GAPTEC®
GREEN TECHNOLOGY

20DAW4_3 Series

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

DC-DC Converter 20 Watt

- Efficiency up to 89%
- 4:1 wide input voltage range
- Short circuit protection (SCP)
- Output over voltage protection
- Output over current protection
- Input under voltage protection
- 3kVDC isolation

The 20DAW4_3 series offers 20W of output, with 4:1 ultra wide input voltage of 9-36VDC or 18-75VDC, and features 3000VDC isolation, over current, over voltage and short-circuit protection, as well as six sided metal shielding.

All models are widely suited for power industry, data transmission devices, battery power supply and tele-communication devices, distributed power supply systems, remote control systems, industrial robot systems etc.

SHORT CIRCUIT PROTECTED

100% RoHS compliant 6/6

c UL us
UL-60950-1 (E347551)

Common specifications	
Short circuit protection:	Hiccup, continuous, self-recovery
Cooling:	Free air convection
Operation temperature range:	-40°C~+85°C Derating if the temperature is ≥55°C see Typical characteristics
Storage temperature range:	-55°C~+125°C
Case temperature: (Operating Temperature curve range)	105°C MAX
Storage humidity range:	5% MIN, 95% MAX
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10 sec
Switching frequency (PWM mode)*:	270kHz TYP
Vibration:	10-55Hz, 10G, 30 Min. along X, Y and Z
Case material:	Plastic (UL94-V0)
MTBF (MIL-HDBK-217F@25°C):	1000 K hours MIN
Weight:	24g

* This series of products using reduced frequency technology, the switching frequency is test value of full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and leakage current less than 1 mA	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	100KHz/0.1V		500		pF

Note:
1. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not The maximum capacitive load offered were tested at nominal input voltage and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
5. We can provide product customization service;
6. Specifications are subject to change without prior notice.

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Output power		1.5		20	W
Output voltage accuracy			±1	±3	%
Line regulation	Full load, Input voltage from low to high		±0.2	±0.5	%
Load regulation	10% to 100% load		±0.5	±1	%
Transient recovery time	25% load step change		300	500	µs
Transient response deviation	25% load step change • 3.3V, 5V output • Others		 ±5 ±3	 ±8 ±5	 % %
Temperature drift	100% full load			±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth		50	100	mVp-p
Over voltage protection	Input voltage range	110		160	%Vo
Trim	Input voltage range		±10		%Vo
Over current protection	Input voltage range	110		190	%Vo

* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

Example:
20DAW4_2415S3
20 = 20Watt; D = DIP; A = series; W4 = wide input (4:1) 9-36Vin; 15Vout; S = single output; 3 = 3000VDC isolation

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20DAW4_3 Series

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DC-DC Converter

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load / no-load)	24VDC input • 3.3V output • 5V output • Others 48VDC input • 3.3V output • 5V output • Others		 799/40 936/40 947/9 400/20 473/20 473/5	 819/45 958/45 969/12 410/25 485/25 485/8	 mA mA mA mA mA mA
Reflected ripple current	• 24VDC input • 48VDC input		30 30		mA mA
Input impulse voltage (1sec. max.)	• 24VDC input • 48VDC input	-0.7 -0.7		50 100	VDC VDC
Start-up voltage	• 24VDC input • 48VDC input			9 18	VDC VDC
Under voltage shut-down	• 24VDC input • 48VDC input	5.5 14	6.5 15.5		VDC VDC
Start-up time	Nominal input & constant resistance load		10		ms
Input filter	Pi filter				
Hot plug	Unavailable				
Ctrl [1]	• Models ON • Models OFF • Input current (Models OFF)	Ctrl suspended or connected to TTL high level (3.5-12VDC) Ctrl pin connected to GND or low level (0-1.2VDC)	4	7	mA

1. The voltage of Ctrl pin is relative to input pin GND.

EMC specifications

EMI	CE	CISPR22/EN55022 CLASS A (Bare component) CLASS B (External Circuit Refer to EMC recommended circuit,②)		
EMI	RE	CISPR22/EN55022 CLASS A (Bare component) CLASS B (External Circuit Refer to recommended circuit,②)		
EMS	ESD	IEC/EN61000-4-2 perf. Criteria B	Contact ±4KV	
EMS	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EMS	EFT	IEC/EN61000-4-4 (External Circuit Refer to recommended circuit,①)	±2KV	perf. Criteria B
EMS	Surge	IEC/EN61000-4-5 (External Circuit Refer to recommended circuit,①)	±2KV	perf. Criteria B
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
EMS	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29	0%-70%	perf. Criteria B

