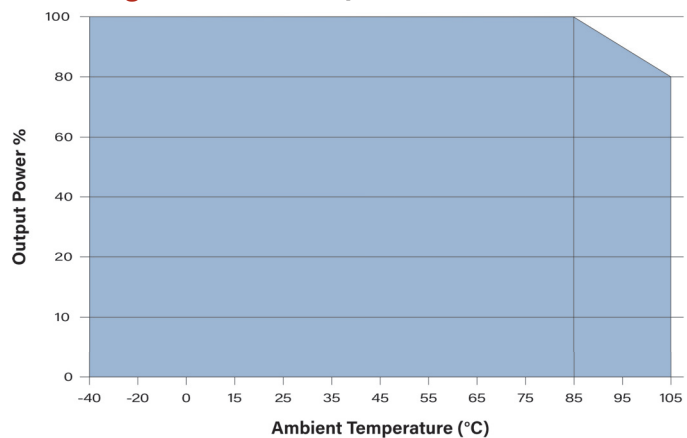
www.micropowerdirect.com

Model Number	Input (Supply)				Output 1		Output 2		Full Load Efficiency % Typ (Out 1/Out 2)	Max. Capacitive Load μ F
	Voltage (VDC)		Current (mA)		Voltage	Current	Voltage	Current		
	Nom.	Range	Full Load	No Load	Nom. (VDC)	mA	Nom. (VDC)	mA		
MSC205-155HI	5.0	4.50 - 5.50	343	20	+15.0	+80.0	-5.0	-40.0	78/82	1,000
MSC205-204HI	5.0	4.50 - 5.50	407	18	+20.0	+80.0	-4.0	-40.0	78/82	470
MSC205-183HI	5.0	4.50 - 5.50	415	20	+18.0	+80.0	-3.5	-80.0	78/82	680
MSC212-152HI	12	10.8 - 13.2	167	8	+15.0	+100	-2.5	-100.0	82/87	2,200
MSC212-183HI	12	10.8 - 13.2	200	8	+18.0	+100	-3.0	-100.0	82/87	1,000
MSC212-154HI	12	10.8 - 13.2	215	8	+15.0	+120.0	-4.0	-120.0	82/87	2,200
MSC212-205HI	12	10.8 - 13.2	213	14	+20.0	+90.0	-5.0	-90.0	82/87	470
MSC215-154HI	15	13.5 - 16.5	171	8	+15.0	+120.0	-4.0	-120.0	82/87	2,200
MSC215-205HI	15	13.5 - 16.5	167	8	+20.0	+90.0	-5.0	-90.0	82/87	2,200
MSC224-154HI	24	21.6 - 26.4	131	10	+15.0	+120.0	-4.0	-120.0	77/82	2,200
MSC224-205HI	24	21.6 - 26.4	129	11	+20.0	+90.0	-5.0	-90.0	76/81	2,200

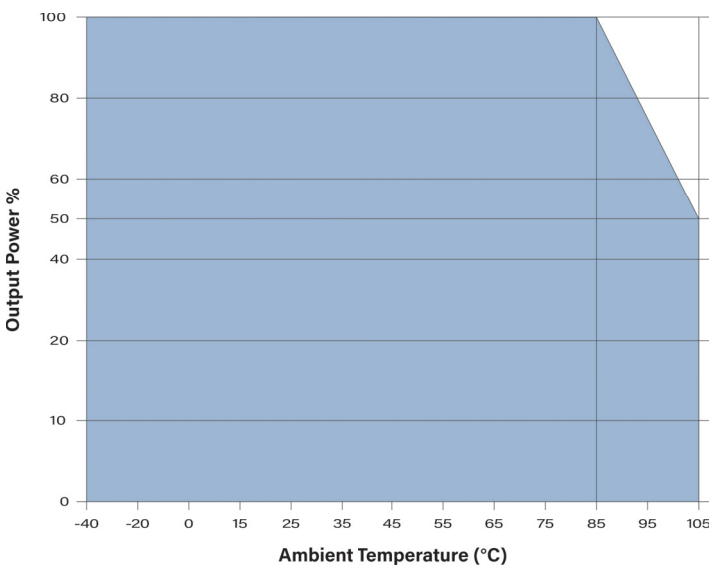
Notes:

1. Line regulation is measured for an input voltage change of $\pm 10\%$.
2. Load regulation is measured from 10% load to full load.
3. When measuring output ripple & noise, it is recommended that an external capacitor (100 μ F/35V) be placed from each output to common.
4. I/O Isolation is specified with a leakage current of 1 mA max.
5. The unit will meet the radiated and conducted EMI specifications with the addition of external components as shown in the connection diagrams on page 8.
6. Operation at no-load will not damage these units. However, they may not meet all specifications.

Derating Curve: +5V Input Models



Temperature Derating Curve: All Other Models



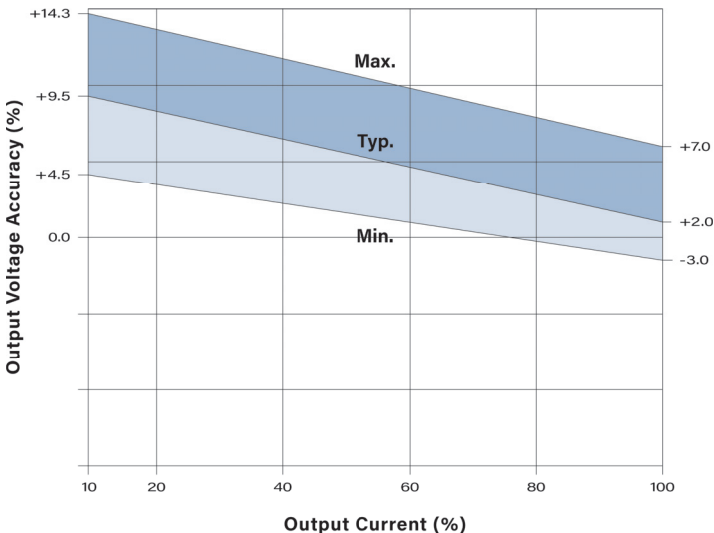
MPD also offers a wide range of DC/DC's specifically designed to fit the specific requirements of IGBT semiconductors.

These miniature converters feature dual, asymmetrical outputs (that fit the specific requirements of IGBT semiconductors), very high I/O isolation levels, compact packaging and UL approvals.

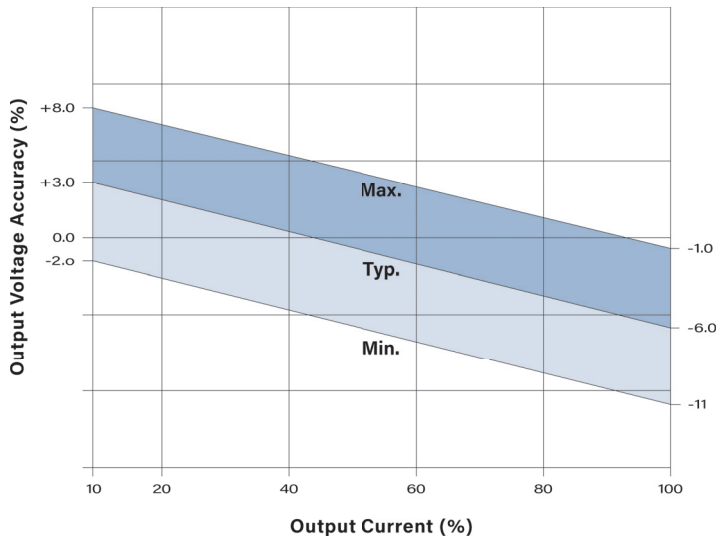
MPD also offers many general purpose power products over a power range of 0.25 to 1,000W. Most models meet international EMI & safety standards. Call today, or go to our website to find the right power product for your application.



