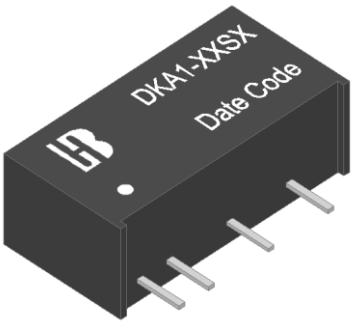
DKA1 Series 1 Watt

isolated DC-DC Converters

BOTHHAND

Features

- 7pin 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
- Meet Safety Standard / Approval: IEC / EN60950-1



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 (V)	Output Current (mA) (1)	Input Current (mA) Typ.		Eff .(%) (2) Typ.	Capacitive Load, max. (3) (uF)
			Full Load	No Load	Full Load		
DKA1-03S0	2.97-3.63 Nominal:3.3	3.3	300	35	405	74	68
DKA1-03S1		5	200		404	75	47
DKA1-03D0		±3.3	±150		405	74	33/33
DKA1-03D1		±5	±100		404	75	22/22
DKA1-05S0	4.5-5.5 Nominal:5	3.3	300	28	264	75	68
DKA1-05S1		5	200		260	77	47
DKA1-05SA		9	110		248	80	33
DKA1-05S2		12	83		247	81	22
DKA1-05S3		15	67		247	81	22
DKA1-05S5		24	42		247	81	10
DKA1-05D0		±3.3	±150		264	75	33/33
DKA1-05D1		±5	±100		260	77	22/22
DKA1-05DA		±9	±55		248	80	10/10
DKA1-05D2		±12	±42		247	81	10/10
DKA1-05D3		±15	±33		247	81	10/10
DKA1-05D5		±24	±21		247	81	4.7/4.7
DKA1-09S1	8.1-9.9 Nominal:9	5	200	19	137	81	47
DKA1-12S0	10.8-13.2 Nominal:12	3.3	300	17	109	76	68
DKA1-12S1		5	200		107	78	47
DKA1-12SA		9	110		107	78	33
DKA1-12S2		12	83		104	80	22
DKA1-12S3		15	67		104	80	22
DKA1-12S5		24	42		104	80	10
DKA1-12D0		±3.3	±150		109	76	33/33
DKA1-12D1		±5	±100		107	78	22/22
DKA1-12DA		±9	±55		107	78	10/10
DKA1-12D2		±12	±42		104	80	10/10

Model Number	Input Voltage Range(V)	Output Voltage (V)	Output Current (mA) [1]	Input Current (mA) Typ.		Eff .(%) [2] Typ.	Capacitive Load, max. [3] (uF)
			Full Load	No Load	Full Load		
DKA1-12D3	10.8-13.2 Nominal:12	±15	±33	17	104	80	10/10
DKA1-15S0	13.5-16.5 Nominal:15	3.3	300	15	87	76	68
DKA1-15S1		5	200		85	78	47
DKA1-15SA		9	110		85	78	33
DKA1-15S2		12	83		83	80	22
DKA1-15S3		15	67		83	80	22
DKA1-15S5		24	42		83	80	10
DKA1-15D0		±3.3	±150		87	76	33/33
DKA1-15D1		±5	±100		85	78	22/22
DKA1-15DA		±9	±55		85	78	10/10
DKA1-15D2		±12	±42		83	80	10/10
DKA1-15D3		±15	±33		83	80	10/10
DKA1-24S0	21.6-26.4 Nominal:24	3.3	300	8	54	77	68
DKA1-24S1		5	200		53	79	47
DKA1-24SA		9	110		52	80	33
DKA1-24S2		12	83		51	81	22
DKA1-24S3		15	67		51	81	22
DKA1-24S5		24	42		51	81	10
DKA1-24D0		±3.3	±150		54	77	33/33
DKA1-24D1		±5	±100		53	79	22/22
DKA1-24DA		±9	±55		52	80	10/10
DKA1-24D2		±12	±42		51	81	10/10
DKA1-24D3		±15	±33		51	81	10/10

Input Specifications

3.3V nominal input	2.97-3.63V
5V nominal input	4.5-5.5V
9 V 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

