DQA1P Series 1 Watt

isolated DC-DC Converters

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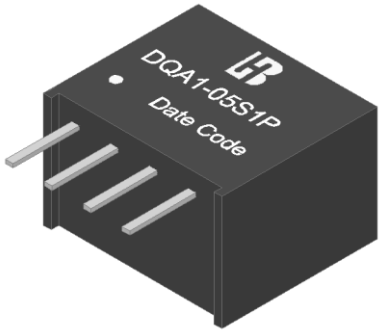
Features

- 4pin SIP Package with Industry-Standard Footprint
- Input / Output Isolation Voltage: 1.5kVDC
- High Efficiency
- Lead Free Design, RoHS Compliant
- Operating temperature: -40°C to +105°C
- IEC/EN 62368-1 Safety Approval



RoHS compliant

Applications

These converters are well suitable for battery operated equipment, measurement equipment, telecom, wireless network, Industry control system, everywhere where isolated, tightly regulated voltages and compact size are required.

Technical Specification All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range(V)	Output Voltage	Output Current (mA) (1)	Input Current (mA) Typ.		Eff .(%) (2) Typ.	Capacitive Load, max. (3) (uF)
		(V)	Full Load	No Load	Full Load		
DQA1-03S0P	2.97-3.63 Nominal:3.3	3.3	300	35	405	74	68
DQA1-03S1P		5	200		404	75	47
DQA1-03SAP		9	110		380	79	33
DQA1-05S0P	4.5-5.5 Nominal:5	3.3	300	28	264	75	68
DQA1-05S1P		5	200		260	77	47
DQA1-05SAP		9	110		248	80	33
DQA1-05S2P		12	83		246	81	22
DQA1-05S3P		15	67		246	81	22
DQA1-05S5P		24	42		246	81	10
DQA1-09S0P	8.1-9.9 Nominal:9	3.3	303	19	158	70	68
DQA1-09S1P		5	200		144	77	47
DQA1-09SAP		9	110		137	80	33
DQA1-09S2P		12	83		136	81	22
DQA1-09S3P		15	67		138	81	22
DQA1-12S0P	10.8-13.2 Nominal:12	3.3	300	17	109	76	68
DQA1-12S1P		5	200		107	78	47
DQA1-12SAP		9	110		107	78	33
DQA1-12S2P		12	83		104	80	22
DQA1-12S3P		15	67		104	80	22
DQA1-12S5P		24	42		105	80	10

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Model Number	Input Voltage Range(V)	Output Voltage	Output Current (mA) (1)	Input Current (mA) Typ.		Eff .(%) (2) Typ.	Capacitive Load, max. (3) (uF)
		(V)	Full Load	No Load	Full Load		
DQA1-15S0P	13.5-16.5 Nominal:15	3.3	300	15	87	76	68
DQA1-15S1P		5	200		85	78	47
DQA1-15SAP		9	110		85	78	33
DQA1-15S2P		12	83		83	80	22
DQA1-15S3P		15	67		83	80	22
DQA1-24S0P	21.6-26.4 Nominal:24	3.3	300	8	54	77	68
DQA1-24S1P		5	200		53	79	47
DQA1-24SAP		9	110		52	80	33
DQA1-24S2P		12	83		51	81	22
DQA1-24S3P		15	67		51	81	22
DQA1-24S5P		24	42		51	78	22

Input Specifications

	3.3V nominal input	2.97-3.63V
	5V nominal input	4.5-5.5V
	9V nominal input	8.1-9.9V
	12V nominal input	10.8-13.2V
	15V nominal input	13.5-16.5V
	24V nominal input	21.6-26.4V
Input filter		Capacitor

Environmental Specifications

Operating ambient temperature		-40°C to +105°C
Maximum case temperature		+125°C
Storage temperature range		-55°C to +125°C
Relative humidity		95% RH max.