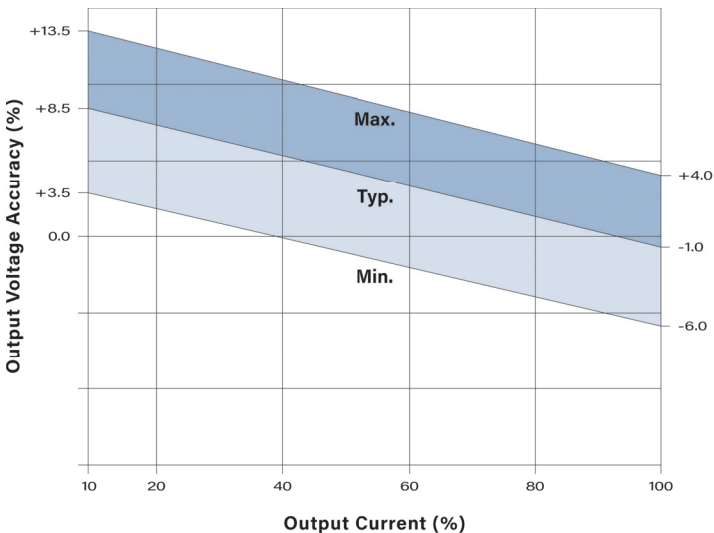
Output Voltage Tolerance: MSC205-155HI, +V_{OUT}



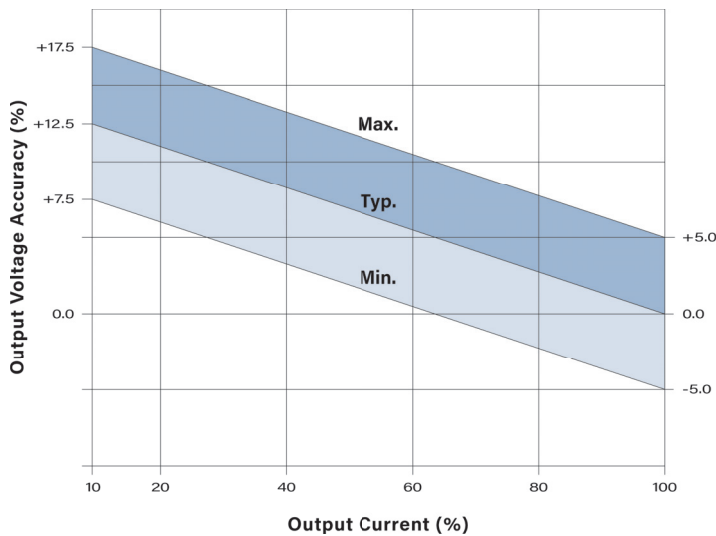
Output Voltage Tolerance: MSC205-155HI, -V_{OUT}



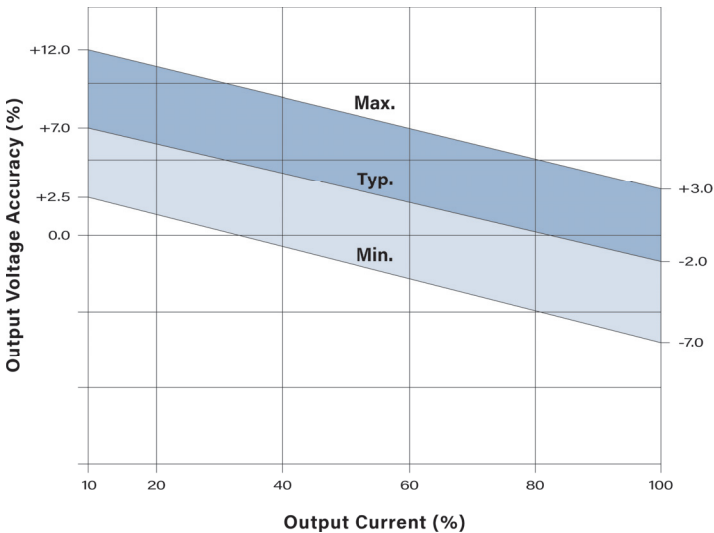
Output Voltage Tolerance: MSC205-204HI, +V_{OUT}



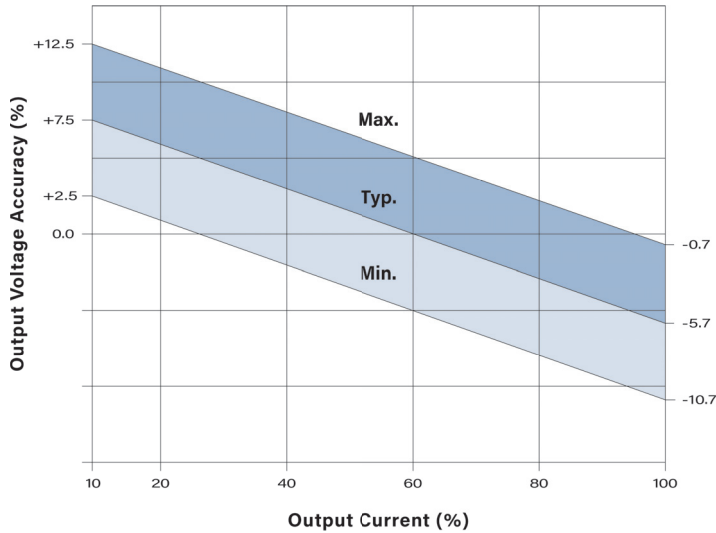
Output Voltage Tolerance: MSC205-204HI, -V_{OUT}



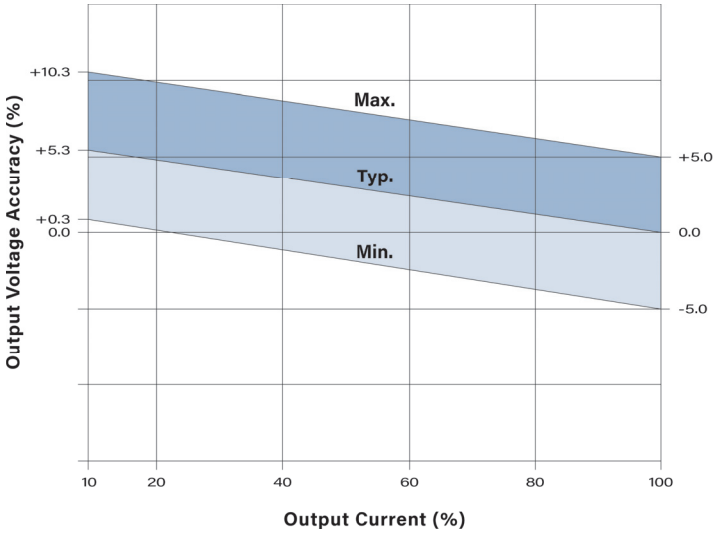
Output Voltage Tolerance: MSC205-183HI, +V_{OUT}



