

Features

- 4:1 Wide Input Range & 2:1 Input Range
- Operating Temperature Range: -40~105°C
- Approved to cURus, FCC, UKCA, CE, RoHS & REACH
- Safety Standards to IEC/UL/EN62368-1 & EC/EN/ANSI/AAMI ES 60601-1
- Efficiency up to 90%
- EMC Class A & B
- Single & Dual output 9~75V DC
- OCP, OTP, OVP SCP & UVP



Ideal Power's 43MPM20-xyz(W) 20W Series DIP DC/DC Converters are certified to cURus, UKCA, CE, FCC, CB, RoHS, REACH & EC/ EN/ ANSI/ AAMI ES 60601-1 & IEC/ EN/ UL 62368-1 Standards and comply with the relevant Efficiency Regulations. These are primarily used in ITE, Video & Audio, Medical Industries and customised solutions are available upon request.

Part Number Structure

MPM20	-	48	S	05	W	-	P
Series Name		Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range		Remote On/Off Options
		12: 9 ~ 18 24: 18 ~ 36 48: 36 ~ 75	S: Single	05:5 12:12 15:15 24: 24	□: 2:1		□: No pin P: Positive logic N: Negative logic
			D: Dual	05:±5 12: ±12 15: ±15			
		24: 9 ~ 36 48: 18 ~ 75	S: Single	05:5 12:12 15:15 24: 24	W: 4:1		□: No pin P: Positive logic N: Negative logic
			D: Dual	05:±5 12: ±12 15: ±15			

Models

Model Number	Input Range V DC	Output Voltage V DC	Output current @ Full Load A	Input Current @ No Load A	Efficiency %	Maximum Capacitor Load µF
43MPM20-12S05	9 ~ 18	5	4000	8	88.5	5000
43MPM20-12S12	9 ~ 18	12	1670	12	88.5	850
43MPM20-12S15	9 ~ 18	15	1330	13	89	700
43MPM20-12S24	9 ~ 18	24	833	11	89	220
43MPM20-12D05	9 ~ 18	±5	±2000	11	86	±2500
43MPM20-12D12	9 ~ 18	±12	±833	11	89	±500
43MPM20-12D15	9 ~ 18	±15	±667	14	89	±350
43MPM20-24S05	18 ~ 36	5	4000	8	90	5000
43MPM20-24S12	18 ~ 36	12	1670	9	90	850
43MPM20-24S15	18 ~ 36	15	1330	9	90	700
43MPM20-24S24	18 ~ 36	24	833	9	90	220
43MPM20-24D05	18 ~ 36	±5	±2000	11	86	±2500
43MPM20-24D12	18 ~ 36	±12	±833	9	90	±500
43MPM20-24D15	18 ~ 36	±15	±667	11	90	±350
43MPM20-48S05	36 ~ 75	5	4000	9	89.5	5000
43MPM20-48S12	36 ~ 75	12	1670	9	88.5	850
43MPM20-48S15	36 ~ 75	15	1330	9	89	700
43MPM20-48S24	36 ~ 75	24	833	9	88.5	220
43MPM20-48D05	36 ~ 75	±5	±2000	9	86	±2500
43MPM20-48D12	36 ~ 75	±12	±833	9	88.5	±500
43MPM20-48D15	36 ~ 75	±15	±667	9	89	±350
43MPM20-24S05W	9 ~ 36	5	4000	8	88.5	5000
43MPM20-24S12W	9 ~ 36	12	1670	11	88.5	850
43MPM20-24S15W	9 ~ 36	15	1330	10	89	700
43MPM20-24S24W	9 ~ 36	24	833	10	88.5	220
43MPM20-24D05W	9 ~ 36	±5	±2000	9	86	±2500
43MPM20-24D12W	9 ~ 36	±12	±833	10	88.5	±500
43MPM20-24D15W	9 ~ 36	±15	±667	11	89	±350
43MPM20-48S05W	18 ~ 75	5	4000	9	89.5	5000
43MPM20-48S12W	18 ~ 75	12	1670	9	88.5	850
43MPM20-48S15W	18 ~ 75	15	1330	9	89	700
43MPM20-48S24W	18 ~ 75	24	833	9	88.5	220
43MPM20-48D05W	18 ~ 75	±5	±2000	9	86	±2500
43MPM20-48D12W	18 ~ 75	±12	±833	9	88.5	±500
43MPM20-48D15W	18 ~ 75	±15	±667	9	89	±350

