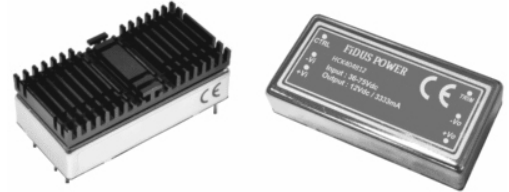


40 Watts

- High power density
- 2:1 Input range
- 2 x 1" Package
- Efficiency up to 92%
- Single and dual outputs
- Remote on/off & 10% output trim
- 5 Year warranty



The HCK40 series of high power dense DC/DC converters come in both single and dual outputs. Inputs are available in 12, 24 & 48V versions with 2:1 range and outputs from 3.3V to 15V single and dual. The units operate from -40 to +71°C, complete with remote on/off feature and 10% output trim. All models have a FIDUS 5 year warranty.

Dimensions:

2.00 x 1.00 x 0.4" (50.8 x 25.4 x 10.16mm)

Models & Ratings

Model Number ⁽¹⁾	Input Voltage	Output Voltage	Output Current	Input Current		Maximum Capacitive Load	Efficiency
				No Load	Full Load		
HCK401203	9-18V	3.3V	8000mA	100mA	2444mA	21800uF	90%
HCK401205		5V	8000mA	160mA	3663mA	13600uF	91%
HCK401212		12V	3333mA	40mA	3663mA	2300uF	91%
HCK401215		15V	2666mA	50mA	3663mA	1500uF	91%
HCK401212D		±12V	±1666mA	50mA	3663mA	±1200uF	91%
HCK401215D		±15V	±1333mA	50mA	3623mA	±750uF	92%
HCK402403	18-36V	3.3V	8000mA	60mA	1208mA	21800uF	91%
HCK402405		5V	8000mA	90mA	1811mA	13600uF	92%
HCK402412		12V	3333mA	30mA	1831mA	2300uF	91%
HCK402415		15V	2666mA	40mA	1811mA	1500uF	92%
HCK402412D		±12V	±1666mA	50mA	1831mA	±1200uF	91%
HCK402415D		±15V	±1333mA	40mA	1811mA	±750uF	92%
HCK404803	36-75V	3.3V	8000mA	40mA	604mA	21800uF	91%
HCK404805		5V	8000mA	60mA	905mA	13600uF	92%
HCK404812		12V	3333mA	20mA	915mA	2300uF	91%
HCK404815		15V	2666mA	20mA	905mA	1500uF	92%
HCK404812D		±12V	±1666mA	30mA	906mA	±1200uF	92%
HCK404815D		±15V	±1333mA	40mA	906mA	±750uF	92%

Notes

1. For heatsink option add "SK" to the part number
2. Under no load conditions the unit may not meet all specifications
3. Do not operate continuously in the red area of the derating curve

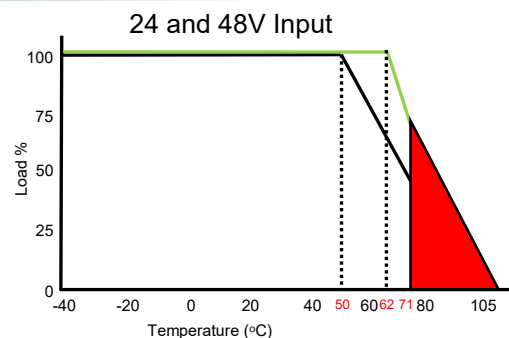
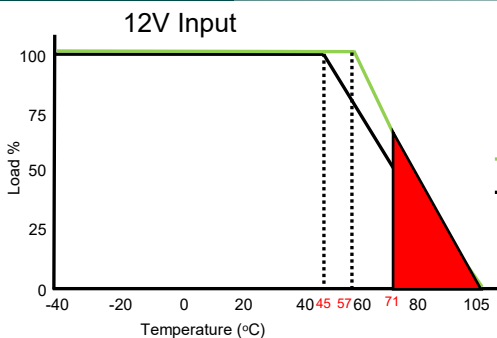
Undervoltage lock-out