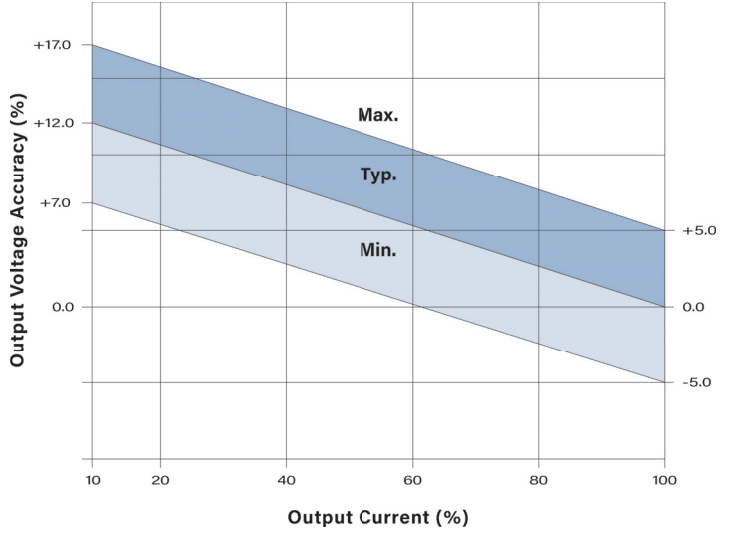
Output Voltage Tolerance: MSC205-183HI, -V_{OUT}



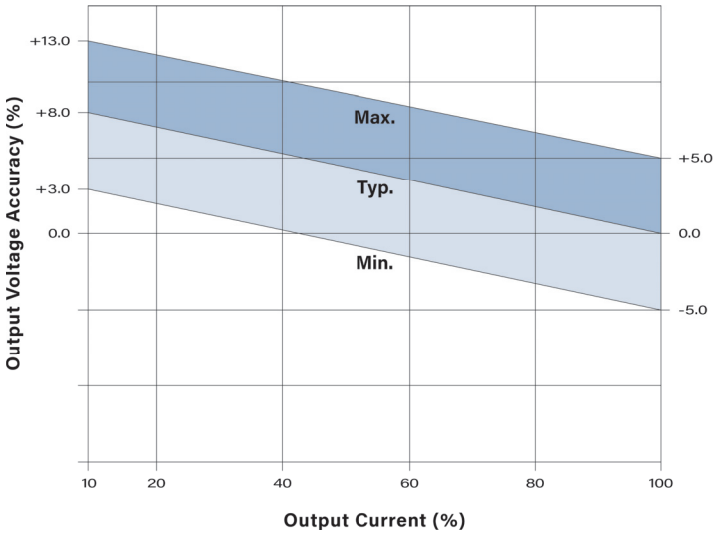
Output Voltage Tolerance: MSC212-152HI, +V_{OUT}



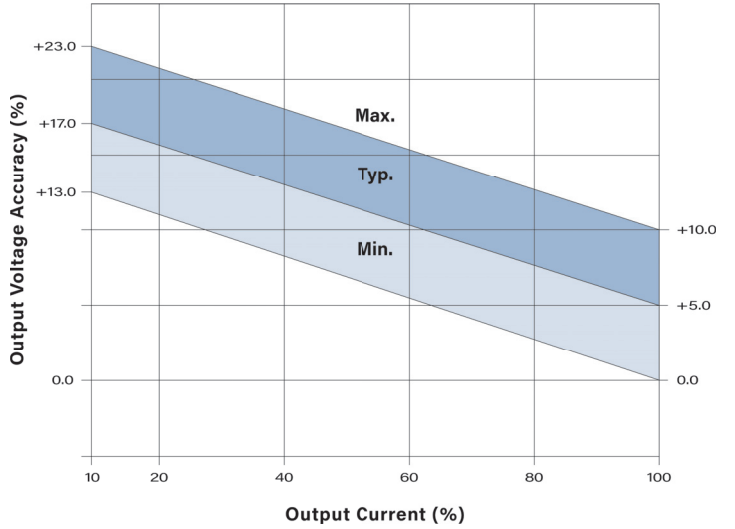
Output Voltage Tolerance: MSC212-152HI, -V_{OUT}



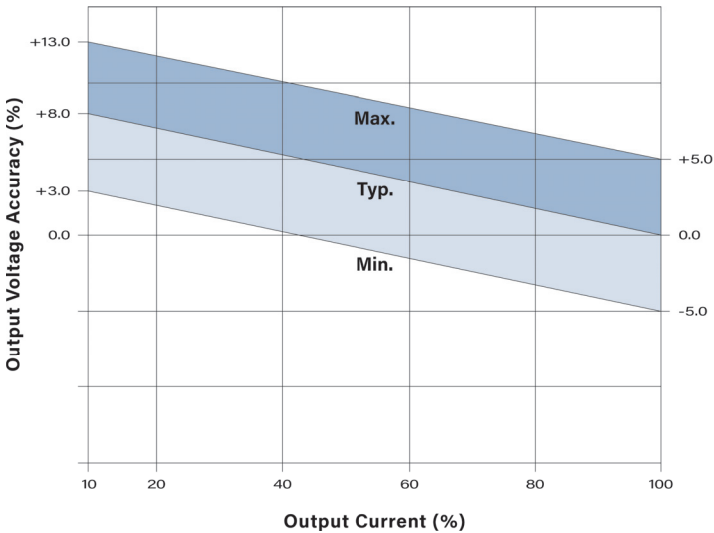
Output Voltage Tolerance: MSC212-183HI, +V_{OUT}



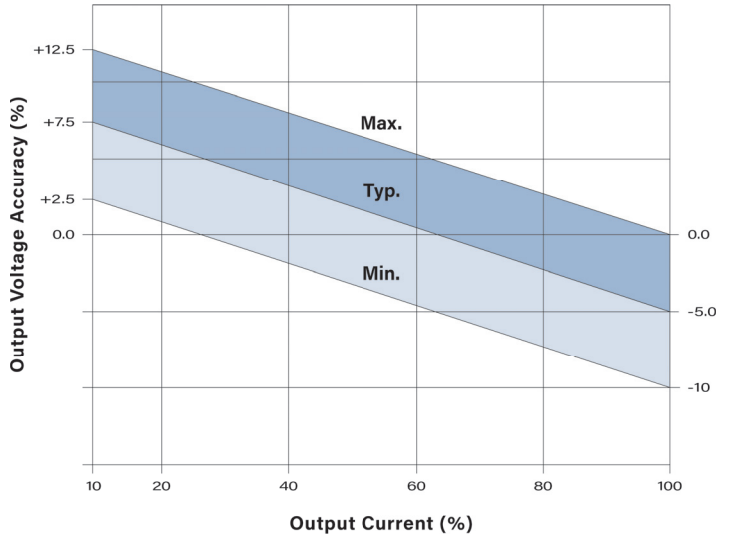
Output Voltage Tolerance: MSC212-183HI, -V_{OUT}



