

FEATURES

- 1600 Vdc Isolation
- Up to 40 Watts
- 4:1 Wide Input Range
- No Min. Load Required
- Remote ON/OFF
- Over Voltage and Over Current Protection
- Short Circuit and Over Load Protection

APPLICATIONS

- Telecom
- Datacom
- Industrial Control
- Automation
- Measurement

GENERAL DESCRIPTION

The VTW40C-Series is a family of 40 Watt single and dual DC/DC converters designed for application where isolated output is required from a distributed power system. These converters achieve different housing versions without compromising performance or field reliability.

Models operate from an ultra wide 4:1 input bus voltage of 24, 48 and 110 Vdc offering output voltage levels of 3.3, 5, 12, 15, 24, ± 12 , ± 15 , and ± 24 Vdc. Typical applications are in telecom/datacom, industry control or automation systems for on board power distribution.



PART NUMBER STRUCTUR

VTW40C - 24	05	S	-	M3	N	HS
Series Name	Input Voltage (VDC)	Output Voltage (VDC)	Output Quantity	Operating Temp. Options	Remote On/Off Options	Assembly Options
	24: 9-36 48: 18-75 110: 43-160	3R3: 3.3 05: 5 5R1: 5.1 12: 12 15: 15 24: 24 12: ± 12 15: ± 15 24: ± 24	S: Single D: Dual	<input type="checkbox"/> : Standard -40~+105°C with derating N: M3 Version -55~+105°C with derating	<input type="checkbox"/> : Positive logic N: Negative logic	<input type="checkbox"/> : None HS1: with Heatsink; transversal fins, H=0.3" HS2: with Heatsink; transversal fins, H=0.5" HS3: with Heatsink; transversal fins, H=0.8"

SELECTION GUIDE						
Model No.	nominal Input Voltage Range [Vdc]	nominal Output Voltage [Vdc]	Output Current @ full load [mA]	Input Current @ No Load [mA]	Max. Capacitive Load [μ F]	Efficiency typ. [%]
VTW40C-243R3S	24 (9~36)	3.3	10000	15	26000	90
VTW40C-2405S		5	8000	15	20000	91
VTW40C-2412S		12	3333	15	3900	92
VTW40C-2415S		15	2666	15	2600	92
VTW40C-2424S		24	1666	15	1300	91
VTW40C-2412D		\pm 12	\pm 1666	15	\pm 2600	90
VTW40C-2415D		\pm 15	\pm 1333	15	\pm 1600	90
VTW40C-2424D		\pm 24	\pm 833	15	\pm 650	91
VTW40C-483R3S		48 (18~75)	3.3	10000	10	26000
VTW40C-4805S	5		8000	10	20000	92
VTW40C-4812S	12		3333	10	3900	92
VTW40C-4815S	15		2666	10	2600	92
VTW40C-4824S	24		1666	10	1300	91
VTW40C-4812D	\pm 12		\pm 1666	10	\pm 2600	90
VTW40C-4815D	\pm 15		\pm 1333	10	\pm 1600	90
VTW40C-4824D	\pm 24		\pm 833	10	\pm 650	91
VTW40C-1103R3S	110 (43~160)		3.3	10000	10	26000
VTW40C-11005S		5	8000	10	20000	89
VTW40C-11012S		12	3333	10	3900	90.5
VTW40C-11015S		15	2666	10	2600	91
VTW40C-11024S		24	1666	10	1300	90
VTW40C-11012D		\pm 12	\pm 1666	10	\pm 2600	89
VTW40C-11015D		\pm 15	\pm 1333	10	\pm 1600	89
VTW40C-11024D		\pm 24	\pm 833	10	\pm 650	91

CAUTION: This power module is not internally fused. An input line fuse must always be used.

INPUT SPECIFICATIONS

Item	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	24 Vin (nom)		9	24	36	Vdc
	48 Vin (nom)		18	48	75	
	110 Vin (nom)		43	110	160	
Start up voltage	24 Vin (nom)		-	-	9	Vdc
	48 Vin (nom)		-	-	18	
	110 Vin (nom)		-	-	43	
Shutdown voltage	24 Vin (nom)		7	8	8.8	Vdc
	48 Vin (nom)		15	16	17.5	
	110 Vin (nom)		37	40	42	
Start up time	Constant resistive load	Power up	-	60	-	ms
		Remote ON/OFF				
Input surge voltage	1s, max.	24 Vin (nom)	-	-	50	Vdc
		48 Vin (nom)	-	-	100	
		110 Vin (nom)	-	-	170	
Input Filter	-		Pi type			
Remote ON/OFF	Referred to -Vin pin	Positive logic (Standard)	DC-DC ON	Open or 3 ~ 12 Vdc		
			DC-DC OFF	Short or 0 ~ 1.2 Vdc		
		Negative logic (Option)	DC-DC ON	Short or 0 ~ 1.2 Vdc		
			DC-DC OFF	Open or 3 ~ 12 Vdc		
	Input current of Ctrl pin		-0.5	-	0.5	mA
Remote off input current		-	3	-	mA	

