Features

- Wide 2 : 1 Input Voltage Range(9~18V,18~36V,36~75V)
- Remote On/Off
- Input / Output Isolation Voltage: 3kVDC
- Extended Operating Temperature Range: -40℃ to+85℃
- Output Short Circuit Protection:
  Continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- 6 pin DIP Package with Industry-Standard Footprint
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1

RoHS compliant

Description

The HUB10H3 Series are isolated 10W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40℃ to +85℃ in a 6 pin DIP package with industry-standard footprint. Further features include wide 2 : 1 input voltage range, remote on/off control, short-circuit protection, over voltage protection and high Input / Output isolation (3000VDC).

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℃ unless otherwise stated.

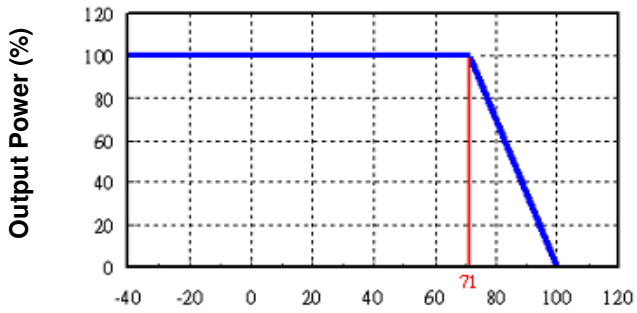
Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff .(2) (%)	Capacitive Load, max.(3) (uF)
			Min. Load (1)	Full. Load	No Load	Full Load		
HUB10-12S0H3	9~18V Nominal:12V	3.3	20	3000	10	1130	77	3300
HUB10-12S1H3		5	0	2000	21	1069	82	1330
HUB10-12S2H3		12	0	830	22	1013	86	680
HUB10-12S3H3		15	0	670	21	1034	85	470
HUB10-12S5H3		24	0	415	24	1000	87	133
HUB10-12D1H3		±5	0	±1000	20	1069	82	1000
HUB10-12D2H3		±12	0	±415	28	1013	86	220
HUB10-12D3H3		±15	0	±330	30	1019	85	147
HUB10-24S0H3	18~36V Nominal:24V	3.3	20	3000	6	558	78	3300
HUB10-24S1H3		5	0	2000	10	528	83	1330
HUB10-24S2H3		12	0	830	12	506	86	680
HUB10-24S3H3		15	0	670	12	517	85	470
HUB10-24S5H3		24	0	415	13	500	87	147
HUB10-24D1H3		±5	0	±1000	10	528	83	1000
HUB10-24D2H3		±12	0	±415	15	506	86	220
HUB10-24D3H3		±15	0	±330	17	510	85	147
HUB10-48S0H3	36~75V Nominal:48V	3.3	20	3000	3	279	78	3300
HUB10-48S1H3		5	0	2000	6	264	83	1330
HUB10-48S2H3		12	0	830	7	253	86	470
HUB10-48S3H3		15	0	670	6	262	84	220
HUB10-48S5H3		24	0	415	8	257	85	100
HUB10-48D1H3		±5	0	±1000	6	261	84	680
HUB10-48D2H3		±12	0	±415	8	253	86	122
HUB10-48D3H3		±15	0	±330	9	258	84	100

Input Specifications			
Input Voltage	12V nominal input		9-18V
	24V nominal input		18-36V
	48V nominal input		36-75V
Input filter			Pi Type
Input surge voltage (100ms max.)	12V nominal input		25V
	24V nominal input		50V
	48V nominal input		100V
Input reflected ripple current	Nominal Vin and full load		170mAp-p max.
Start up time	Nominal Vin and constant resistive load		770ms typ.
Remote ON/OFF	Converter: ON		Open or 3.5V＜Vr＜12V
	Converter: OFF		Short[4] or 0V＜Vr＜1.2V
Sourcing current of remote control pin	Nominal Vin		＜0.2 mA
Idle input current (at Remote OFF state)	Nominal Vin		＜3 mA
Environmental Specifications			
Operating ambient temperature			-40℃ to +85℃ (with derating)
Maximum case temperature			+100℃
Storage temperature range			-55℃ to +105℃
Relative humidity			5% to 95% RH
Temperature coefficient			±0.02% / ℃ max.
Output Specifications			
Output power			10 Watts max.
Voltage accuracy	Full load and nominal Vin		±1%
Minimum load			See table
Line regulation	LL to HL at full load		±0.5%
Load Regulation	25% load to full load	Single	±0.5%
	Balanced load	Dual	±0.5%
	Unbalanced load 25% to 100% full load		±5%
Ripple and Noise	20MHz bandwidth		100mVp-p max.
Over voltage protection (Zener Diode Clamp)	3.3Vout models		3.9V
	5Vout models		6.2V
	12Vout models		15V
	15Vout models		18V
	24Vout models		27V
Capacitive load			See table
Over load protection	% of full load at nominal input		150% typ.
Short circuit protection			Continuous, automatic recovery
Transient response settling time	50% load step change		2000μs typ.
Transient response over shoot	di/dt=0.8A/μs		≤ ±5% of Vo

