20DBMW4_6 series

20W - Single/Dual Output DC-DC Converter - Wide Input - Isolated & Regulated

DC-DC Converter 20 Watt

- 4:1 input voltage range
- 5000VAC isolation
- Reinforced isolation for 250Vrms working voltage
- Up to 90% efficiency
- Under voltage protection
- Remote on/off control
- Adjustable output voltage
- Short circuit protection (SCP)
- Over load protection
- Over voltage protection
- Over temperature protection

Introducing our new 20DBMW4_6 series, a high-performance DC-DC converter engineered for applications requiring maximum safety, flexibility, and efficiency. Featuring a wide 4:1 input voltage range, it adapts seamlessly to varying supply conditions while ensuring stable and reliable operation. With 5000 VAC isolation and reinforced isolation for a 250 Vrms working voltage, the 20DBMW4_6 series is designed to meet stringent safety and insulation requirements. Delivering efficiency levels of up to 90%, it supports energy-efficient system designs without compromising performance. Comprehensive protection features are integrated as standard, including input undervoltage protection, short-circuit protection (SCP), overload protection, overvoltage protection, and overtemperature protection, ensuring robust operation under all conditions. Additional functionality such as remote on/off control and adjustable output voltage provides designers with enhanced control and system-level flexibility.

SHORT CIRCUIT PROTECTED

100% RoHS compliant 6/6

c UL us
UL62368 - E347551

Common specifications

Short circuit protection	Indefinite (hiccup - automatic recovery)
Over temperature protection	115°C (typ.) case temperature
Switching frequency	275 kHz
Operation temperature	-40°C ~+100°C (with derating)
Storage temperature	-55°C ~+125°C
Soldering temperature*	260°C (1.5mm from case 10sec max.)
Maximum case temperature	105°C
Thermal impedance	13.2°C/W
Storage humidity	95% RH
MTBF: (MIL-HDBK-217F@25°C)	533,000 hours
Input filter	Pi Type
Cooling	30-65 LFM (natural convection)
Leakage current	2.0μA (240VAC, 60Hz)
Clearance/creepage	8mm
Safety standard	IEC / EN / UL 62368-1, DK-127793-UL, E252573
Insulation system	Reinforced Isolation
Case material	Non-conductive black plastic (UL94V-0 rated)
Base material	Non-conductive black plastic (UL94V-0 rated)
Pin material	Φ1.0mm brass solder-coated
Potting material	Silicone (UL94V-0 rated)
Weight	22 g (typ.)
Dimensions	1.61" x 1.00" x 0.40"

Note: * These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation Voltage	Input-output, and rated for 60sec	5000			VAC
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output		17		pF

Example:
20DBMW4_2405S6
20 = 20Watt; D = DIP; BM = Series; W4 = Wide input; 24 = 24Vin; 05 = 5Vout; S = Single Output; 6 = 6000VDC isolation

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy		-1.0		+1.0	%
Voltage adjustability (trim)		-10		+10	%
Line regulation	Single output Dual output	-0.2 -0.5		+0.2 +0.5	%
Load regulation (from 0% to 100% load)	Single output Dual output	-0.5 -1.0		+0.5 +1.0	%
Cross regulation	Asymmetrical Load 25% / 100% for dual output	-5		+5	%
Ripple & noise (20mhz bandwidth)*	5V output 12V & 15V output		50 75		mVpk-pk
Over voltage protection (zener diode clamp)	5V output 12V output 15V output		6.2 15 18		VDC
Over current protection			150		% of FL
Temperature coefficient		-0.02		+0.02	%/°C
Maximum capacitive load	Minimum Vin and constant resistive load		See Table		
Transient recovery time**	All models		250		μs
Transient response deviation**	5V output 12V & 15V output	-5 -3		+5 +3	%

Note: *Measured with a 10μF ceramic capacitor.
** Nominal Vin and 25% load step change (75% - 50% - 25% of Io)

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input voltage range	24V Input 48V Input	9 18	24 48	36 75	VDC
Under voltage protection	24V Input, module ON 24V Input, module OFF 48V Input, module ON 48V Input, module OFF		8.2 7.5 17.4 16.0		VDC
Input reflected ripple current*			20		mApk-pk
Start up time	Nominal Vin and constant resistive load		20		ms
Remote on/off control**	• Module ON (open circuit) • Module OFF (short circuit pin 2 and pin 6) • OFF idle current • CTRL pin input current	3.0 0	 2.5	12 1.2 1	VDC VDC mA mA
Recommended input fuse (slow blow)	24V Input 48V Input		4 2		A
Input surge voltage (100 ms)***	24V Input 48V Input		50 100		VDC

Note: *Measured with a simulated source inductance of 4.7μH and a source capacitor Cin (22μF, ESR <1.0Ω at 100kHz).
**The remote on/off control pin is referenced to –Vin (pin2).
***These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