Model	Voltage
12V Input ON/OFF	8.6Vdc / 7.9Vdc
24V Input ON/OFF	17.8Vdc / 16Vdc
48V Input ON/OFF	33.5Vdc / 30.5Vdc

Input

Parameter	Rating
Input voltage range	See table
Input reflected ripple current	20mA pk-pk through 12uH inductor
Input surge (100mS max)	12V Models 25V DC Max. 24V Models 50VDC Max. 48V Models 100VDC Max.
Input filter	Pi type

Derating Curves



Output					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	3.3		15	VDC	See Model & Ratings table
Set point accuracy			±1	%	
Line regulation			±0.5	%	Low line to High line
Load regulation			±0.5	%	Single outputs. 0 to 100% load change
			±1		Dual outputs. 0 to 100% load change
Cross regulation			±5	%	On dual output models when one load is varied by 25 to 100% and the other is 100% load.
Ripple & Noise			100	mV pk-pk	3.3 and 5V output models.
			150		All other output models. Measured with 1uF ceramic capacitor and 10uF tandem. 20 MHz bandwidth
Overvoltage protection	3.3V output 3.9V. 12V output 15V. ±12V output ±15V.	5V output 6.2V. 15V output 18V. ±15V output ±18V		VDC	
Transient response			±3	% Deviation	For a 25% load change, recovery to within 3% within 250uS typically.
Short circuit protection					Continuous with automatic recovery
Maximum capacitive load					See Model and Ratings table
Remote on/off	ON:3 to 12Vdc or open circuit. OFF <1.2Vdc or short circuit pins 2 & 3. Off idle current :5mA typical.				
Output Trim	±10% for details please see p5				

General					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency			92	%	See Model & Ratings table
Isolation			1600	VDC	Input to output
Isolation resistance	1000			M Ohm	
Isolation capacitance		1000		pF	
Switching frequency		270		KHz	
Power density			50	W/In ³	
MTBF		>328		KHrs	As per MIL-HDBK-217F, 25°C GB
Start up time		30		ms	Nominal Vin and constant resistive load

Environmental					
Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		71	°C	-40 to +45° for 12Vin models (-40 to +57° with heat-sink). -40 to +50° for 24 and 48Vin models (-40 to +62° with heat-sink) Please see page 1 for detail.
Storage temperature	-55		125	°C	
Case temperature			105	°C	
Cooling					Convection cooled
Humidity			95	% RH	Non-condensing
Temperature coefficient			±0.02	%/°C	
Thermal impedance	10		12	°C/W	10°C/W without heat-sink, 12°C/W with heat-sink

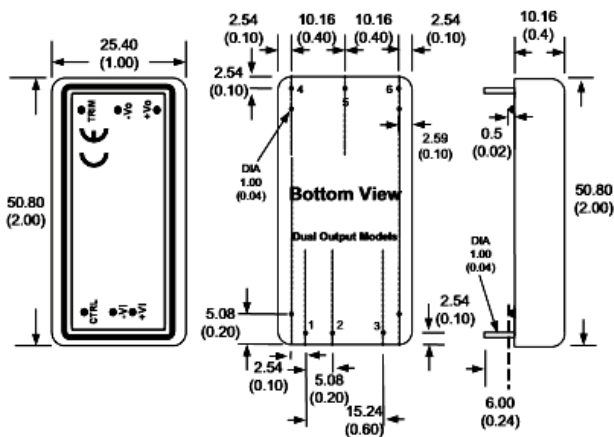
EMC: Emissions

	Standard	Test level	Notes & Conditions
Conducted	EN55032	Class B	Extra components required please see p4
Radiated	EN55032	Class B	Extra components required please see p4