FUSE CONSIDERATION

This power modules is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

The input line fuse suggest as below:

Model	Fuse Rating [A]	Fuse Type
24 Vin-Models	8	Fast-Acting
48 Vin-Models	4	Slow-Blow
110 Vin-Models	3.15	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

OUTPUT SPECIFICATIONS

Item	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy	-		-1.0	-	+1.0	%
Line regulation	Low Line to high line @ full load		-0.2	-	+0.2	%
Load regulation	No load to full load	Single	-0.5	-	+0.5	%
		Dual	-1.0	-	+1.0	%
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0	-	5.0	%
Voltage adjustability	Single output	Others	-10	-	+10	%
		15Vout, 24Vout	-10	-	+20	%
Ripple and noise	Measured by 20MHz band-width with a 0.1µF/50 V X7R MLCC	3.3Vout, 5Vout	-	75	100	mVp-p
		12Vout, 15Vout	-	100	125	
		24Vout	-	150	200	
Temperature coefficient	-		-0.02	-	+0.02	%/°C
Transient response recovery time	25% load step change		-	250	-	µs
Over voltage protection	Zener diode clamp	3.3Vout	-	3.9	-	Vdc
		5Vout	-	6.2	-	
		12Vout	-	15.	-	
		15Vout	-	20.	-	
		24Vout	-	30	-	
Over load protection	% of lout rated; Hiccup mode		-	150	-	%
Short circuit protection	-		continuous, automatic recovery			

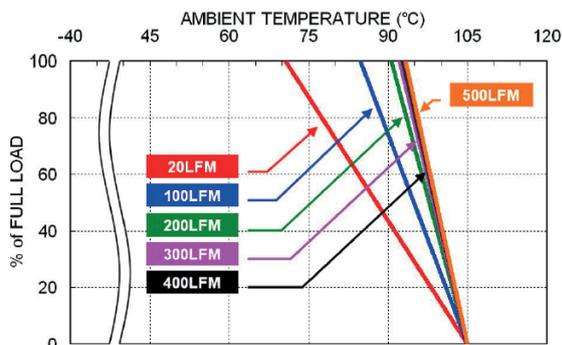
ENVIRONMENTAL SPECIFICATIONS

Item	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Standard	with derating	-40	-	+105	°C
	M3-Version	with derating	-55	-	+105	
Maximum case temperature	-		-	-	+105	°C
Over temperature protection	-		-	115	-	°C
Storage temperature range	-		-55	-	+125	°C
Operating altitude	-		-	-	5000	m
Thermal impedance	Module without assembly option		-	10.8	-	°C/W
	Heat-sink option HS1		-	9.3	-	
	Heat-sink option HS2		-	7.7	-	
	Heat-sink option HS3		-	6.2	-	
Thermal shock	-		MIL-STD-810F			
Shock	-		EN61373, MIL-STD-810F			
Vibration	-		EN61373, MIL-STD-810F			
Relative humidity	-		5% to 95% RH			

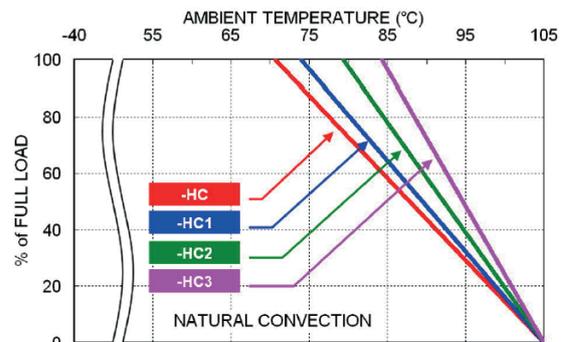
GENERAL SPECIFICATIONS

Item	Conditions		Min.	Typ.	Max.	Unit	
Isolation voltage	1 minute	110Vin (nom)	Input to Output	3000	-	-	Vdc
			Input to case	1600	-	-	
		Others	Input to Output	1600	-	-	
			Input to case	1600	-	-	
Isolation resistance	500 Vdc		1			GΩ	
Isolation capacitance	-		-	-	1500	pF	
Switching frequency	-		225	250	275	kHz	
Safety standards	IEC / UL / EN62368-1 (designed to meet)		UL: E352836				
Approval standards	-		EN50155, EN45545-2 (designed to meet)				
Case material	-		Copper				
Base material	-		FR4 PCB				
Potting material	-		Silicone (UL94 V-0)				
Weight	Module stand alone		32g (1.13oz)				
MTBF	MIL-HDBK-217F, Full load		9.073 x 10 ⁵ hrs				