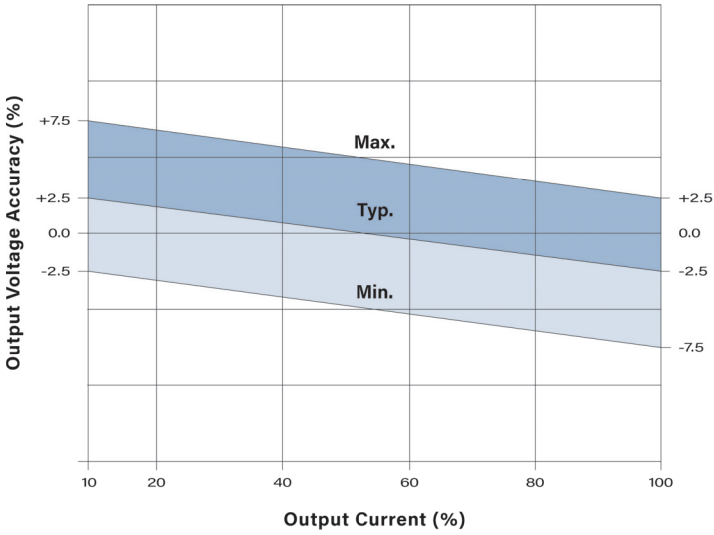
Output Voltage Tolerance: MSC212-154HI, +V_{OUT}



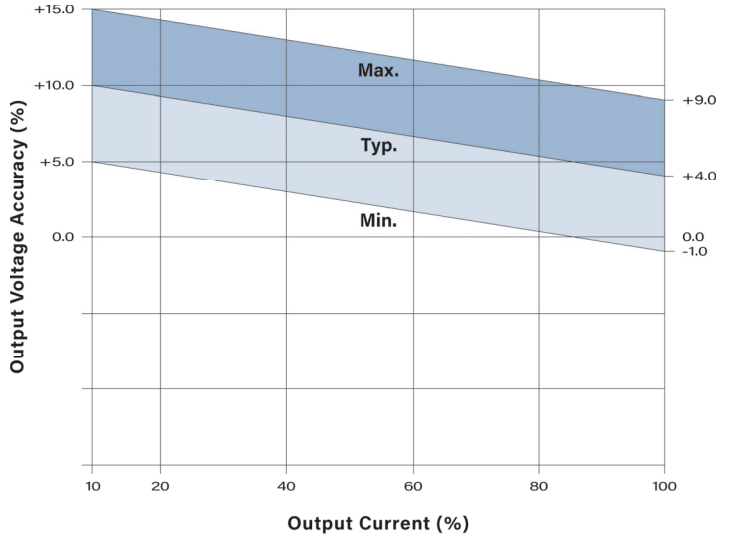
Output Voltage Tolerance: MSC212-154HI, -V_{OUT}



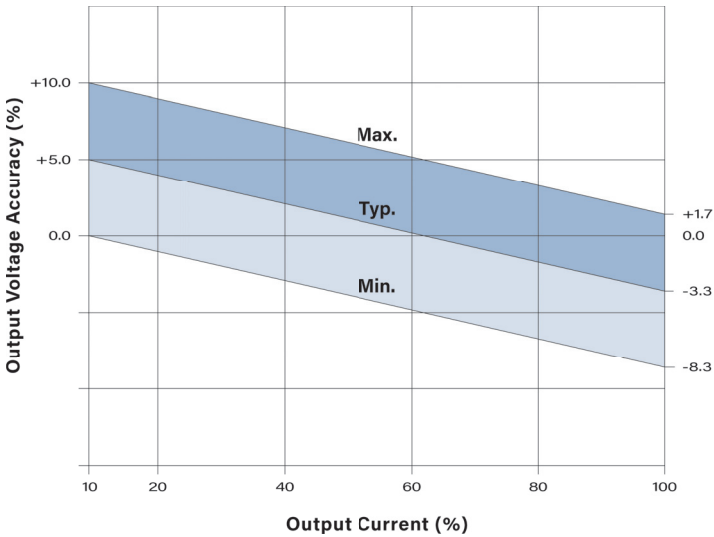
Output Voltage Tolerance: MSC212-205HI, +V_{OUT}



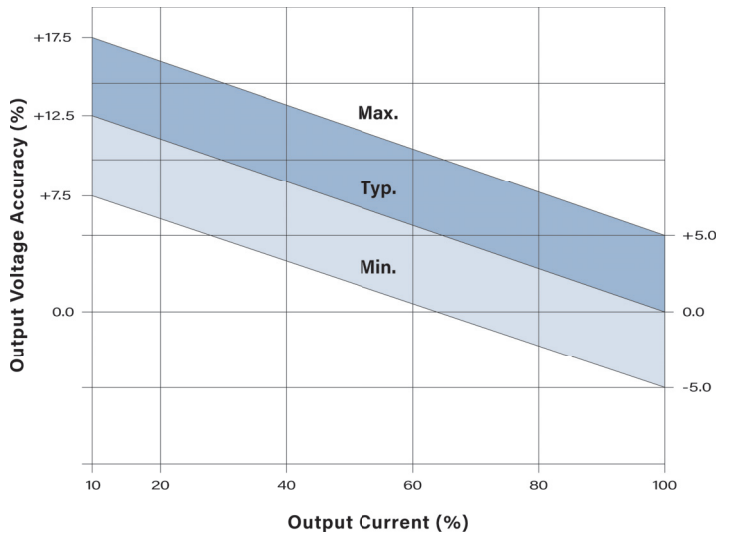
Output Voltage Tolerance: MSC212-205HI, -V_{OUT}



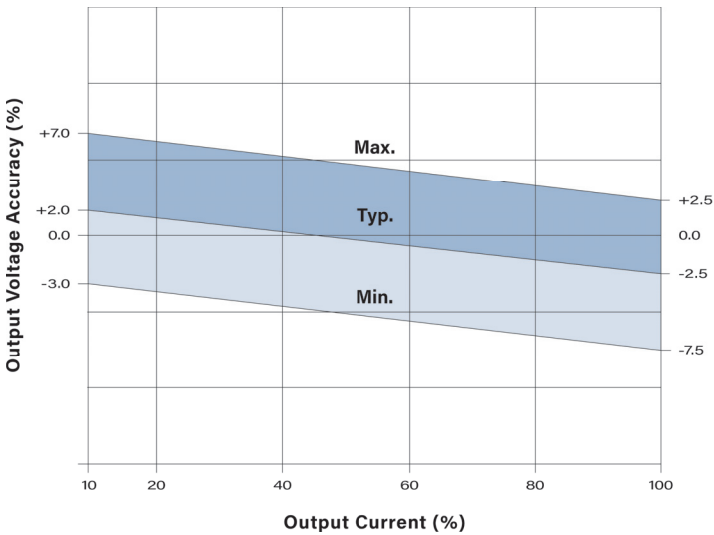
Output Voltage Tolerance: MSC215-154HI, +V_{OUT}



