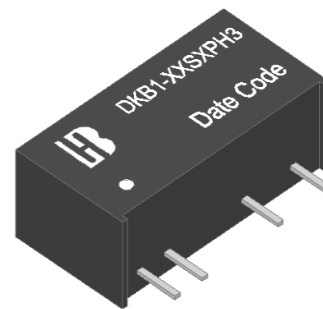


## Features

- 7pin SIP Package with Industry-Standard Footprint
- Input / Output Isolation Voltage: 3kVDC
- High Efficiency
- Lead Free Design, RoHS Compliant
- Operating temperature: -40°C to +105°C
- Meet Safety Standard / Approval: IEC / EN60950-1



## 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) <sup>(1)</sup>	Input Current (mA) Typ.		Eff. (%) <sup>(2)</sup> Typ.	Capacitive Load, max. <sup>(3)</sup> (uF)		
			Full Load	No Load	Full Load				
DKB1-03S0PH3	2.97-3.63 Nominal:3.3	3.3	300	35	405	74	68		
DKB1-03S1PH3		5	200		404	75	47		
DKB1-03D0PH3		±3.3	±150		405	74	33/33		
DKB1-03D1PH3		±5	±100		404	75	22/22		
DKB1-05S0PH3	4.5-5.5 Nominal:5	3.3	300	28	264	75	68		
DKB1-05S1PH3		5	200		260	77	47		
DKB1-05SAPH3		9	110		248	80	33		
DKB1-05S2PH3		12	83		247	81	22		
DKB1-05S3PH3		15	67		247	81	22		
DKB1-05S5PH3		24	42		247	81	10		
DKB1-05SLPH3		25	40		247	81	10		
DKB1-05D0PH3		±3.3	±150		264	75	33/33		
DKB1-05D1PH3		±5	±100		260	77	22/22		
DKB1-05DAPH3		±9	±55		248	80	10/10		
DKB1-05D2PH3		±12	±42		247	81	10/10		
DKB1-05D3PH3		±15	±33		247	81	10/10		
DKB1-05D5PH3		±24	±21		247	81	4.7/4.7		
DKB1-12S0PH3		10.8-13.2 Nominal:12	3.3		300	17	109	76	68
DKB1-12S1PH3			5		200		107	78	47
DKB1-12SAPH3			9		110		107	78	33
DKB1-12S2PH3	12		83	104	80		22		
DKB1-12S3PH3	15		67	104	80		22		
DKB1-12S5PH3	24		42	104	80		10		
DKB1-12D0PH3	±3.3		±150	109	76		33/33		
DKB1-12D1PH3	±5		±100	107	78		22/22		
DKB1-12DAPH3	±9		±55	107	78		10/10		

# DKB1PH3 Series 1 Watt

isolated DC-DC Converters



Model Number	Input Voltage Range(V)	Output Voltage (V)	Output Current (mA) <sup>(1)</sup>		Input Current (mA) Typ.		Eff. (%) <sup>(2)</sup> Typ.	Capacitive Load, max. <sup>(3)</sup> (uF)			
			Full Load	No Load	No Load	Full Load					
DKB1-12D2PH3		±12	±42			104	80	10/10			
DKB1-12D3PH3		±15	±33			104	80	10/10			
DKB1-15S0PH3	13.5-16.5 Nominal:15	3.3	300	15		87	76	68			
DKB1-15S1PH3		5	200			85	78	47			
DKB1-15SAPH3		9	110			85	78	33			
DKB1-15S2PH3		12	83			83	80	22			
DKB1-15S3PH3		15	67			83	80	22			
DKB1-15S5PH3		24	42			83	80	10			
DKB1-15D0PH3		±3.3	±150			87	76	33/33			
DKB1-15D1PH3		±5	±100			85	78	22/22			
DKB1-15DAPH3		±9	±55			85	78	10/10			
DKB1-15D2PH3		±12	±42			83	80	10/10			
DKB1-15D3PH3		±15	±33			83	80	10/10			
DKB1-24S0PH3		21.6-26.4 Nominal:24	3.3			300	8		54	77	68
DKB1-24S1PH3			5			200			53	79	47
DKB1-24SAPH3			9			110			52	80	33
DKB1-24S2PH3	12		83	51	81	22					
DKB1-24S3PH3	15		67	51	81	22					
DKB1-24S5PH3	24		42	51	81	10					
DKB1-24D0PH3	±3.3		±150	54	77	33/33					
DKB1-24D1PH3	±5		±100	53	79	22/22					
DKB1-24DAPH3	±9		±55	52	80	10/10					
DKB1-24D2PH3	±12		±42	51	81	10/10					
DKB1-24D3PH3	±15		±33	51	81	10/10					

## Input Specifications

3.3V nominal input	2.97-3.63V
5V nominal input	4.5-5.5V
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	3.135-3.399V
	5Vdc	4.75-5.15V
	9Vdc	8.73-9.18V
	12Vdc	11.64-12.24V
	15Vdc	14.55-15.30V
	24Vdc	23.52-24.36V
25Vdc	24.50-25.37V	

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	15% Typ.
	5Vdc	13% Typ.
	9Vdc	9% Typ.
	12Vdc	8% Typ.
	15Vdc	7% Typ.
	24Vdc	6% Typ.
25Vdc	6% Typ.	