Part Number	Input Voltage [VDC] Nominal	Range	Max[1]	Output Voltage [VDC]	Output Current [mA, Max]	Efficiency[2] [%, Typ.]	Capacitive load [µF, Max]
20DAW4_2403S3	24	9-36	40	3.3	5000	86	10000
20DAW4_2405S3	24	9-36	40	5	4000	89	10000
20DAW4_2409S3	24	9-36	40	9	2222	88	4700
20DAW4_2412S3	24	9-36	40	12	1667	88	1600
20DAW4_2415S3	24	9-36	40	15	1334	89	1000
20DAW4_2424S3	24	9-36	40	24	833	89	500
20DAW4_4803S3	48	18-75	80	3.3	5000	86	10000
20DAW4_4805S3	48	18-75	80	5	4000	88	10000
20DAW4_4812S3	48	18-75	80	12	1667	88	4700
20DAW4_4815S3	48	18-75	80	15	1334	89	1000
20DAW4_4824S3	48	18-75	80	24	833	89	500

1. Absolute maximum rating without damage on the converter, but it isn't recommended

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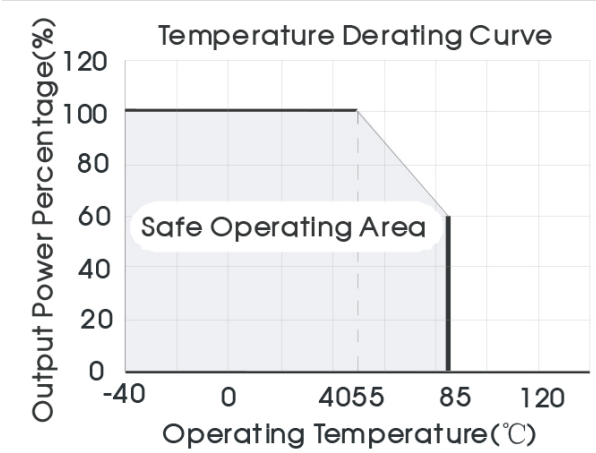
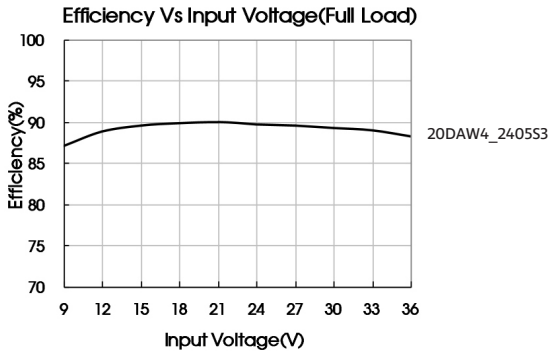
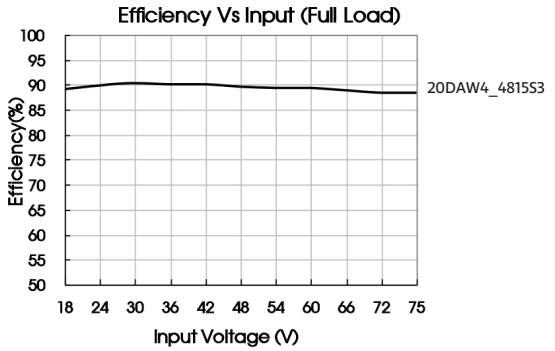
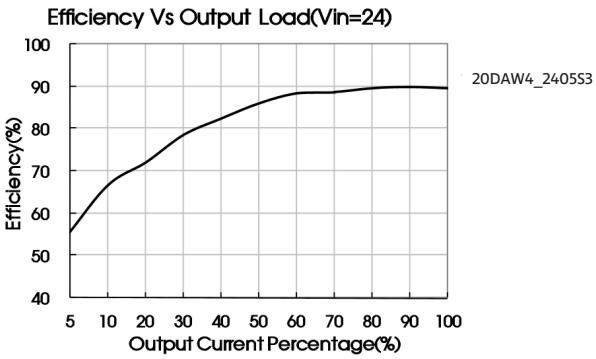
Typical characteristics

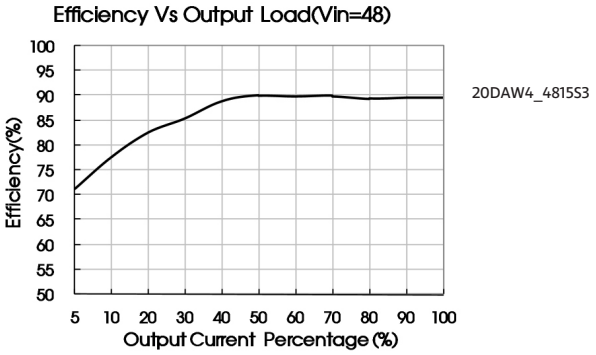


Efficiency curves









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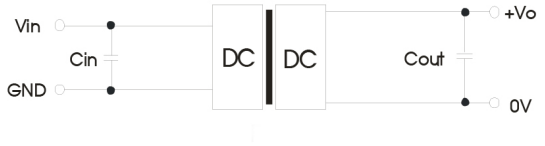
Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.