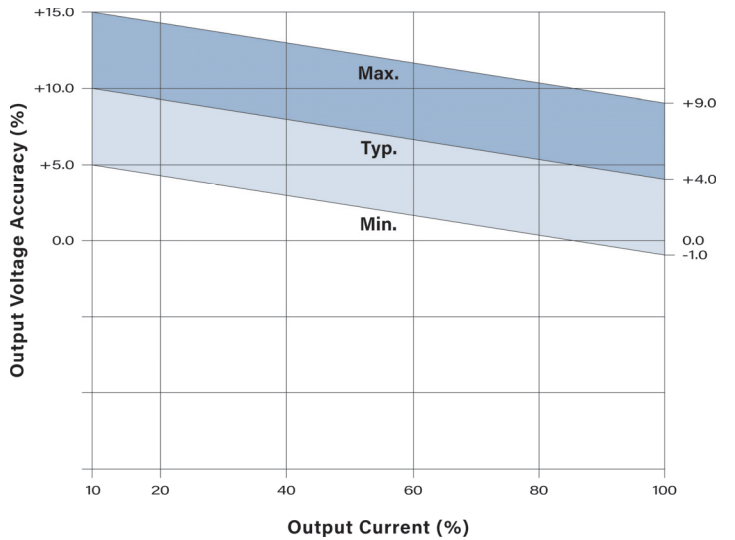
Output Voltage Tolerance: MSC215-154HI, -V_{OUT}



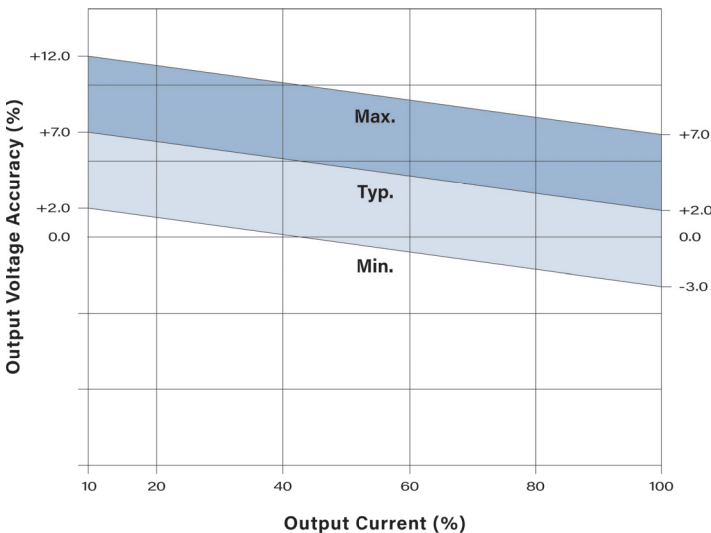
Output Voltage Tolerance: MSC215-205HI, +V_{OUT}



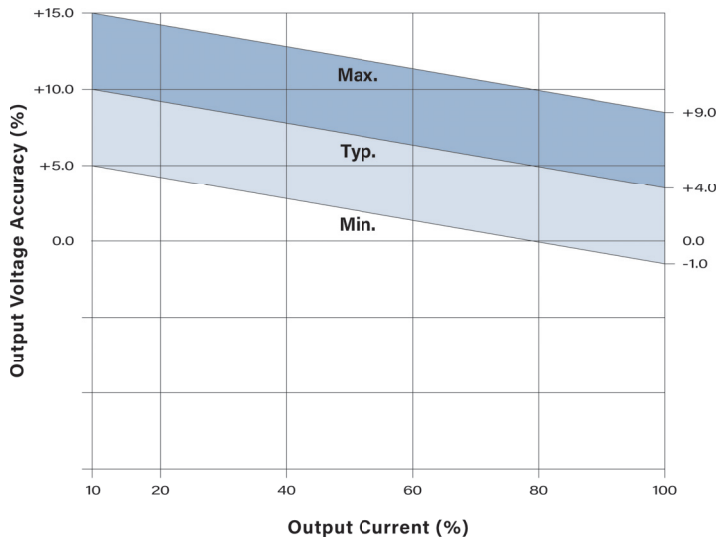
Output Voltage Tolerance: MSC215-205HI, -V_{OUT}



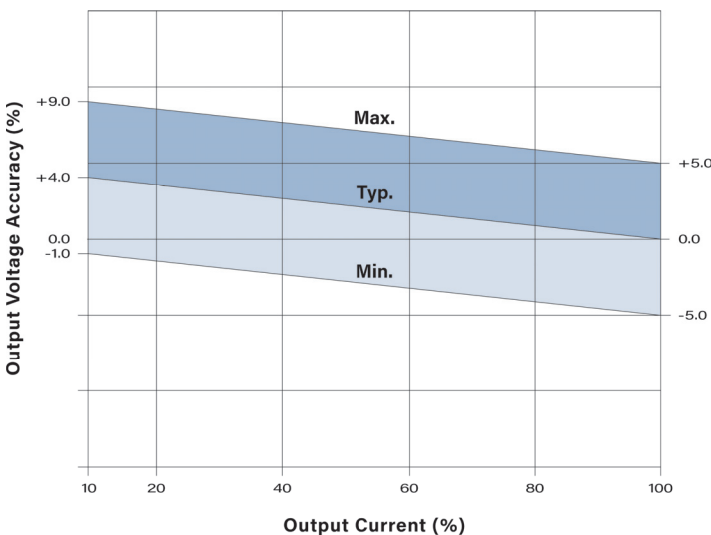
Output Voltage Tolerance: MSC224-154HI, +V_{OUT}



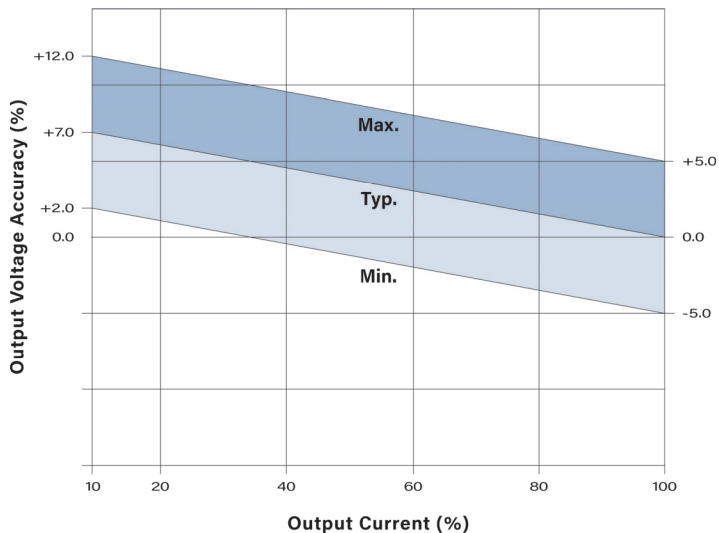
Output Voltage Tolerance: MSC224-154HI, -V_{OUT}



