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ATQ150 SERIES 9-75VDC INPUT / 150W OUTPUT 8:1 ISOLATED DC-DC CONVERTER



"Achieve Total Assurance and Quality in Power."

EFFICIENT - INNOVATIVE - VERSATILE

The ATQ150 Series provides a high-performance solution for demanding power conversion applications. With its 150-Watt output power, 9 - 75VDC input voltage and 8:1 input voltage range, this isolated DC-DC converter ensures reliable operation and high efficiency. It is engineered for robustness supports a wide operating temperature range and complies with industrial standards.

- I. Compliant with MIL-STD-1275^(*) with external components
- II. Compliant with MIL-STD-704^(*) with external components

NOTE:

* Suitable for COTS use. If the product is intended to be used with a military system, it must be tested in the internal structure of a system subject to military tests. ATAQ does not guarantee the use of this product in military and medical products.

FEATURES TABLE

Feature	Specification	Details
Ultra-Wide Input Voltage: Efficiency: Switching Frequency: Output Regulation: Remote On/Off: Protection: Isolation Voltage: Operating Case Temperature: Package Size: Safety Approval:	9 – 75 VDC Up to 90% Fixed, 200kHz Regulated Outputs Yes Fully (OTP/OCP/OVP/UVLO) 1500Vdc I/O Isolation -40°C to +100°C Half Brick Size UL60950-1 2nd Edition	- Over-Temperature, Over-Current, Short-Circuit, Over-Voltage, Under-Voltage Lockout protection. - Turned off by the ON/OFF input. - Output voltage trim range of $\pm 10\%$. - Remote sense for the output voltage. - 2.40" L x 2.28" W x 0.50" H (61.0mm L x 57.9mm W x 12.7mm H) - Complies with safety standards for reliable operation.

Discover your needs, let us help you! Contact us at info@ataq.com.tr or visit our official website www.ataq.com.tr

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULLLOAD	Nominal Input Voltage 36VDC	
ATQ150-WH36S28	9-75 VDC	28 VDC	0 mA	5.35 A	60 mA	4.63 A	89 ⁽¹⁾	1500 μ F ⁽²⁾

NOTE:

1. The output terminal of 24Vout models required a minimum capacitor 100 μ F to maintain specified regulation
2. The input external capacitor recommends to parallel with 330 μ F ESR<0.5 Ω to reduce the input ripple voltage

PART NUMBER

Series	Input Voltage Range	Dimension	Nominal Input Voltage	Number of Outputs		Nominal Output Voltage	Remote On/Off Logic	
ATQ150-	X	X	XX	X		XX	X	
	W Wide Input Voltage Range (9-75 VDC)	H (Half Brick)	36 (36 VDC)	Single Double	S D	28 (28 VDC)	High Low	- L

TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	28Vo	-0.3		75	Vdc
Input Surge Voltage	100ms max.	28Vo			100	Vdc
Input Surge Voltage	100ms max.	28Vo			80	Vdc
Operating Case Temperature	At the Center Part of Base Plate	28Vo	-40		100	°C
Storage Temperature		28Vo	-55		105	°C

INPUT CHARACTERISTICS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		28Vo	9	36	75	Vdc
Input Under Voltage Lockout						
Turn-On Voltage Threshold		28Vo	8.5	9.0	9.5	Vdc
Turn-Off Voltage Threshold		28Vo	7.5	8.0	8.5	Vdc
ON/OFF control, positive remote ON/OFF logic	Logic low (Module OFF) Logic high (Module ON)	28Vo	0 3.5V or open circuit		1.2 75	Vdc
Lockout Hysteresis Voltage		28Vo	1			Vdc
Maximum Input Current	V _{in} =9V, Full Load.	28Vo	20			A
No-Load Input Current	V _{in} =36V, I _o =0A		20			mA
Input Filter	LC filter	28Vo				
Recommended Input Fuse	Fast acting type	28Vo	30			A
Input Capacitance (External)	< 0.5 Ω ESR	28Vo	330			μ F
Switching frequency		28Vo	200			kHz