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EMC specifications					
EMC	EMI	CE	EN55032	without external components	Criterion A
EMC	EMI	RE	EN55032	without external components	Criterion A
EMC	EMS	ESD	IEC 61000-4-2	Air ± 15kV, Contact ± 8kV	Criterion A
EMC	EMS	RS	IEC 61000-4-3	20V/m	Criterion A
EMC	EMS	EFT	IEC 61000-4-4	±2kV with external components	Criterion A
EMC	EMS	Surge	IEC 61000-4-5	±2kV with external components	Criterion A
EMC	EMS	CS	IEC 61000-4-6	10Vrms	Criterion A
EMC	EMS	PFMF	IEC 61000-4-8	100A/m	Criterion A

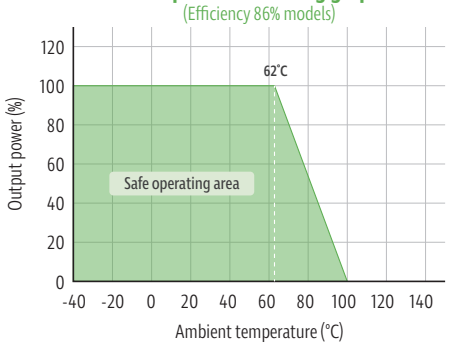
Product Selection Guide

Approval	Part number	Input Voltage Nominal Range (VDC)	Input Current No-Load (mA, max.)	Input Current Full Load (mA, typ.)	Output Voltage (VDC)	Output Current Min. load (mA)	Output Current Full load (mA)	Full Load Efficiency (%) typ.	Capacitive Load (µF) max.
	20DBMW4_2405S6	9~36	15	942	5	0	4000	88.5	5000
	20DBMW4_2412S6	9~36	15	938	12	0	1670	89	850
	20DBMW4_2415S6	9~36	15	934	15	0	1330	89	700
	20DBMW4_4805S6	18~75	15	468	5	0	4000	89	5000
	20DBMW4_4812S6	18~75	15	472	12	0	1670	88.5	850
	20DBMW4_4815S6	18~75	15	462	15	0	1330	90	700

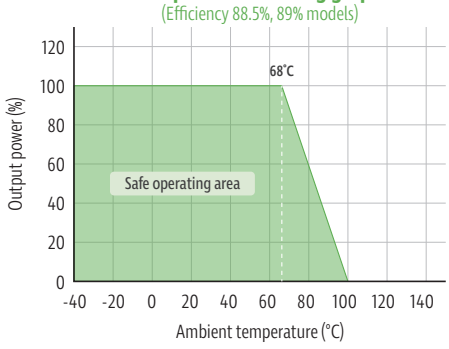
Approval	Part number	Input Voltage Nominal Range (VDC)	Input Current No-Load (mA, max.)	Input Current Full Load (mA, typ.)	Output Voltage (VDC)	Output Current Min. load (mA)	Output Current Full load (mA)	Full Load Efficiency (%) typ.	Capacitive Load (µF) max.
	20DBMW4_2405D6	9~36	15	969	±5	0	±2000	86	±2500
	20DBMW4_2412D6	9~36	15	936	±12	0	±833	89	±500
	20DBMW4_2415D6	9~36	15	937	±15	0	±667	89	±350
	20DBMW4_4805D6	18~75	15	485	±5	0	±2000	86	±2500
	20DBMW4_4812D6	18~75	15	471	±12	0	±833	88.5	±500
	20DBMW4_4815D6	18~75	15	469	±15	0	±667	89	±350

Typical characteristics

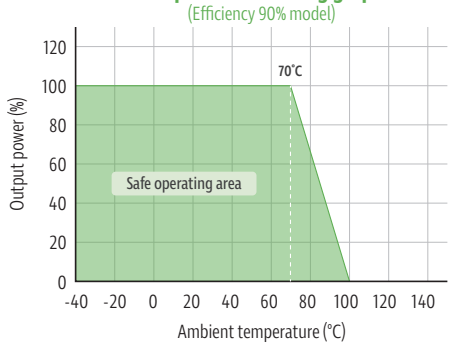
Temperature derating graph
(Efficiency 86% models)



Temperature derating graph
(Efficiency 88.5%, 89% models)

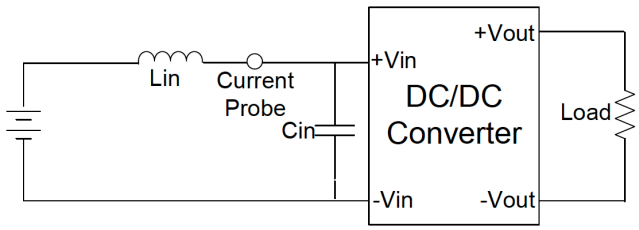


Temperature derating graph
(Efficiency 90% model)



Typical circuit design and application

Input reflected ripple current is measured with a source inductor Lin(4.7µH) and a source capacitor Cin(22µF, ESR<1.0Ω at 100kHz) at nominal input and full load.