Input Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Operating input voltage range	2:1	12Vin(nom)	9	12	18	VDC
		24Vin(nom)	18	24	36	
		48Vin(nom)	36	48	75	
	(W) 4:1	24Vin(nom)	9	24	36	
		48Vin(nom)	18	48	75	
Startup voltage	2:1	12Vin(nom)	--	--	9	VDC
		24Vin(nom)	--	--	18	
		48Vin(nom)	--	--	36	
	(W) 4:1	24Vin(nom)	--	--	9	
		48Vin(nom)	--	--	18	
Shutdown voltage	2:1	12Vin(nom)	7.8	8	8.6	VDC
		24Vin(nom)	15.8	16	17.4	
		48Vin(nom)	32	33	34	
	(W) 4:1	24Vin(nom)	7.8	8	8.6	
		48Vin(nom)	15.8	16	17.4	
Startup time	Constant resistive load	Power up	--	30	60	ms
		Remote ON/OFF	--	30	60	
Input surge voltage	3 second, max.	12Vin(nom)	--	--	25	VDC
		24Vin(nom)	--	--	50	
		48Vin(nom)	--	--	100	
	3 second, max.	24Vin(nom)	--	--	50	
		48Vin(nom)	--	--	100	
Input filter		Pi type				
Remote ON/OFF (Option)	Referred to - Vin pin	Positive logic DC-DC ON	Open or 3.5 ~ 12VDC			
		DC-DC OFF	Short or 0 ~ 1.2VDC			
		Negative logic DC-DC ON	Short or 0 ~ 1.2VDC			
		DC-DC OFF	Open or 3.5 ~ 12VDC			
		Input current of Ctrl pin	-0.5	1		mA
		Remote off input current	2.5			

Output Specifications

Parameter	Conditions		Min	Typ	Max	Unit	
Voltage accuracy			-1.0	--	+1.0		
Line regulation	Low Line to High Line at Full Load	Single	-0.2	--	+0.2		
		Dual	-0.5	--	+0.5		
Load regulation	No Load to Full Load	Single	-0.2	--	+0.2	%	
		Dual	-1.0	--	+1.0		
Cross regulation	Asymmetrical load 25%/100% FL		-5.0	--	+5.0		
Voltage adjustability	Single output	5Vout, 12Vout	-10	--	+10		
		15Vout, 24Vout	-10	--	+20		
Ripple and noise	Measured by 20MHz bandwidth						
			Single				
		With a 10µF/25V X7R MLCC	5Vout	--	50	--	mVp-p
		With a 10µF/25V X7R MLCC	12Vout	--	75	--	
		With a 10µF/25V X7R MLCC	15Vout	--	75	--	
		With a 4.7µF/50V X7R MLCC	24Vout	--	100	--	
			Dual				
		With a 10µF/25V X7R MLCC	±5Vout	--	50	--	
		With a 10µF/25V X7R MLCC	±12Vout	--	75	--	
		With a 10µF/25V X7R MLCC	±15Vout	--	75	--	
Temperature coefficient			-0.02		+0.02	%/°C	
Transient response recovery time	25% load step change		--	250	--	µs	
Over voltage protection	Zener diode clamp	5Vout	--	6.2	--	VDC	
		12Vout	--	15	--		
		24Vout	--	20	--		
		5Vout	--	30	--		
Overload protection	% of Iout rated; Hiccup mode		--	150	185	%	
Short circuit protection			Continuous, automatic recovery				

General Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Isolation voltage	1 minute	Input to Output	5000	--	--	V AC
	Reinforced insulation for 250VAC working voltage					
Isolation resistance	500V DC		10	--	--	GΩ
Isolation capacitance			--	20	--	pF
Leakage current	240V AC, 60Hz		--	2	2.5	µA
Switching frequency			225	250	285	kHz
Clearance/Creepage			8	--	--	mm
Safety approvals	EC/ EN/ ANSI/AAMI ES 60601-1					UL:E360199
	IEC/ EN/ UL 62368-1					UL:E193009 CB:UL(Demko)
Case material			Non-conductive black plastic			
Base material			None			
Potting material			Silicone (UL94 V-0)			
Weight			24g (0.85oz)			
MTBF	MIL-HDBK-217F, Full Load		1.712×10 ⁶ hrs			