General Specifications		
Efficiency	Nominal input	See table
Isolation voltage	Input to output	3000VDC
Isolation resistance	500VDC	10^9 Ohms min.
Isolation capacitance		500pF typ.
Switching frequency		300kHz typ.
Reliability, calculated MTBF		1.96×10^6 Hrs
Physical Specifications		
Case material		Nickel-coated copper
Base material		Non-conductive black plastic
Potting material		Silicon rubber (UL94V-0)
Dimensions		2.0 × 1.0 × 0.4 Inch (50.8 × 25.4 × 10.2 mm)
Weight		30g (1.06oz) typ.

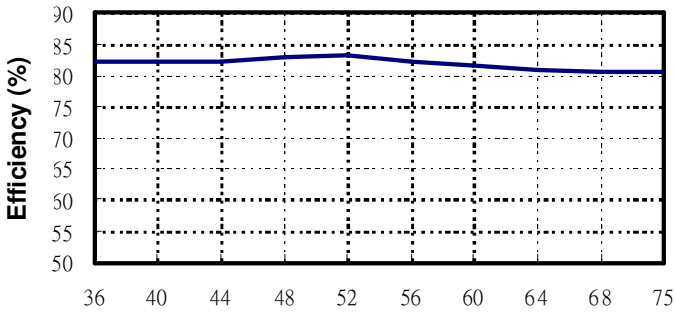
HUB10H3 Series

Power Derating Curve (5)



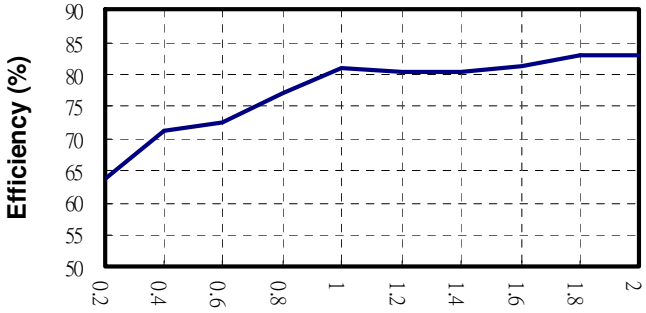
HUB10-48S1H3

Input voltage vs. Efficiency

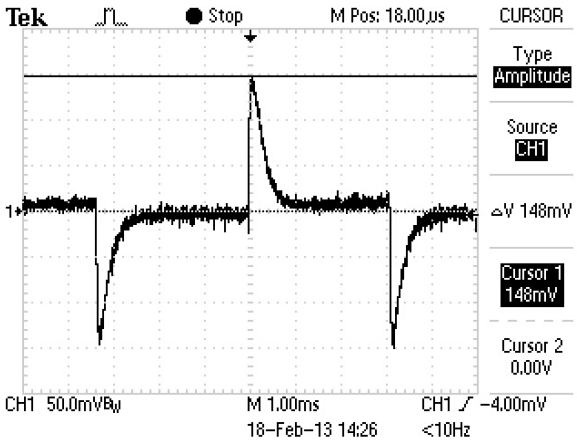


HUB10-48S1H3

Output Current vs. Efficiency

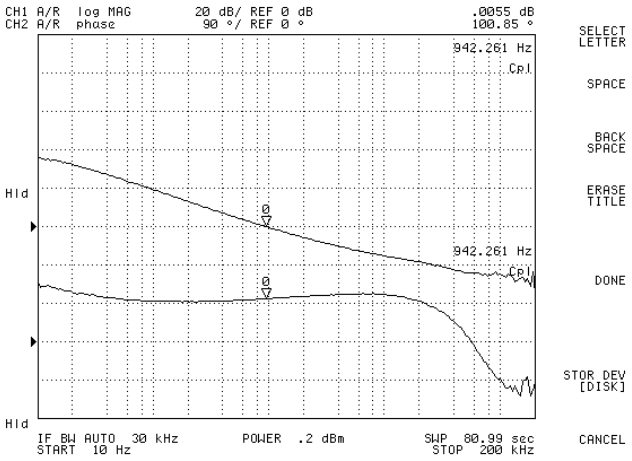


HUB10-48S1H3



Transient Response at 50%~100% Max Load

HUB10-48S1H3

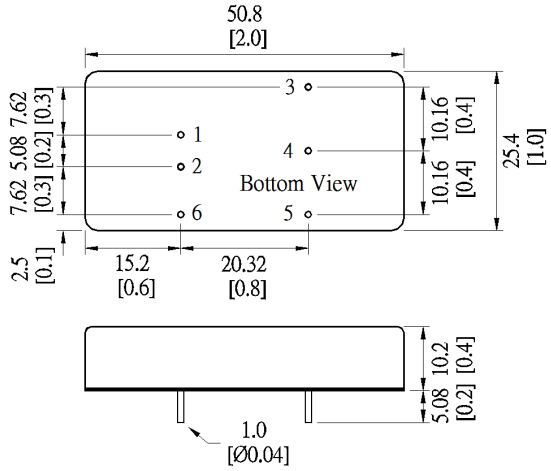


Loop Gain & Phase at Vi=48V,Full Load

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. Short to -Vin (Pin 2).
5. Based on HUB10-48S1H3.