External capacitor table

Single Vout (VDC)	Cout (µF)	Cin (µF)
3.3, 5	470	100
9, 12, 15	220	100
24	100	100

EMC solution-recommended circuit

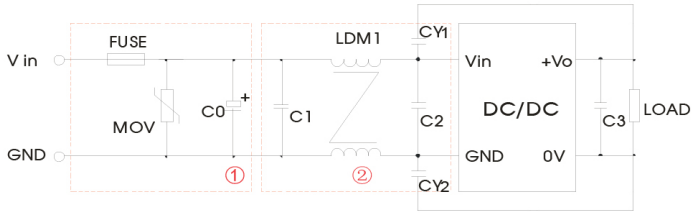


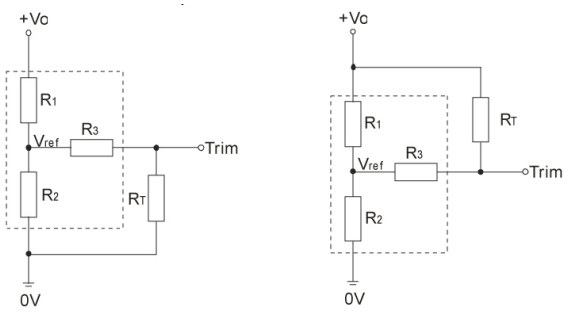
Figure 1

Note:
In Figure 1, part ① is used for EMS test, part ② for EMI filtering.
Choose according to requirements.

Recommended external circuit parameters	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	330µF/50V	330µF/100V
C1/C2	1µF/50V	1µF/100V
C3	Refer to the Cout in Typical application	
LDM1	6.8µH	
CY1, CY2	1nF/3KV	

Trim application & trim resistance

Application circuit for TRIM
(Part in broken line is the interior of models)



Calculation formula of Trim resistance

$$up:\ R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vo' - Vref} \cdot R_1$$

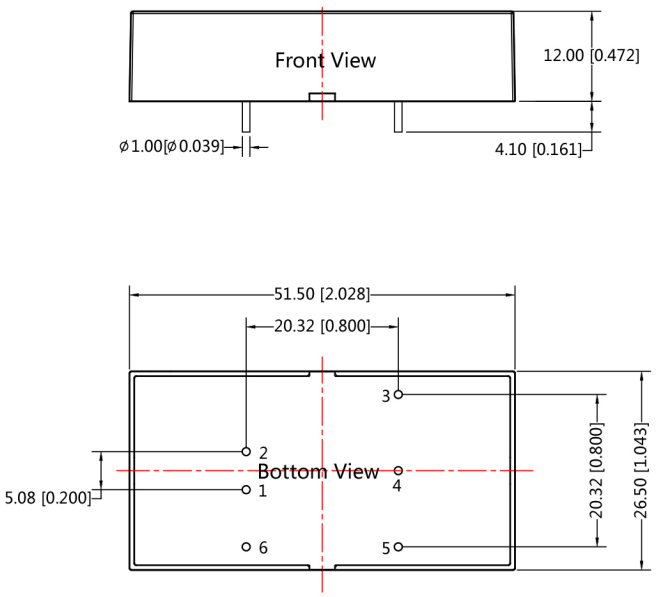
$$down:\ R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - Vref}{Vref} \cdot R_2$$

Note:
Value for R1, R2, R3, and Vref refer to the following table.
R_T: Resistance of Trim
a: User-defined parameter, no actual meanings
Vo': The trim up/down voltage

Vout (V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	4.801	2.87	12.4	1.25
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

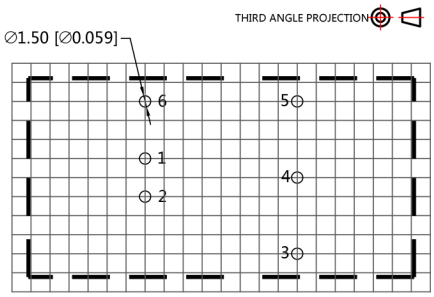
It is not allowed to connect modules output in parallel to enlarge the power.

Mechanical dimensions



Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10mm [±0.004inch]
General tolerances: ±0.50mm [±0.020inch]

Recommended layout



Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	GND
2	Vin
3	+Vo
4	Trim
5	0V
6	Ctrl