Output Specifications

Output power		1Watts max.
Voltage accuracy	Nominal Vin and full load 3.3Vdc 5Vdc 9Vdc 12Vdc 15Vdc 24Vdc	 3.135-3.399V 4.75-5.15V 8.73-9.18V 11.64-12.24V 14.55-15.30V 23.52-24.36V
Voltage balance	output	±1% max.
Minimum load		10% load of full load
Line regulation	For Vin change of 1%	±1.2% Typ.

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Load regulation	Nominal Vin and 10%-100% load 3.3Vdc 5Vdc 9Vdc 12Vdc 15Vdc 24Vdc	 15% Typ. 13% Typ. 9% Typ. 8% Typ. 7% Typ. 6% Typ.
Ripple and Noise (20MHz Bandwidth)		50mVp-p Typ. 120mVp-p Max.
Maximum capacitive load		See table
Output short circuit protection	DQA1-03SXP/DQA1-24SXP	3S Max.
	Other models	Continuous, Automatic recovery
Temperature coefficient		±0.03%/°C Typ.
General Specifications		
Efficiency	Nominal input and full load	See table
Isolation voltage	Input to output	1500VDC (60 second)
Isolation resistance	500VDC	1000MΩ min.
Isolation capacitance		30pF typ.
Switching frequency		150kHz typ. 300kHz max.
Reliability, calculated MTBF		2×10^{6} Hrs
Physical Specifications		
Case material		Plastic (UL94 V-0)
Potting material		Epoxy (UL94 V-0)
Dimensions		11.6 × 10.1 × 6.0 mm
Weight		1.5g Typ.

Note

1. Io below this value will not damage these converters, however, they may not meet all listed specifications.
2. Typical value, tested at nominal input and full load.
3. For each output.
4. Specifications subject to change without notice.
5. This series of products do not support CC mode, CR mode is recommended.
6. In case of long input lines or hot plug-in requirements, we recommended to use an external low ESR capacitor (22uF) near to the converter's input pins.

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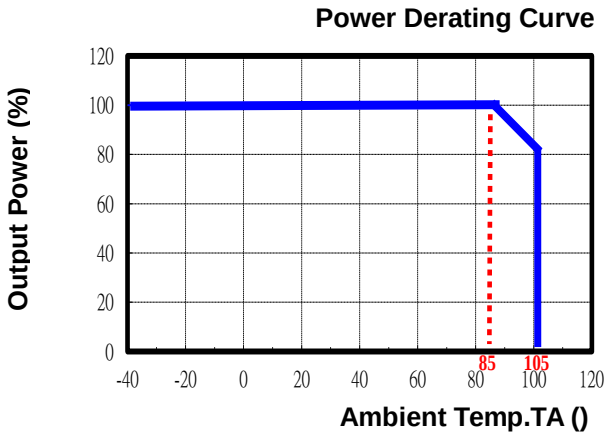
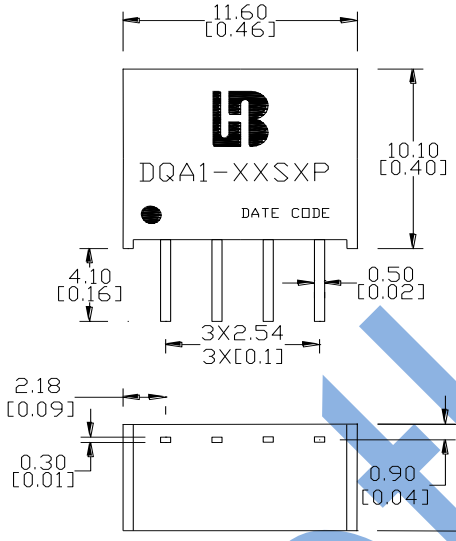
Power Derating Curve