OUTPUT CHARACTERISTICS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	Vin=36V, Full Load, Tc=25°C	28Vo	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full Load to No Load	28Vo			±0.2	%
Line Regulation	Vin=High Line to Low Line, Full Load	28Vo			±0.2	%
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF tantalum and 1.0uF ceramic capacitors	28Vo			280	mV
RMS		28Vo			100	mV
Output Current Range	Vin= 9 to 75V		0 – 5.35			A
Over Current Protection	<90% Vo	28Vo	105	160	200	%
Short Circuit Protection	Hiccup Mode / Auto Recovery	28Vo	Continuous, Auto Recovery			
External Load Capacitance	Full load (Constant resistive load)		1500			uF
Output Voltage Trim Range	Vin=9-13V, Iout=max rated current	28Vo	-10		0	%
	Vin=13-75V, Pout=max rated power, Iout=max rated current	28Vo	-10		+10	
Start-up time		28Vo		110		ms

EFFICIENCY:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	Vin=28V	28Vo		up to 90%		%

GENERAL SPECIFICATIONS:

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I _o =100% of I _{o_max} ; MIL-HDBK-217F_Notice 1, GB, 25°C	28Vo		800		K hours
Weight		28Vo		109		Grams
Isolation resistance	10 ⁷ ohms, min.					
Isolation capacitance	Input to Output	2300				pF
	Input to Case (Base Plate)	1000				
	Output to Case (Base Plate)	1000				
Isolation voltage	Input / Output : 1500VDC min. (1 minute) Input / Case : 1500VDC min. Output / Case : 1500VDC min.					
Case Material	Plastic, DAP, UL 94V-0					
Dimensions	57.9 x 61.0 x 12.7 mm					
Base plate Material	Aluminum					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F Compliant					
Humidity	95% RH max. non-condensing					
Altitude	2000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
EMI	Meets EN55032 (with external filter)					Class A