Over Current Protection
The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).The module will try to restart after shut down. If the over load condition still exists, the module will shut down again

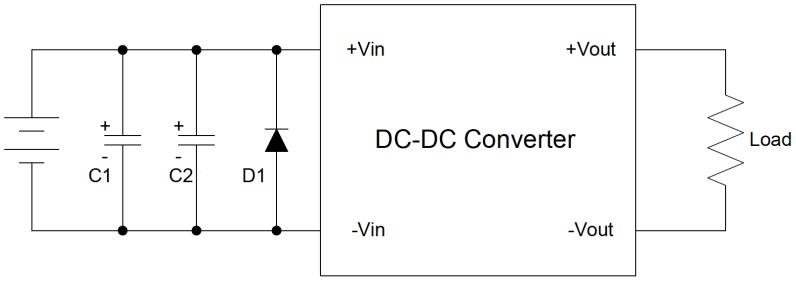
Over Voltage Protection
The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

Over Temperature Protection Test
The over temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the over temperature threshold the module will shut down. The module will try to restart after shut down, if the over temperature condition still exists during restart, the module will shut down again. This restart trial will continue until the temperature is within specification.

Remote Module ON / OFF
Positive logic turns on the module during high logic and off during low logic. Remote module on/off can be controlled by an external switch between the CTRL terminal and -Vin terminal. For positive logic if the remote feature is not used, please leave the CTRL pin floating.

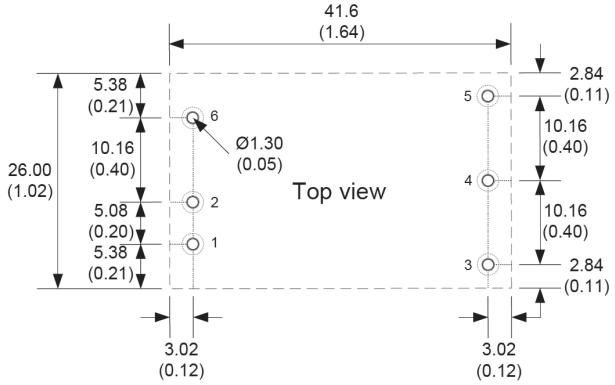
EMI Recommended component parameters

The Circuit is used to meet Surge & EFT test.



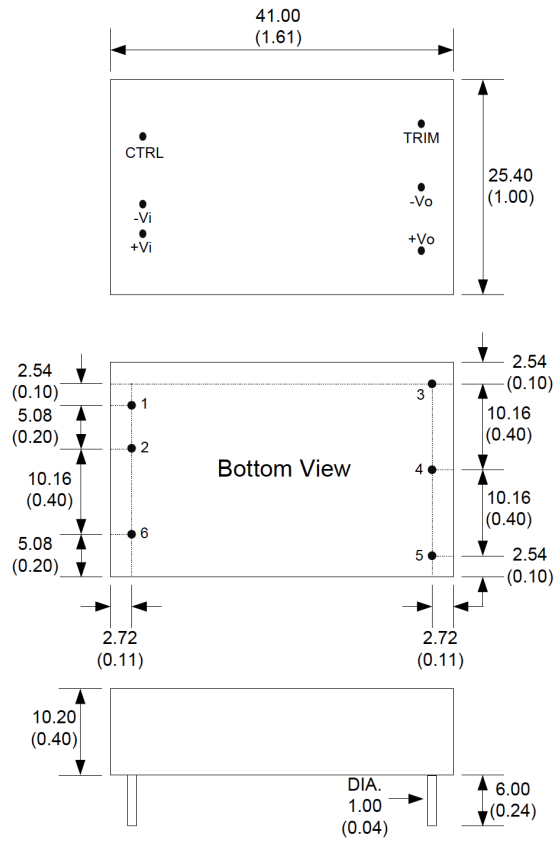
	C1, C2	D1
24V	NIPPON Chemi-con KY Series	SMDJ58A
48V	220uF, 100V	SMDJ120A

Recommend footprint details



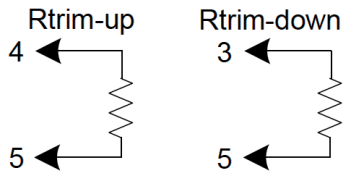
Notes:
1. All dimensions are typical in millimeters (inches).
Through hole (black) 1 ~ 6: Ø1.30 (0.05)
Top view pad (green) 1 ~ 6: Ø1.50 (0.06)
Bottom view pad (pink) 1 ~ 6: Ø2.60 (0.10)
2. There should be at least 8mm distance between primary and secondary circuit.

Mechanical dimensions



Pin Definition Table		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	-Vout	COM
5	Trim	-Vout
6	CTRL	CTRL

EXTERNAL OUTPUT TRIMMING
Output can be externally trimmed by using the method as below. (single output models only)



Notes:
All dimensions are typical in millimeters (inches).
Pin diameter: 1.0±0.05 (0.04±0.002)
Pin pitch and length tolerance: ±0.35 (±0.014)
Case Tolerance: ±0.5 (±0.02)