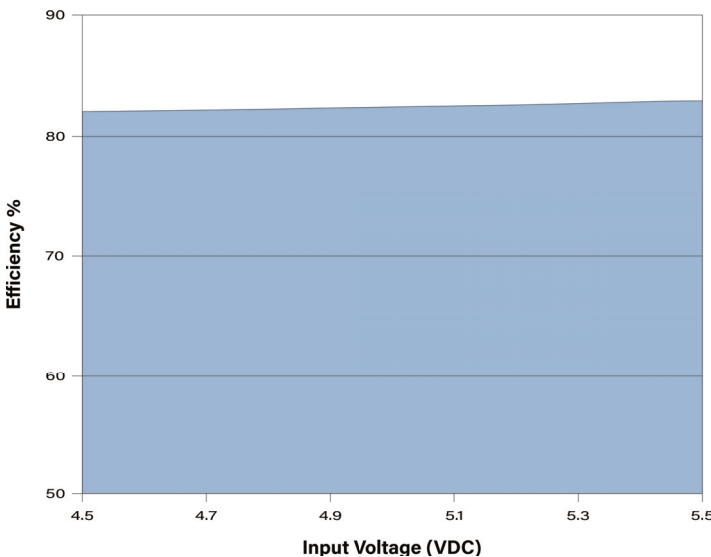
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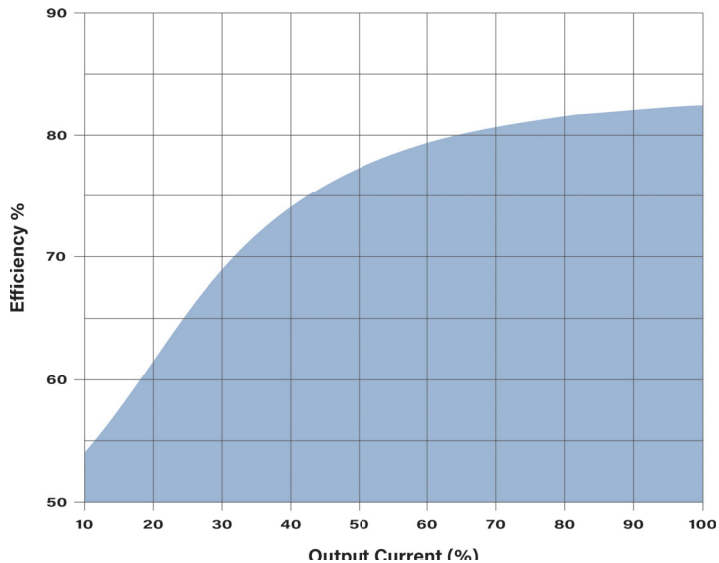
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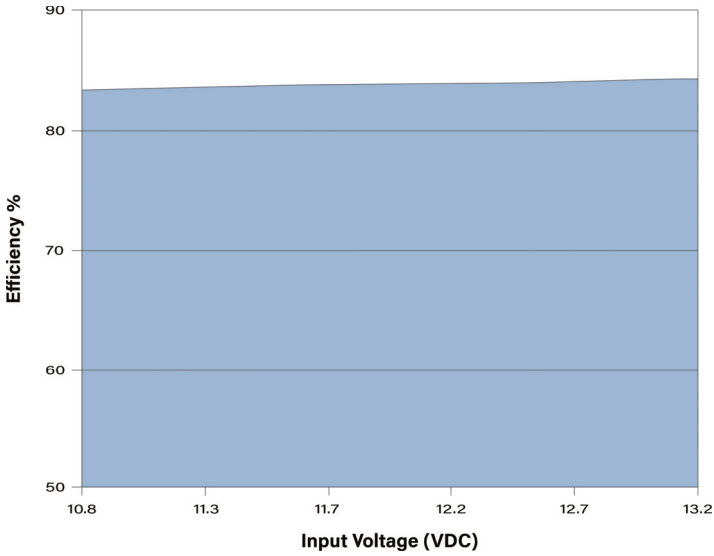
Efficiency vs Input: 5VIN Models



