



**DKE Series**  
**Isolated Sub-Miniature Single Output DC-DC Converters**



**FEATURES**

- Efficiency up to 81%
- Small Footprint
- SIP Package
- Single Output Voltage
- 3kVDC Isolation
- Fixed Input Voltage
- Power Density 0.99W/cm<sup>3</sup>
- Temperature Range -40°C to 85°C
- Industry Standard Pinout
- UL 94V-0 Package Material
- No Heatsink required
- No External Component Required
- PCB Mounting
- Fully Encapsulated
- MTTF>3,500,000 hours

**APPLICATIONS**

The DKE Series are specially designed for applications where a single power supply is highly isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

- 1) Where the voltage of the input power supply is fixed (voltage variation ≤ ±10%);
- 2) Where isolation is necessary between input and output (isolation voltage =3000VDC);
- 3) Where the regulation of the output voltage and the output ripple and noise are not demanding.

Such as: purely digital circuits, ordinary low frequency analog circuits and IGBT power device driven circuits, etc.

**SELECTION GUIDE**

	Nominal Input Voltage	Rated Output Voltage	Output Current		Efficiency	Package Style
			Min	Max		
Order Code	(V)	(V)	(mA)	(mA)	(%,Typ)	
DKE0505S	5	5	20	200	70	SIP
DKE0509S	5	9	12	111	75	SIP
DKE0512S	5	12	9	83	78	SIP
DKE0515S	5	15	7	67	80	SIP
DKE1205S	12	5	20	200	72	SIP
DKE1209S	12	9	12	111	76	SIP
DKE1212S	12	12	9	83	79	SIP
DKE1215S	12	15	7	67	81	SIP

**INPUT CHARACTERISTICS**

Parameter	Conditions	MIN	TYP	MAX	Units
Voltage Range	All DKE05 Types	4.5	5	5.5	
	All DKE12 Types	10.8	12	13.2	

**OUTPUT CHARACTERISTICS**

Parameter	Conditions	MIN	TYP	MAX	Units
Output Power		0.1		1	W
Output Voltage Accuracy	See tolerance envelope graph				
Line Regulation	For V <sub>IN</sub> change of 1%			1.2	%
Load Regulation	10% to 100% full Load		10	15	%
Temperature Drift	100% full load			0.03	%/°C
Temperature Rise	Full load		15	25	°C
Ripple & Noise	B/W=20Hz to 300kHz		50	75	mV p-p

**ABSOLUTE MAXIMUM RATINGS**

Short-circuit protection	1 second
Internal power dissipation	10% nominal power(typical)
Lead temperature 1.5mm from case for 10 seconds	300°C

1 All specifications measured at TA=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

2 See below recommended circuits for more details.



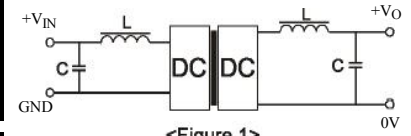
## DKE Series Isolated Sub-Miniature Single Output DC-DC Converters



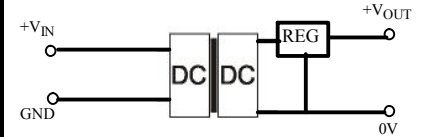
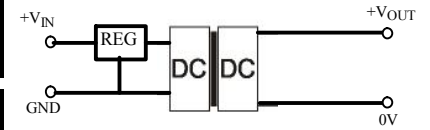
ISOLATION CHARACTERISTICS					
Parameter	Conditions	MIN	TYP	MAX	Units
Isolation Test Voltage	Flash Test for 1 minute	3000			VDC
Resistance	Viso=500VDC	1			GΩ

GENERAL CHARACTERISTICS					
Parameter	Conditions	MIN	TYP	MAX	Units
Switching Frequency	Full load, nominal input voltage		100		kHz

ENVIRONMENTAL					
Parameter	Conditions	MIN	TYP	MAX	Units
Operation		-40		85	°C
Storage temperature		-55		125	°C
Storage humidity				95	%
Cooling	Free air convection				

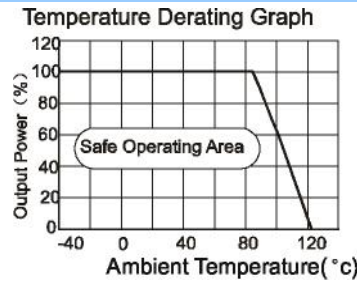
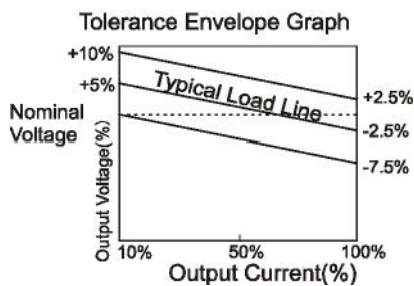


<Figure 1>



<Figure 2>

### TYPICAL CHARACTERISTICS



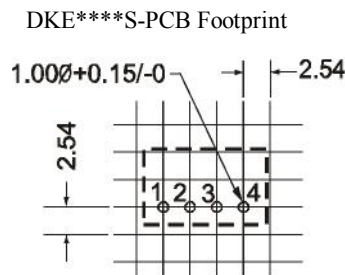
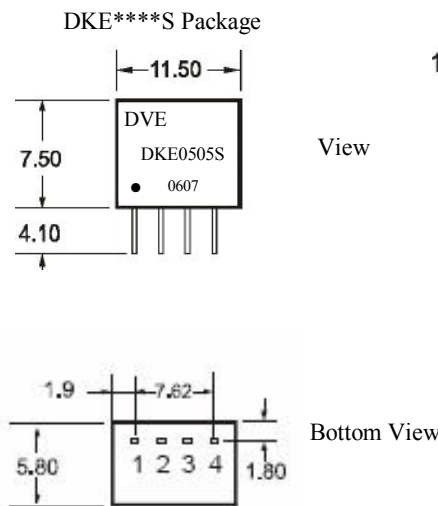
### Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against over-current and short-circuits. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

### Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Figure 2).

### OUTLINE DIMENSIONS & RECOMMENDED FOOTPRINT



### External Capacitor Table

V <sub>IN</sub>	External capacitor	V <sub>OUT</sub>	External capacitor
5VDC	4.7μF	5VDC	10μF
12VDC	2.2μF	9VDC	4.7μF
		12VDC	2.2μF
		15VDC	1μF

### FOOTPRINT DETAILS

PIN	
1	GND
2	V <sub>IN</sub>
3	0V
4	+V <sub>O</sub>

Note: All Pins on a 2.54mm pitch; All Pin diameters are 0.50 mm; all dimensions in mm.

### APPLICATION NOTE

#### Filtering

In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees the external capacitor table. To get an extremely low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference (see figure 1).

#### Requirement On Output Load

To ensure this module can operate efficiently and reliably, a minimum load is specified for this kind of DC/DC converter in addition to a maximum load (namely full load). During operation, make sure the specified range of input voltage is not exceeded, the minimum output load is **not less than 10%** of the full load, and that this product should never be operated under no load!