Mechanical Dimensions

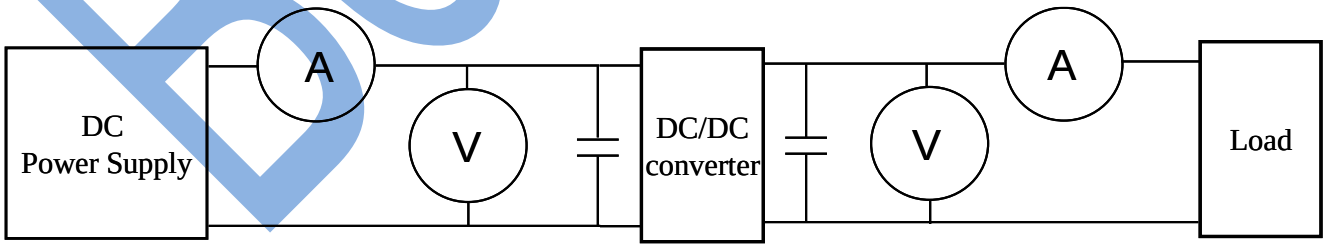


Pin Assignment	
Pin	Single
1	-Vin
2	+Vin
3	-Vout
4	+Vout

Unit: mm (inch)
Pin section tolerances:±0.1(±0.004)
General tolerances:±0.5(±0.02)

Test Configurations

All specifications are typical at nominal input, full load and 25°C unless otherwise stated.



◎DC Power Supply: It offers a wide voltage and current range precisely.

◎Current meter (A): Accuracy➔ 200μA ~ 200mA 4 ranges±(0.2% rdg + 2 digits)

2000mA ~ 20A 2 ranges±(0.3% rdg + 2 digits).

◎Voltage meter (V): Accuracy➔ ±(0.03% rdg + 4 digits).

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◎Load: At full load.
◎Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range（±10%）、wide input voltage range (2:1 and 4:1）。

EX: Narrow input voltage range（±10%）

5V nominal input ➔ 4.5~5.5V
12V nominal input ➔ 10.8~13.2V
24V nominal input ➔ 21.6~26.4V

Wide input voltage range 2:1

5V nominal input ➔ 4.5~9V
12V nominal input ➔ 9~18V
24V nominal input ➔ 18~36V
48V nominal input ➔ 36~75V

Wide input voltage range 4:1 (W)

24V nominal input ➔ 9~36V
48V nominal input ➔ 18~75V

2. Input power :

Pin = Vin x Iin

Vin：Input voltage
Iin：Input current

3. Output power :

Pout = Vout x Iout

Vout：Output voltage
Iout：Output current

4. Efficiency :

$$\text{Efficiency} = \frac{Pout}{Pin} \times 100\%$$

Pout: Output power
Pin: Input power

5. Voltage accuracy:

$$\frac{|Vout - Vout(nominal)|}{Vout} \times 100\%$$

Vout：Output voltage
Vout(nominal)：Nominal output voltage

6. Line regulation:

Narrow input voltage range（±10%）and unregulated output voltage series.

$$\text{Line regulation} = \frac{\Delta Vout}{\Delta Vin}$$

$$\Delta Vout = \frac{Vout(+10\%) - Vout(-10\%)}{Vout} \times 100\%$$

Vout(+10%)：Output voltage at Vin = 1.1xVin(nominal)&full load

Vout(-10%)：Output voltage at Vin = 0.9xVin(nominal)&full load

Vout：Output voltage at Vin = Vin(nominal)&full load

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Ä Vin = Vin(+10%)-Vin(-10%) x100%
Vin(nominal)

Vin(+10%)：Input voltage = 1.1xVin(nominal)

Vin(-10%)：Input voltage = 0.9xVin(nominal)