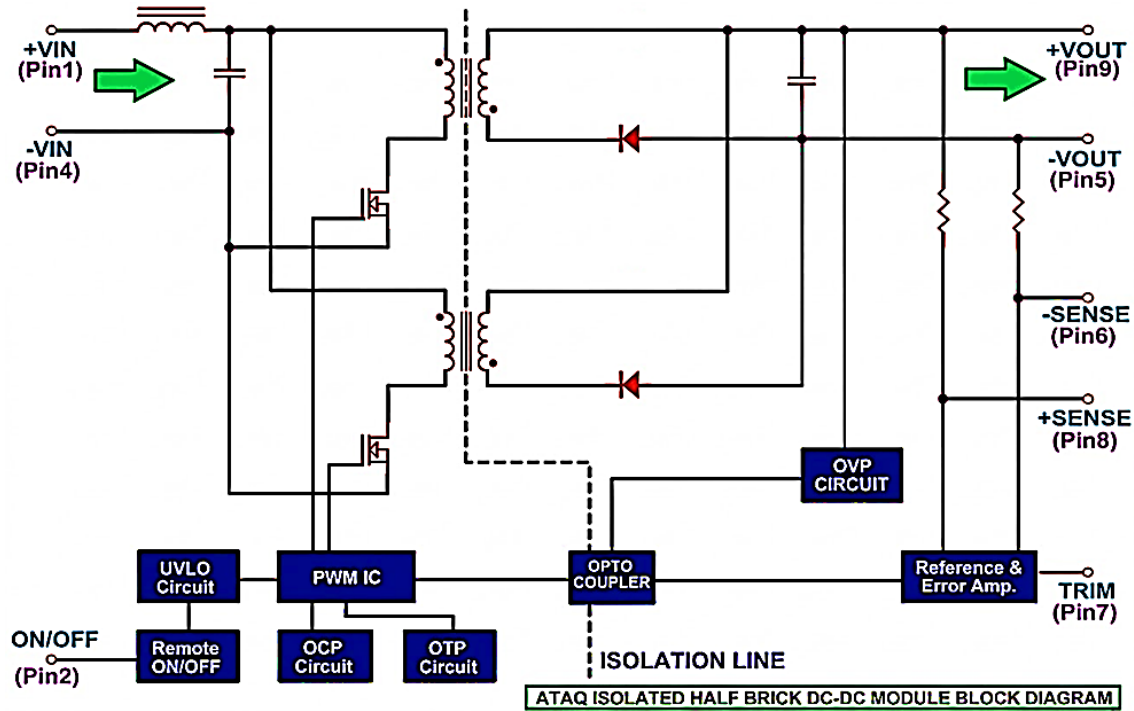


Figure-1

STANDARDS COMPLIANCE						
MIL-STD-1275D						
No	Parameters	Min	Typ	Max	Unit	Status
1	5.1.3.1 Steady-State Voltage	25	-	30	VDC	Passed
2	5.1.3.2 Ripple	-	-	2	VDC	Passed
3	5.1.3.3 Surges	28	-	40	VDC	Passed
4	5.1.4.1 Steady-State Voltage	23	-	33	VDC	Passed
5	5.1.4.2 Ripple	-	-	7	VDC	Passed
MIL-HDBK-704-8						
No	Parameters	Min	Typ	Max	Unit	Status
1	LDC101	-	-	-	-	Passed
2	LDC102	16	28	40	VDC	Passed
3	LDC105	28	-	100	VDC	Passed
4	LDC201	-	-	-	-	Passed
5	LDC301-704E	20	-	31,5	VDC	Passed
6	LDC302-704E	22	-	50	VDC	Passed
7	LDC401-704E	18	-	29	VDC	Passed
8	LDC501	12	-	29	VDC	Passed
9	LDC601	0	-	28	VDC	Passed

Table-1: MIL-STD-1275 and MIL-STD-704 baseline test results applied with external components (TVS+EMC filters).

CHARACTERISTIC CURVE & GRAPHS

POWER DERATING CURVE:

Note: Figure 1 shows the results of thermal tests for different heatsinks.

Heatsink - 1 / VHS-95 (517-95AB) / , Heatsink - 2 / VHS-45 (528-45AB), Heatsink - 3 / M-C308