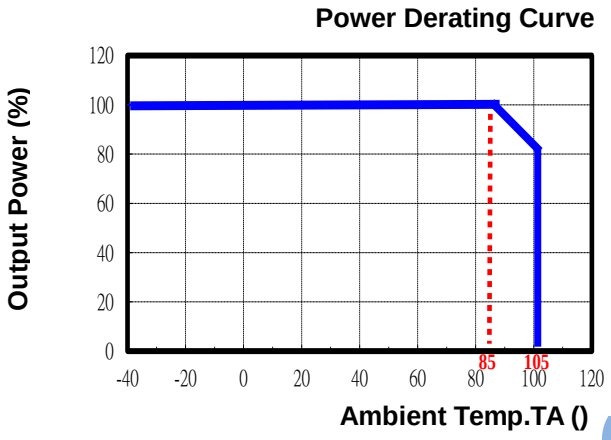
Operating ambient temperature	-40°C to +105°C
Maximum case temperature	+125°C
Storage temperature range	-55°C to +125°C
Relative humidity	95% RH max.

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	Dual output	±1% max.
Minimum load		10% load of full load
Line regulation	For Vin change of 1%	±1.2% Typ.
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. 100mVp-p Max.
Maximum capacitive load		See table
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		19.6× 10.1× 6.0 mm
Weight		2g Typ.

Note

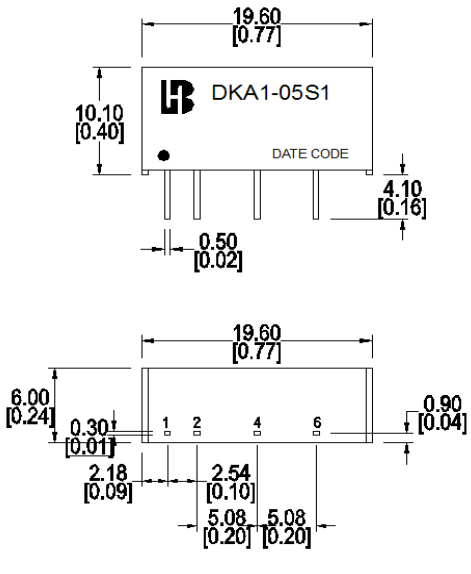
1. Io below this value will not damage these converters, however, they may not meet all listed specifications.
2. Typical value, tested at nominal input and full load.
3. For each output.
4. Specifications subject to change without notice.
5. This series of products do not support CC mode, CR mode is 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.

Power Derating Curve

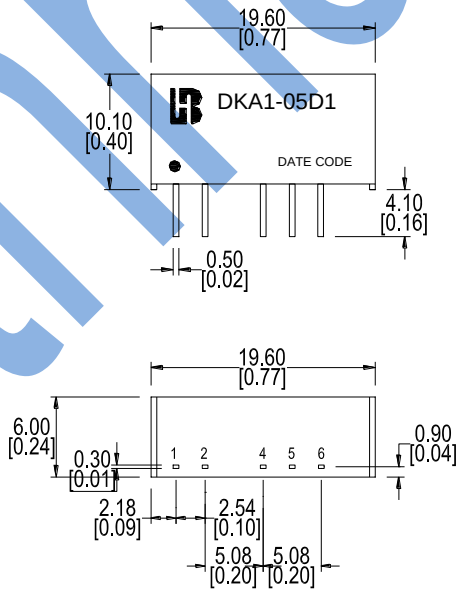


Mechanical Dimensions

Single output



Dual output

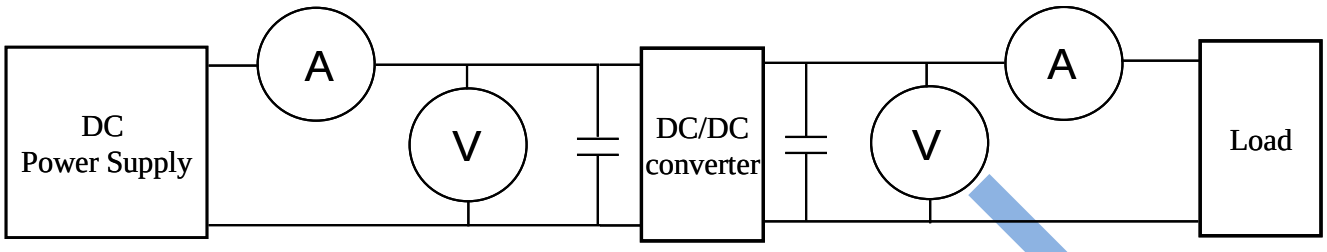


Unit: mm (inch)
Pin section tolerances:±0.1(±0.004)
General tolerances:±0.5(±0.02)

Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	-Vout	-Vout
5	No pin	Common
6	+Vout	+Vout

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).

◎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.

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

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

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

$$\Delta \text{Vin} = \frac{\text{Vin(+10\%)-Vin(-10\%)}}{\text{Vin(nominal)}} \times 100\%$$

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

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

Vin(nominal)：Nominal Input voltage

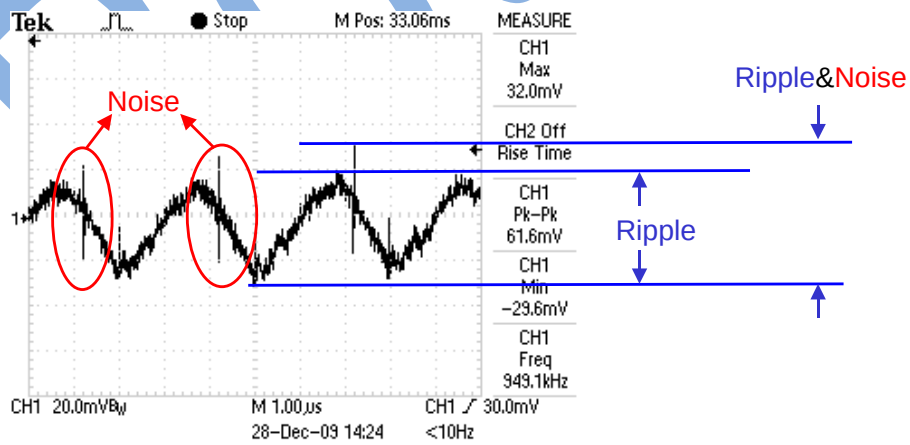
7. Load regulation :

$$\frac{|\text{Vout(FL)-Vout(NL)}|}{\text{Vout(FL)}} \times 100\%$$

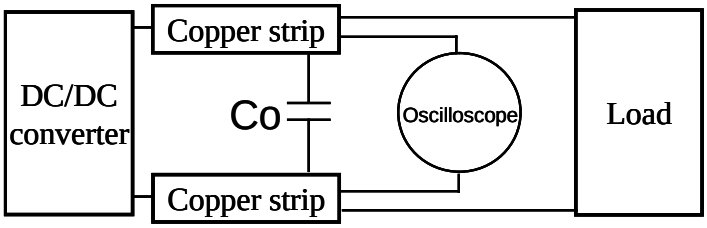
Vout(FL): Output voltage at full load

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

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

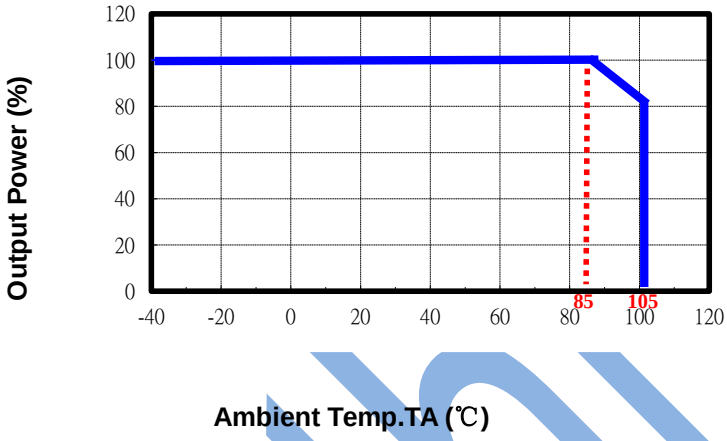


Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 0.47uF.

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.