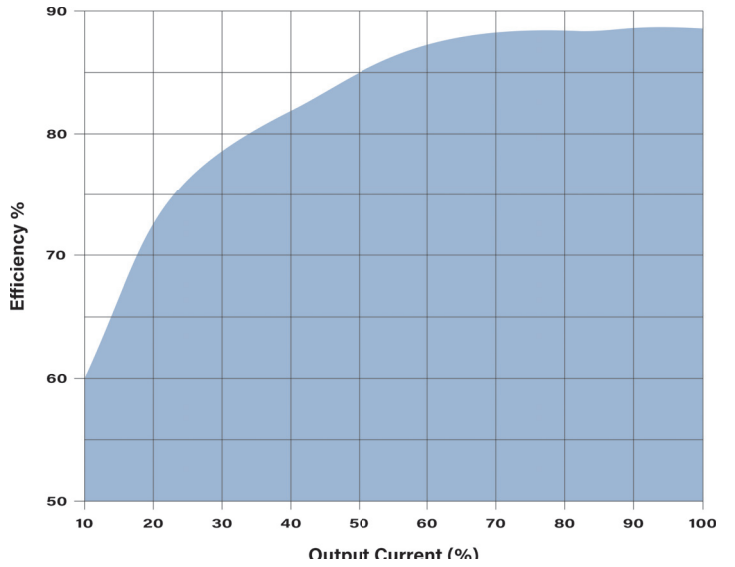
Efficiency vs Output Load: 5VIN Models



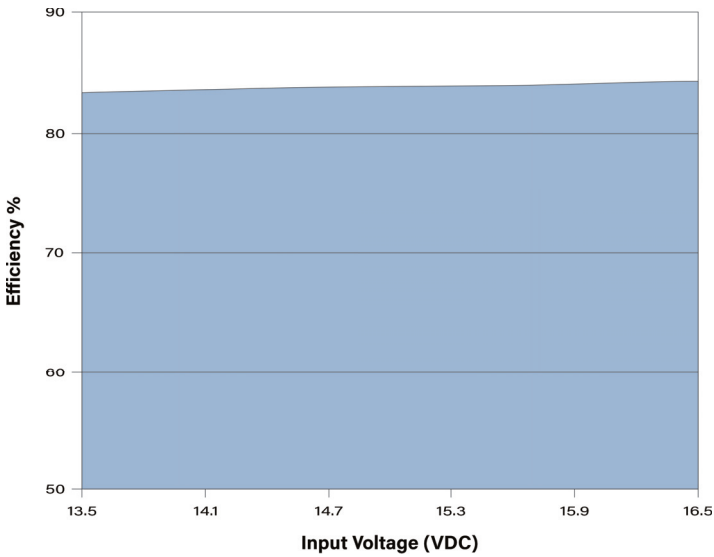
Efficiency vs Input: 12VIN Models



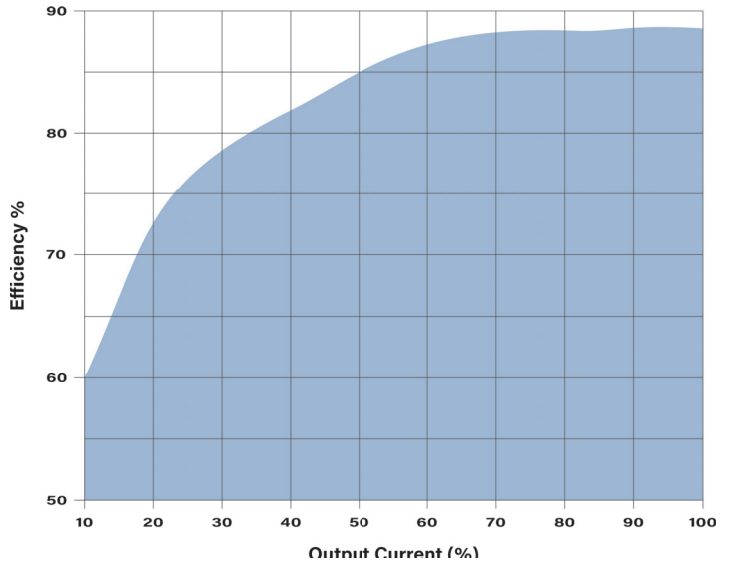
Efficiency vs Output Load: 12VIN Models



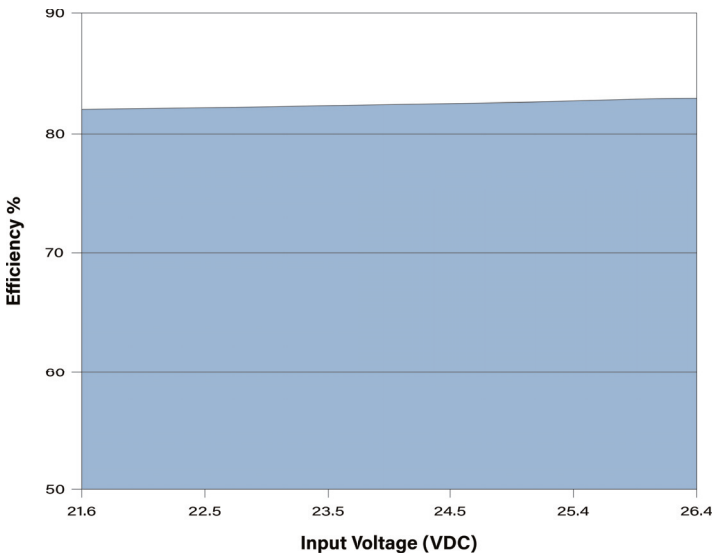
Efficiency vs Input: 15VIN Models



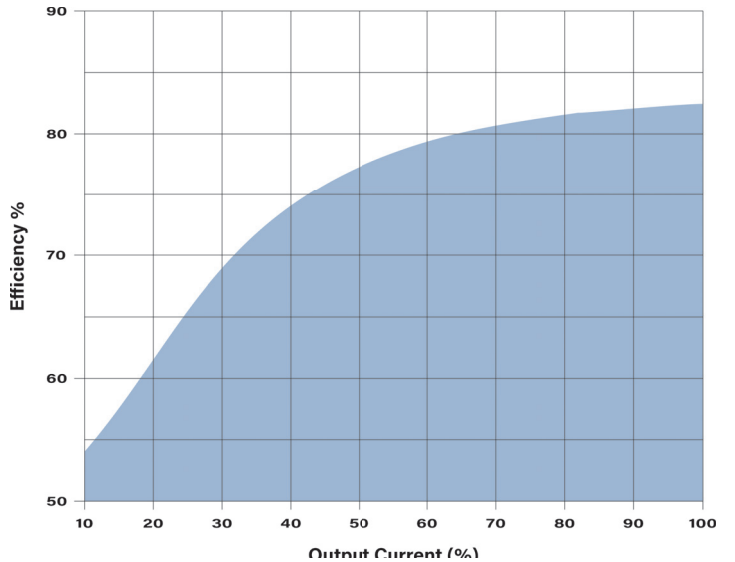
Efficiency vs Output Load: 15VIN Models



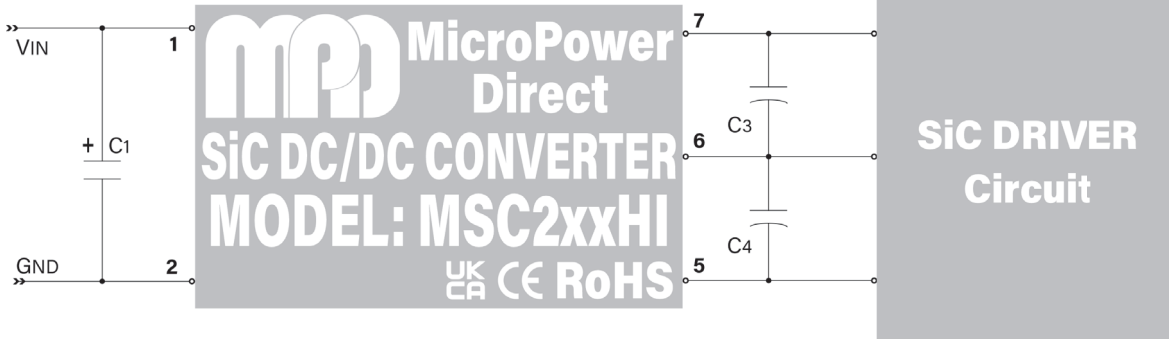
Efficiency vs Input: 24VIN Models



Efficiency vs Output Load: 24VIN Models



Typical Connection



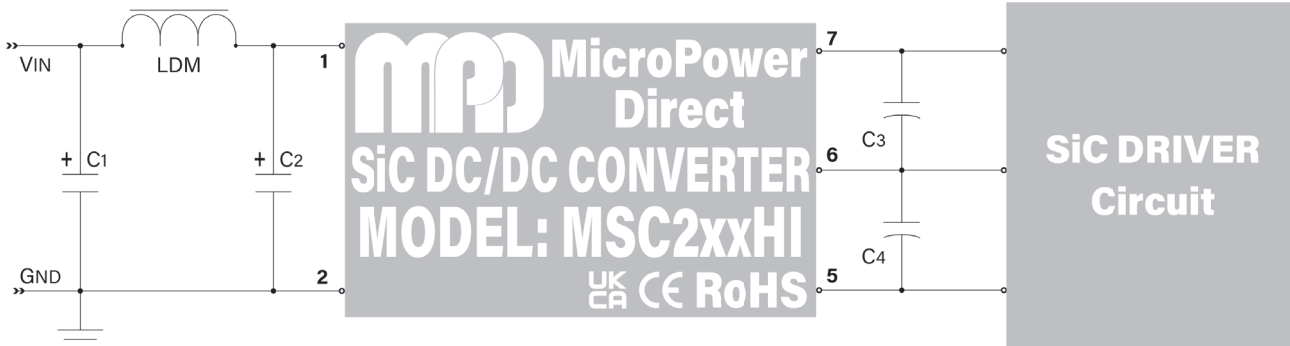
Specifically designed to be used in the driver circuits for silicon carbide (SiC) MOSFETs, the asymmetrical outputs of the MSCHI series provides the positive/negative gate bias needed to efficiently switch the MOSFET.

The circuit above shows a simple connection to a driver circuit. Low ESR electrolytic capacitors should be used. The recommended values for all capacitors is given in the chart at the right of the diagram.