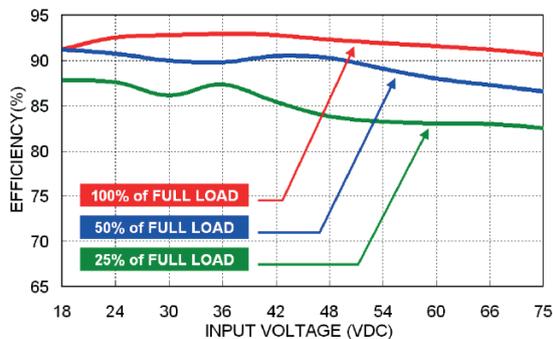
CHARACTERISTIC CURVE



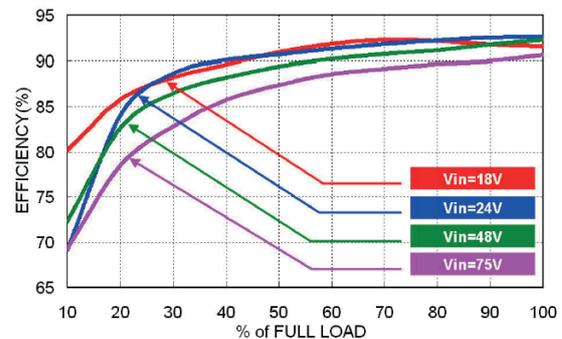
VTW40C-4805S Derating Curve



VTW40C-4805S Derating Curve With Heat-sink



VTW40C-4805S Efficiency vs. Input Voltage



VTW40C-4805S Efficiency vs. Output Load

EMC SPECIFICATIONS

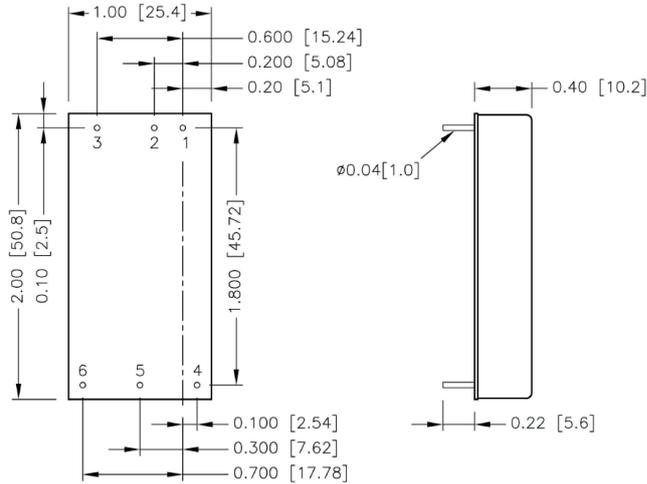
Item	Conditions		Level
EMI	EN55032, EN50121-3-2	with external components	Class A, Class B
EMS	EN55035, EN50121-3-2		
ESD	EN61000-4-2	Air ± 8 kV and Contact ± 6 kV	Perf. Criteria A
Radiated Immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2 kV	Perf. Criteria A
	24 Vin	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) in parallel.	
	48 Vin	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) in parallel.	
	110 Vin	With 2 pcs of aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 μ F/200V) and a 2 pcs. of TVS (SMDJ90A, 90V, 3000Watt peak pulse power in series connection) in parallel.	
Surge	EN61000-4-5	± 2 kV	Perf. Criteria A
	24 Vin	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) in parallel.	
	48Vin	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220 μ F/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) in parallel.	
	110 Vin	With 2 pcs of aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150 μ F/200V) and a 2 pcs. of TVS (SMDJ90A, 90V, 3000Watt peak pulse power in series connection) in parallel.	
Conduced immunity	EN61000-4-6	10 Vrms	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

OUTPUT VOLTAGE ADJUSTMENT

It allows to increase or decrease the output voltage of the module.
 This is accomplished by connecting an external resistor between the Trim pin and either the +Vout or -Vout pins.
 With an external resistor between the Trim and -Vout pin, the output voltage increases.
 With an external resistor between the Trim and +Vout pin, the output voltage decreases.
 The external Trim resistor needs to be at least 1/16 W of rated power.