Ripple and Noise (20MHz Bandwidth)		50mVp-p Typ. 100mVp-p Max.
Maximum capacitive load		See table
Output short circuit protection	DKB1-03SXP/03DXP/24SXP/ 24DXP	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	3000VDC (60 second)
Isolation resistance	500VDC	1000MΩ min.
Isolation capacitance		30pF typ.
Switching frequency		150kHz typ.
		300kHz max.
Reliability, calculated MTBF		2×10 <sup>6</sup> Hrs

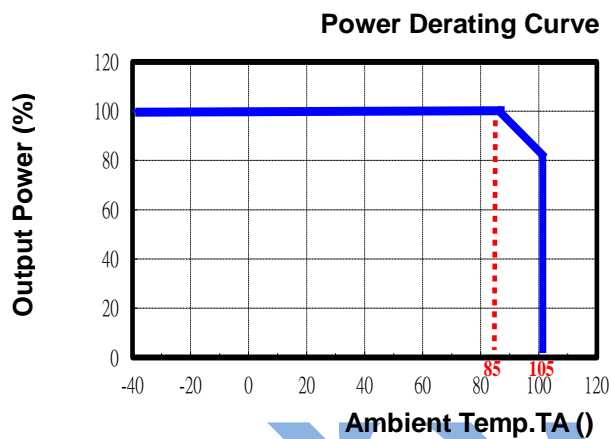
## Physical Specifications

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.

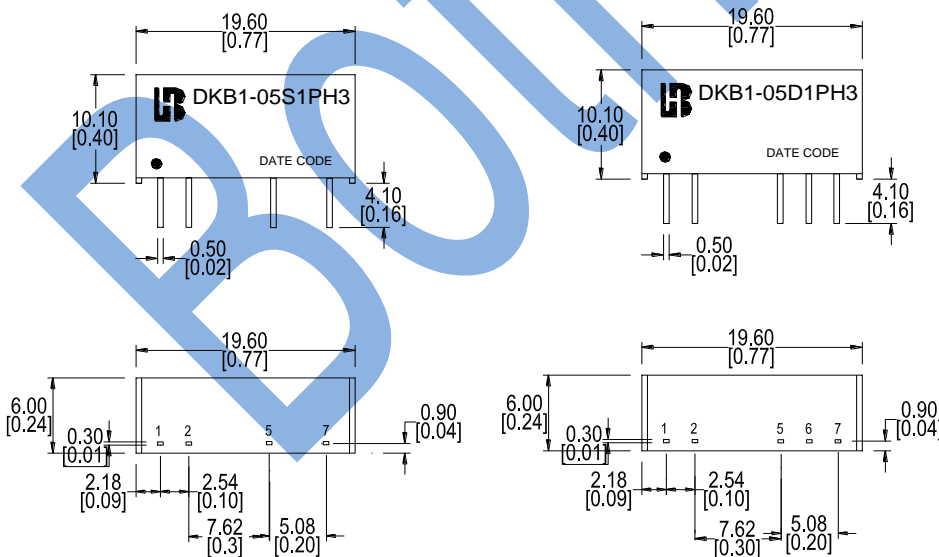
## Power Derating Curve



## Mechanical Dimensions

### Single output

### Dual output

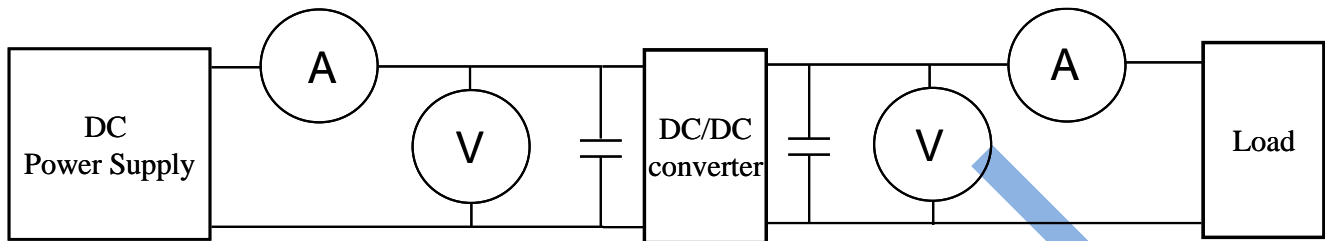


Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout
6	No pin	Common
7	+Vout	+Vout

Unit: mm (inch)  
 Pin section tolerances:  $\pm 0.1 (\pm 0.004)$   
 General tolerances:  $\pm 0.5 (\pm 0.02)$

## 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  $\pm(0.2\% \text{ rdg} + 2 \text{ digits})$   
 2000mA ~ 20A 2 ranges  $\pm(0.3\% \text{ rdg} + 2 \text{ digits})$ .