Mechanical Dimensions



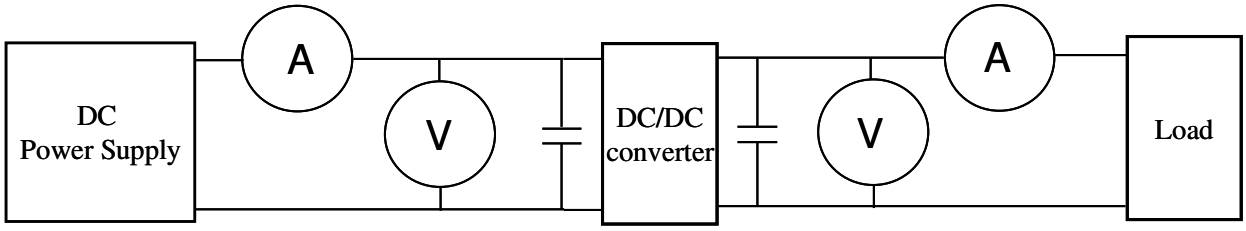
Unit: mm [inch]
Tolerance:±0.5[0.02]

Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off (optional)	

Specifications subject to change without noticed.

Test Configurations

All specifications are typical at nominal input, full load and 25℃ 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 :

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

Pout: Output power
Pin: Input power

5. Voltage accuracy:

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

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

6. Line regulation: (1) Wide input voltage range and regulated output voltage series.

$$\frac{|\,Vout(LL)-Vout(HL)\,|}{Vout(LL)} \times 100\%$$

LL: Low Line input voltage
HL: High Line input voltage

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

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

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

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

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

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

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

Vin(nominal)：Nominal Input voltage

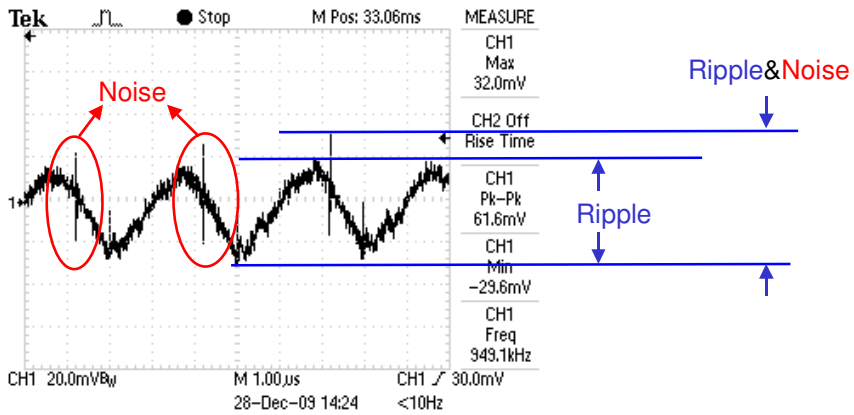
7. Load regulation :

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

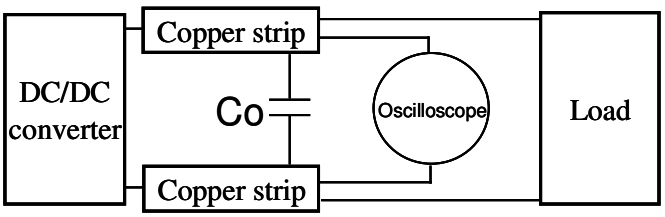
Vout(FL): Output voltage at full load

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

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

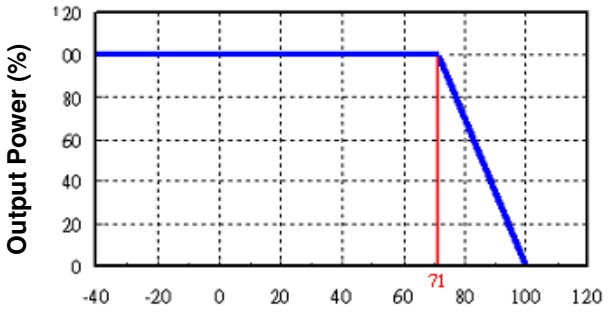


Output Ripple&Noise measurement test circuit: as shown below.



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.