Vin(nominal)：Nominal Input voltage

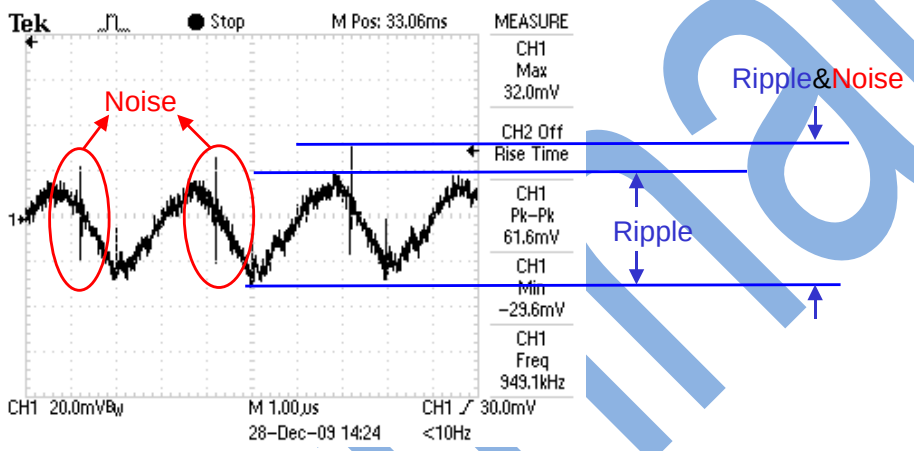
7. Load regulation :

|Vout(FL)-Vout(NL)| x100%
Vout(FL)

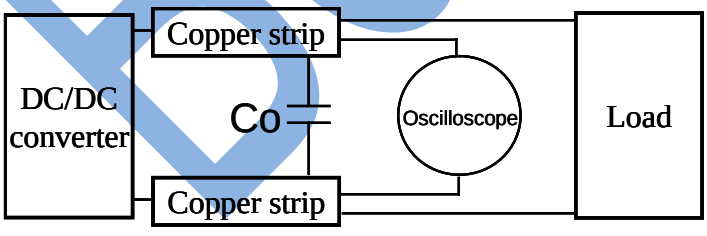
Vout(FL): Output voltage at full load

Vout(NL): Output voltage at 25% full load or 10% full load

8. Ripple and Noise: as shown below. The bandwidth is 0-20MHz.



Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 0.47uF.

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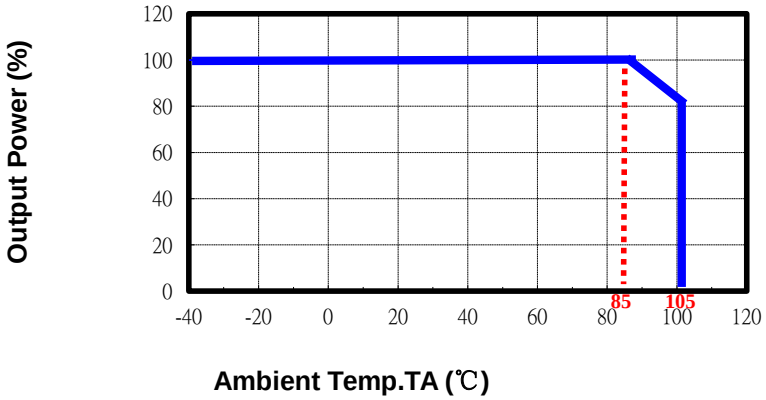
9. Temperature derating curve: The DC-DC converter will operate over a wider temperature range if less power is drawn from the output and the device is already running. The temperature derating curve shows the operating power-temperature range. As shown below.

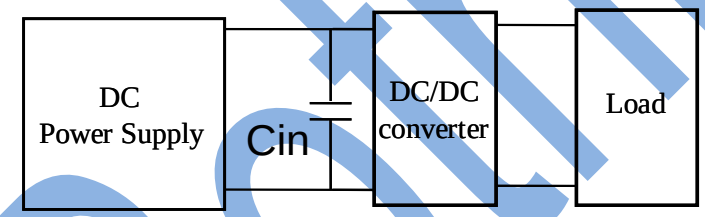


10. Switching frequency: The nominal operating frequency of the DC-DC converters.

11. Input to output isolation: The dielectric breakdown strength test between input and output circuits. This is the isolation voltage the device is capable of withstanding for a specified time, usually 1 second or 1 minute.

12. Input souce impedance: The power module should be connected to low ac-impedance input souce.

Highly inductive souce impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high , it maybe necessary to use a capacitor at the input to ensure startup. Capacitor mounted close to the power module helps ensure stability of the unit , it is commended to use a good quality low Equivalent Series Resistance (ESR < 0.1Ω at 100KHz) capacitor of a 22uF for the power module.



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