©Voltage meter (V): Accuracy →  $\pm(0.03\% \text{ rdg} + 4 \text{ digits})$ .

©Load: At full load.

©Wires: The resistance of the wires must be small.

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

EX: Narrow input voltage range ( $\pm 10\%$ )

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 :

$$P_{in} = V_{in} \times I_{in}$$

$V_{in}$ : Input voltage  
 $I_{in}$ : Input current

3. Output power :

$$P_{out} = V_{out} \times I_{out}$$

$V_{out}$ : Output voltage  
 $I_{out}$ : Output current

4. Efficiency :

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\%$$

$P_{out}$ : Output power  
 $P_{in}$ : Input power

5. Voltage accuracy:

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

$V_{out}$ : Output voltage  
 $V_{out(nominal)}$ : Nominal output voltage

## 6. Line regulation:

Narrow input voltage range ( $\pm 10\%$ ) and unregulated output voltage series.

$$\text{Line regulation} = \frac{\Delta V_{out}}{\Delta V_{in}}$$

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

$V_{out(+10\%)}$ : Output voltage at  $V_{in} = 1.1 \times V_{in}(\text{nominal})$  & full load

$V_{out(-10\%)}$ : Output voltage at  $V_{in} = 0.9 \times V_{in}(\text{nominal})$  & full load

$V_{out}$ : Output voltage at  $V_{in} = V_{in}(\text{nominal})$  & full load

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

$V_{in(+10\%)}$ : Input voltage =  $1.1 \times V_{in}(\text{nominal})$

$V_{in(-10\%)}$ : Input voltage =  $0.9 \times V_{in}(\text{nominal})$

$V_{in}(\text{nominal})$ : Nominal Input voltage

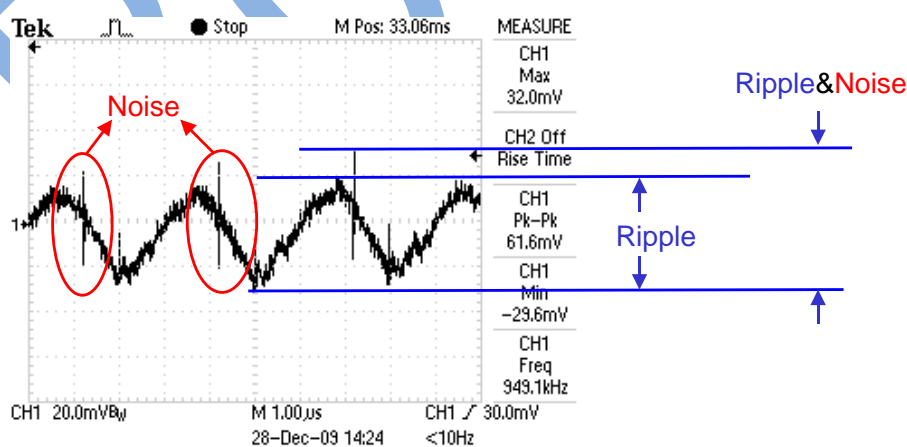
## 7. Load regulation :

$$\frac{|V_{out(FL)} - V_{out(NL)}|}{V_{out(FL)}} \times 100\%$$

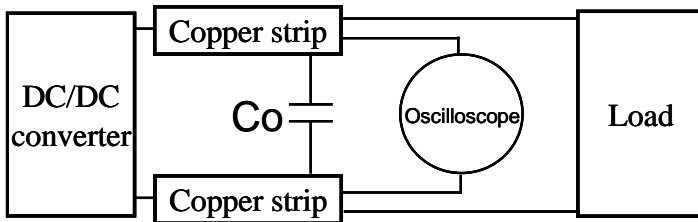
$V_{out(FL)}$ : Output voltage at full load

$V_{out(NL)}$ : Output voltage at 25% full load or 10% full load

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

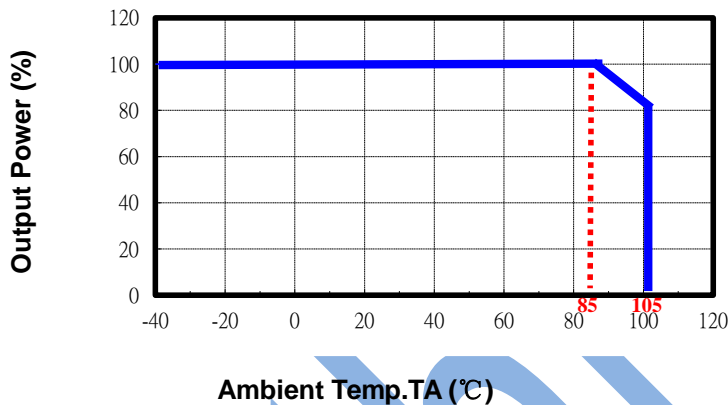


Output Ripple&Noise measurement test circuit: as shown below.



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 source impedance: The power module should be connected to low ac-impedance input source.

Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be 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 recommended to use a good quality low Equivalent Series Resistance (ESR <math>< 0.1 \Omega</math> at 100KHz) capacitor of a 22uF for the power module.