Recommended component values:

Component	Value
C1	100 μ F/35V
C3, C4	100 μ F/35V

EMI Connection: All Models, Class A

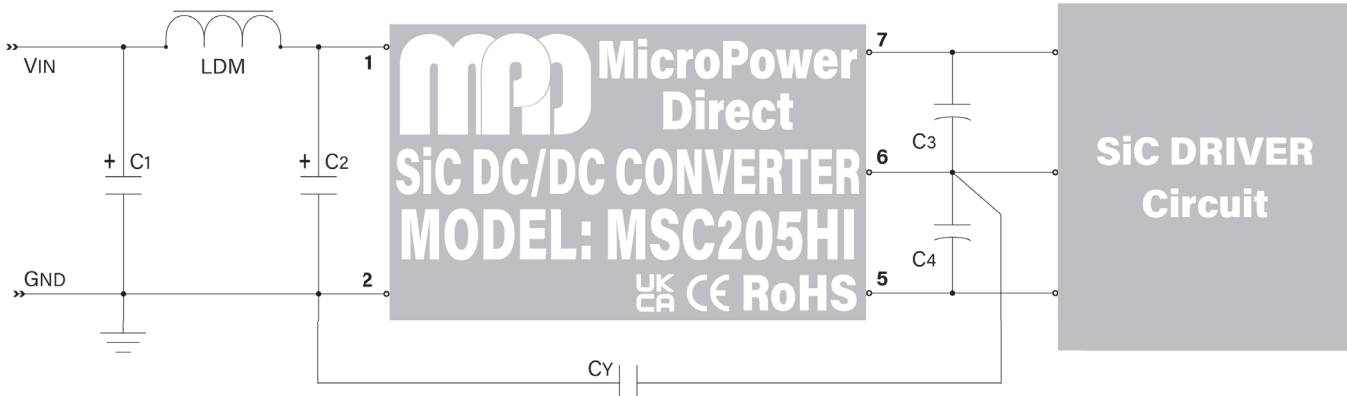


For noise sensitive applications that require the power circuit meets EN 55032 limits, the circuit above shows a connection for the MSCHI series that typically meets Class A EMI limits. Low ESR electrolytic capacitors should be used. The recommended values for all components is given in the chart at the right of the diagram.

Recommended component values:

Component	Input Voltage	
	5 VDC	All Other Models
C1, C2	4.7 μ F/16V	1 μ F/50V
LDM	6.8 μ H	33 μ H
C3, C4	10 μ F/50V	100 μ F/30V

EMI Connection: 5VIN Models, Class B

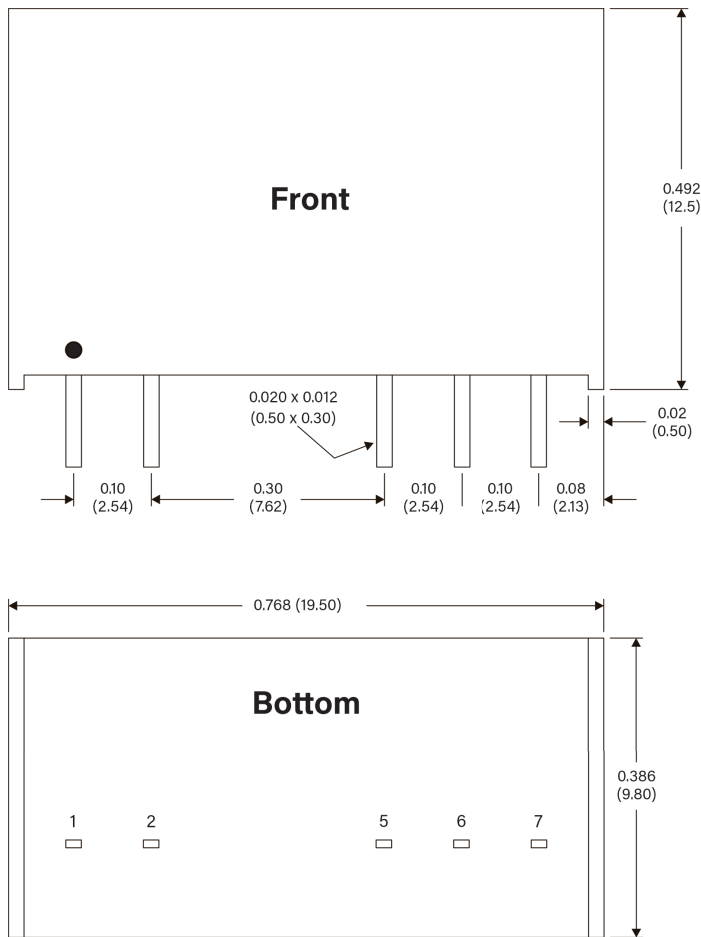


For noise sensitive applications that require the power circuit meets Class B EN 55032 limits, the circuit above shows a connection for the 5 VIN MSCHI series that typically meets Class B EMI limits. Low ESR electrolytic capacitors should be used. The recommended values for all components is given in the chart at the right of the diagram.

Recommended component values:

Component	Input Voltage
	5 VDC
C1, C2	4.7 μ F/16V
LDM	6.8 μ H
C3, C4	10 μ F/50V
CY	330 pF

Mechanical Dimensions



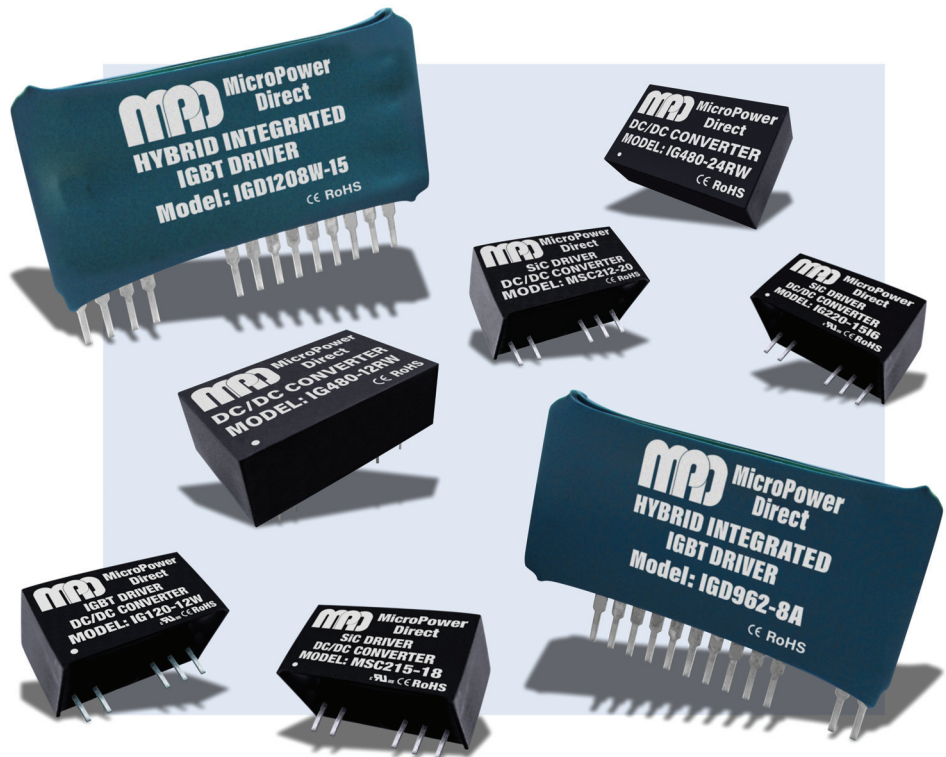
Pin Connections

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

Notes:

- All dimensions are typical in inches (mm)
- Pin 1 is marked by a "dot" or indentation on the unit
- General Tolerance = ± 0.02 (± 0.50)
- Pin Tolerance = ± 0.004 (± 0.10)
- Recommended pin hole size (on the application PC Board) is $\varnothing 0.039$ ($\varnothing 1.00$)
- Weight (Typ) = 0.152 Oz (4.3g)

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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