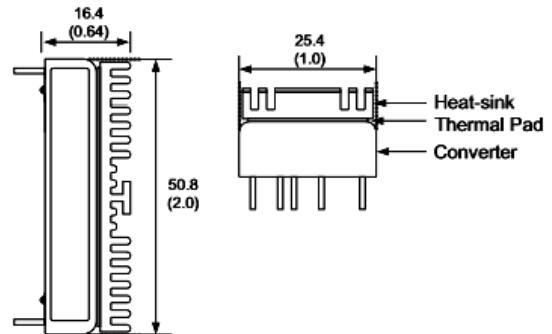
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	3	A	8kV air discharge, 6kV contact discharge
Radiated	EN61000-4-3	3	A	80~1000 MHz, 10V/m, 80% AM (1kHz)
EFT/Burst	EN61000-4-4	3	A	A 220uF/100V capacitor required. Power line : 2kV
Surges	EN61000-4-5	2	A	A 220uF/100V capacitor required. 1.2/50 μ s Open Circuit Voltage, 8/20 μ s Short Circuit Current, DC Port, Line to line : 1.0kV
Conducted	EN61000-4-6	10Vrms	A	0.15 ~ 80 MHz, 10Vrms, 80% AM (1kHz)
Magnetic fields	EN61000-4-8	1A/m	A	50Hz, 1A/m

Mechanical Details



With Heat Sink



Notes

- All dimensions shown in millimetres (inches)
- Pin diameter 1.0 \pm 0.05 (0.04 \pm 0.002)
- Case tolerance \pm 0.5 (\pm 0.002)

Pin Connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	-Vout	0V
6	Trim	-Vout

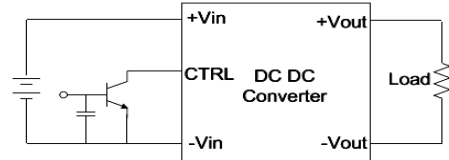
Physical

Parameter	Rating
Case material	Nickel coated copper
Pin material	1.0mm Brass solder coated
Potting material	Non conductive plastic (UL94V-0)
Weight	31g
Dimensions	2.00 x 1.00 x 0.40"
Soldering temperature	1.5mm from case, 10s and 260°C max.

Application notes:

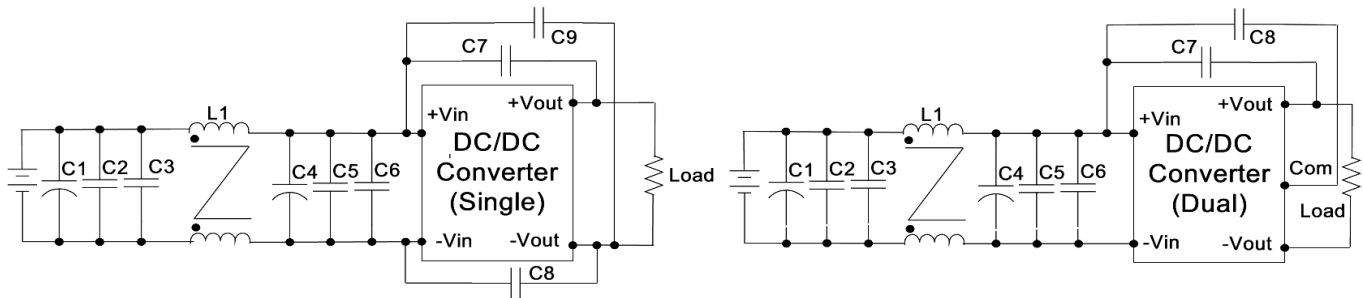
Remote ON/OFF

The HCK40 series can be turned on and off using the remote on/off function. If Pin 3 is left open circuit or high impedance then the unit is ON. To turn off short pin 2 and 3 or supply 0-1.2V. Idle current 5mA typically.