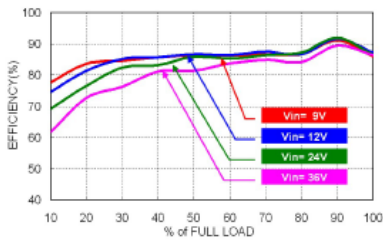
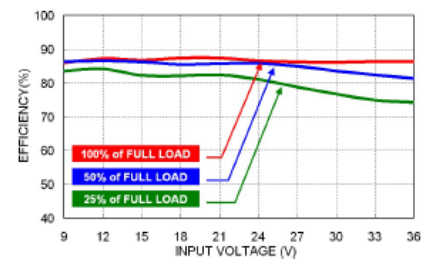
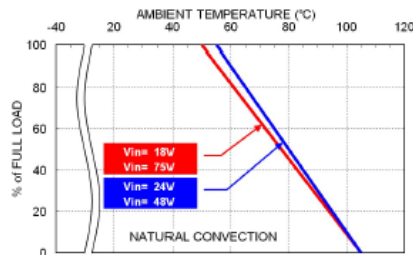
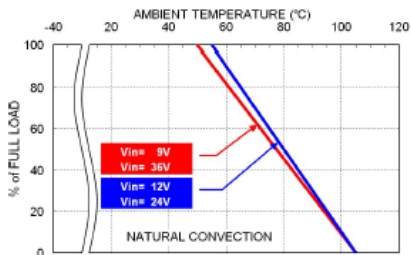
Environmental Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Operating ambient temperature	With derating	-40	--	+105	°C
Maximum case temperature		--	--	105	°C
Over temperature protection		--	115	--	°C
Storage temperature range		-55	--	+125	°C
Operating altitude		--	--	5000	m
Thermal impedance		--	14.36	--	°C/W
Thermal Shock					MIL-STD-810F
Vibration					MIL-STD-810F
Relative humidity					5% to 95% RH

EMC Specifications

Parameter	Conditions	Level
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15	
	Without external components.	Class A
	With external components.	Class B
EMS	EN55024 and EN60601-1-2	Perf. Criteria A
ESD	EN61000-4-2 Air ± 15kV and Contact ± 8kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
	EN61000-4-4 ± 2kV	Perf. Criteria A
Fast transient	43MPM20-12□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ36A, 36V, 3000-Watt peak pulsepower) in parallel.	
	43MPM20-24□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000-Watt peak pulsepower) in parallel.	
	43MPM20-48□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000-Watt peak pulsepower) in parallel.	
Surge	EN61000-4-5 ± 2kV	Perf. Criteria A
	43MPM20-12□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ36A, 36V, 3000-Watt peak pulsepower) in parallel.	
	43MPM20-24□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000-Watt peak pulsepower) in parallel.	
	43MPM20-48□□□□ With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-Con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000-Watt peak pulsepower) in parallel.	
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous, 1000A/m 1 second	Perf. Criteria A

Characteristic Curve



43MPM20-48D05W Derating Curve

Fuse Considerations

This power module is not internally fused. An input line fuse must always be used.

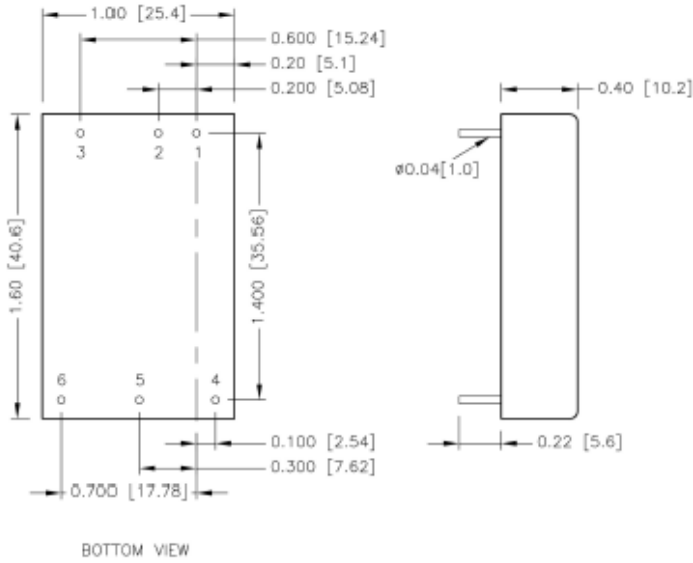
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
43MPM20-12□□□, 24□□□W	4	Slow-Blow
43MPM20-24□□□, 48□□□W	2	Slow-Blow
43MPM20-48□□□	1	Slow-Blow