MECHANICAL DRAWING

Standard, -HS1, -HS2, -HS3



BOTTOM VIEW

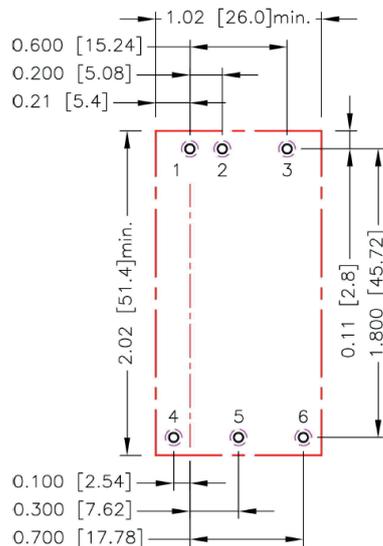
PIN CONNECTION

PIN	Single	Dual
1	+ Vin	+ Vin
2	- Vin	- Vin
3	Ctrl	Ctrl
4	+ Vout	+ Vout
5	- Vout	Com
6	Trim	- Vout

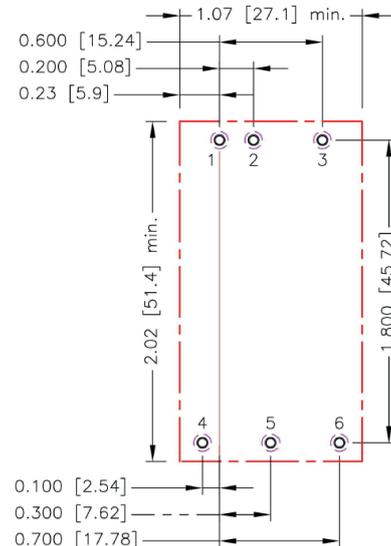
- All dimensions in inch [mm]
Tolerance: x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.x±0.25]
- Pin dimension tolerance ±0.004 [±0.10]

RECOMMENDED PAD LAYOUT

Standard



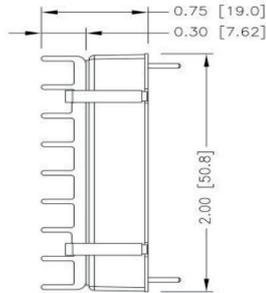
-HS1, -HS2, -HS3



All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 1.2.3.4.5.6: diameter 0.051[1.30]
Top view pad 1.2.3.4.5.6: diameter 0.064[1.63]
Bottom view pad 1.2.3.4.5.6: diameter 0.102[2.60]

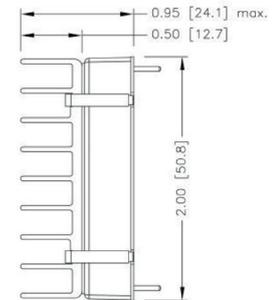
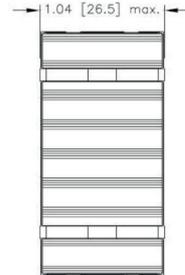
HEAT-SINK OPTIONS

-HS1 Option



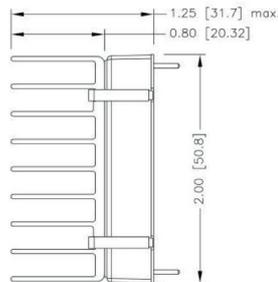
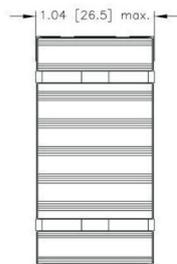
SIDE VIEW

-HS2 Option



SIDE VIEW

-HS3 Option



All dimensions in inch [mm]
Tolerance: x.xx±0.02 [x.x±0.5]
x.xx±0.01 [x.x±0.25]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the middle point on top of the module.

The temperature at this location should not exceed „Maximum case temperature“

When operating, adequate cooling must be provided to maintain the test point temperature at or below „Maximum case temperature“.

You can limit this Temperature to a lower value for extremely high reliability.

Thermal test condition with vertical direction by natural convection (20LFM).

Specifications can be changed without prior notice. Products are not intended for and must not be used in life support systems, human implantation, nuclear facilities or systems or any other application where product failure or malfunction of the component could lead to loss of life or catastrophic property damage.