EMI Filter

The input filter components can be fitted to help meet conducted emission requirements for the system. They should be mounted as close as possible to the module. Lead lengths should be minimized and where possible avoid running input and output tracks under the module as part of good design practice for best EMC performance. If the module is embedded in a system running from a AC/DC converter, this will have its own additional immunity protection and EMI filtering that will impact the overall system EMI performance.

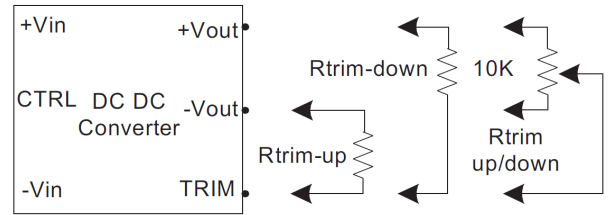


Single	C1	L1	C2/C3/C5/C6	C4	C7	C8	C9
HCK4012XX	220uF, 100V	Common Choke 68uH	1812, 6.8uF, 50V	330uF, 100V			1206, 1000PF, 2KV
HCK4024XX	220uF, 100V	Common Choke 68uH	1812, 47uF, 50V	220uF, 100V	1206, 1000PF, 2KV	1206, 1000PF, 2KV	
HCK4048XX	220uF, 100V	Common Choke 68uH	1812, 1.5uF, 100V	220uF, 100V	1206, 1000PF, 2KV	1206, 1000PF, 2KV	

Dual	C1	L1	C2/C3/C5/C6	C4	C7	C8
HCK4012XXD	220uF, 100V	Common Choke 68uH	1812, 6.8uF, 50V	330uF, 100V		
HCK4024XXD	220uF, 100V	Common Choke 68uH	1812, 47uF, 50V	220uF, 100V	1206, 1000PF, 2KV	1206, 1000PF, 2KV
HCK4048XXD	220uF, 100V	Common Choke 68uH	1812, 1.5uF, 100V	220uF, 100V	1206, 1000PF, 2KV	1206, 1000PF, 2KV

Trim Tables

Output voltage trim function allows the user to increase or decrease the output voltage set point. The module may be connected with an external resistor (Rtrim) between TRIM pin and either +Vout or -Vout. By adjusting Rtrim, the output voltage can be changed by $\pm 10\%$ of nominal the output voltage.



HCK40xx03

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Volts
Rtrim-down	315.932	172.257	112.528	79.806	59.153	44.93	34.539	26.616	20.374	15.33	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630	Volts
Rtrim-up	544.612	184.034	103.305	67.715	47.676	34.824	25.88	19.297	14.249	10.255	KOhms

HCK40xx05

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	4.95	4.9	4.85	4.8	4.75	4.7	4.65	4.6	4.55	4.5	Volts
Rtrim-down	230.566	106.182	64.301	43.281	30.643	22.207	16.177	11.651	8.129	5.31	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	5.05	5.1	5.15	5.2	5.25	5.3	5.35	5.4	5.45	5.5	Volts
Rtrim-up	244.547	113.776	70.631	49.142	36.274	27.707	21.592	17.01	13.447	10.598	KOhms

HCK40xx12

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	11.88	11.76	11.64	11.520	11.4	11.28	11.16	11.04	10.92	10.8	Volts
Rtrim-down	327.351	142.1	83.928	55.47	38.591	27.418	19.477	13.542	8.939	5.264	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.2	Volts
Rtrim-up	371.425	183.645	117.623	83.929	63.489	49.767	39.919	32.508	26.728	22.094	KOhms

HCK40xx15

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	14.85	14.7	14.55	14.4	14.25	14.1	13.95	13.8	13.65	13.5	Volts
Rtrim-down	433.811	174.916	100.946	65.907	45.468	32.077	22.625	15.596	10.165	5.842	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	15.15	15.3	15.45	15.6	15.75	15.9	16.05	16.2	16.35	16.5	Volts
Rtrim-up	347.293	178.523	115.235	82.084	61.683	47.863	37.882	30.336	24.43	19.682	KOhms