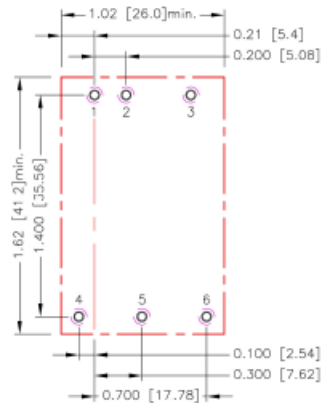
The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

Mechanical Drawing


1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

Pin Connection

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl (Option)	Ctrl (Option)
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

Recommended Pad Layout


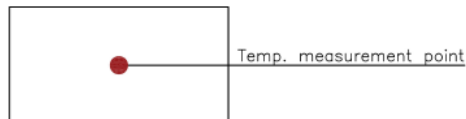
- * There should be at least 8mm distance between primary and secondary circuit.
- ** For further information, please contact P-DUKE.

All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1.2.3.4.5.6: $\varnothing 0.051[1.30]$
 Top view pad 1.2.3.4.5.6: $\varnothing 0.064[1.63]$
 Bottom view pad 1.2.3.4.5.6: $\varnothing 0.102[2.60]$

Thermal Considerations

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding Environment. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed "Maximum case temperature". When operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature". You can limit this Temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW

Output Voltage Adjustment

It allows the user to increase or decrease the output voltage of the module.

This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins. With an external resistor between the Trim and -Vout pin, the output voltage increases.

With an external resistor between the Trim and +Vout pin, the output voltage decreases. The external Trim resistor needs to be at least 1/8W of rated power.

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

Trim-up

It allows the user to increase or decrease the output voltage of the module.

This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins.

With an external resistor between the Trim and -Output pin, the output voltage increases.

With an external resistor between the Trim and +Output pin, the output voltage decreases.

The external Trim resistor needs to be at least 1/16W of rated power.

Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{o,up} - L) - K} - H \right] \Omega$$

Trim Down Equation

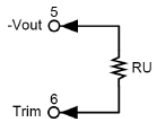
$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

Trim Constants

Module	G	H	K	L
MPM20-□□S05 · □□S05W	5110	2050	2.5	2.5
MPM20-□□S12 · □□S12W	10000	5110	9.5	2.5
MPM20-□□S15 · □□S15W	10000	5110	12.5	2.5
MPM20-□□S24 · □□S24W	56000	13000	21.5	2.5

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



□□S05, □□S05W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5
RU (kΩ)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

□□S12, □□S12W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2
RU (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

□□S15, □□S15W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5
RU (kΩ)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	16.65	16.8	16.95	17.1	17.25	17.4	17.55	17.7	17.85	18
RU (kΩ)	10.042	8.779	7.711	6.795	6.001	5.307	4.694	4.149	3.662	3.223

Ideal Power Limited

14 Larks Way, Tree Beech Enterprise Park, Gunn, Barnstaple, Devon, England, EX32 7NZ.

www.idealpower.co.uk | +44 (0) 845 260 3400

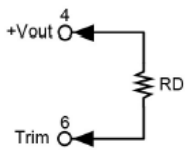
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Trim-up (Continued)

□□S24, □□S24W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.2	25.44	25.68	25.92	26.16	26.4
RU (kΩ)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.64	26.88	27.12	27.36	27.6	27.84	28.08	28.32	28.56	28.8
RU (kΩ)	40.030	35.611	31.872	28.667	25.889	23.458	21.314	19.407	17.702	16.167

Trim-down


□□S05, □□S05W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.95	4.9	4.85	4.8	4.75	4.7	4.65	4.6	4.55	4.5
RU (kΩ)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

□□S12, □□S12W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.88	11.76	11.64	11.52	11.4	11.28	11.16	11.04	10.92	10.8
RU (kΩ)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

□□S15, □□S15W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5
RU (kΩ)	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

□□S24, □□S24W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.76	23.52	23.28	23.04	22.8	22.56	22.32	22.08	21.84	21.6
RU (kΩ)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667