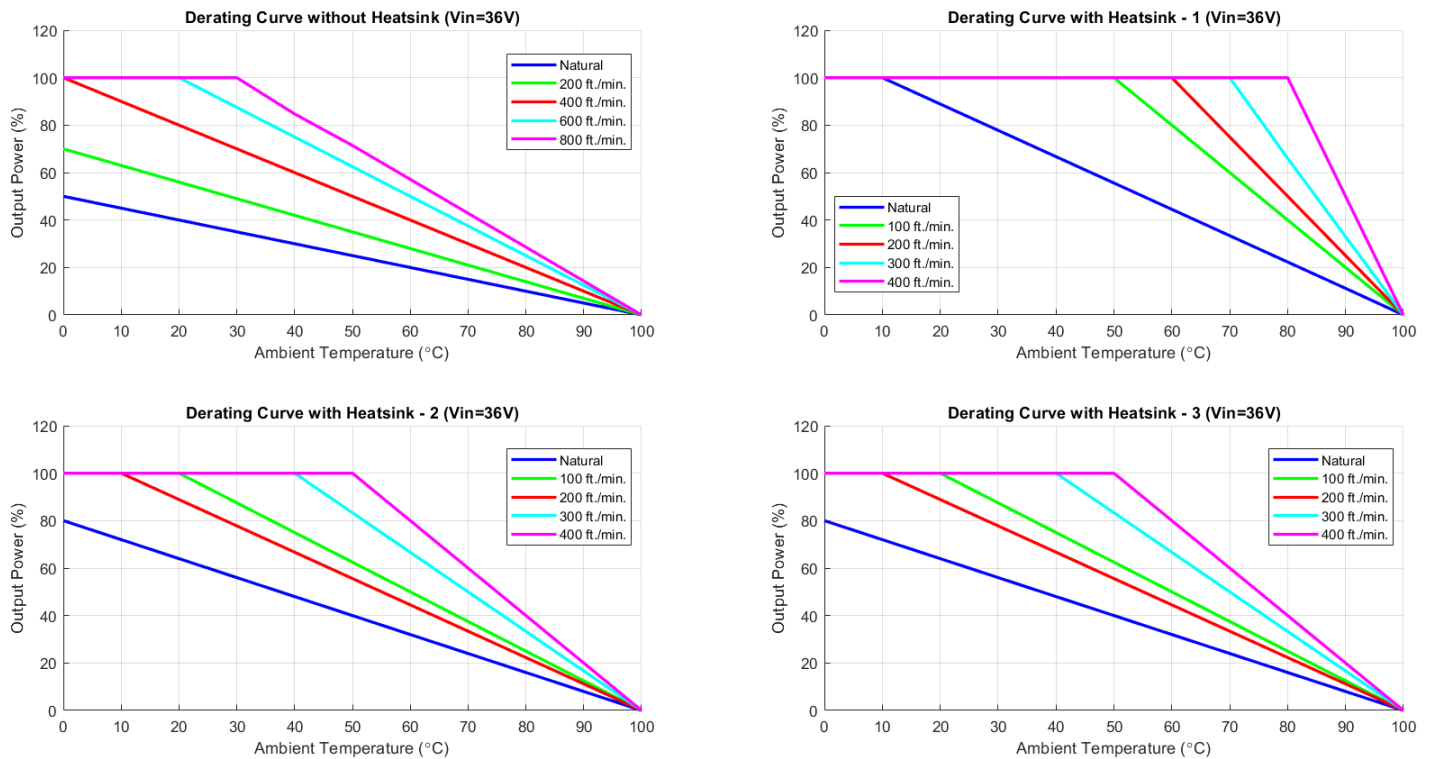


Figure-2

PERFORMANS INFO & DATA

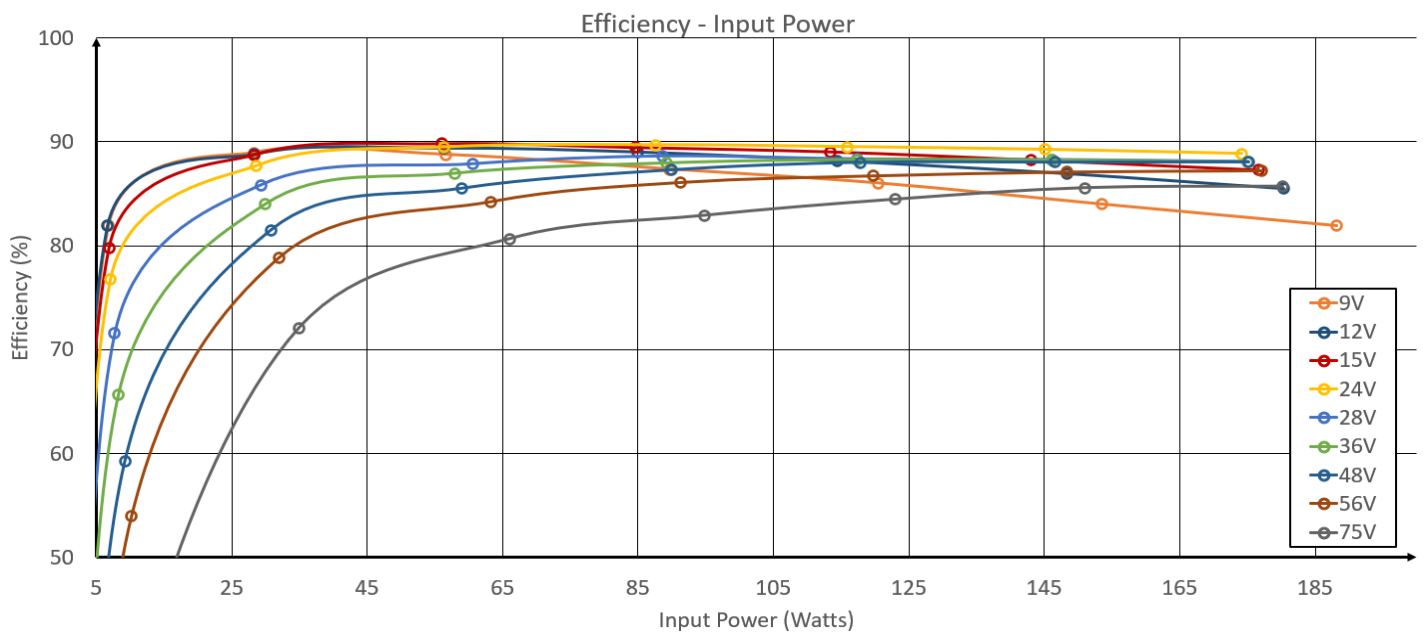


Figure-3a

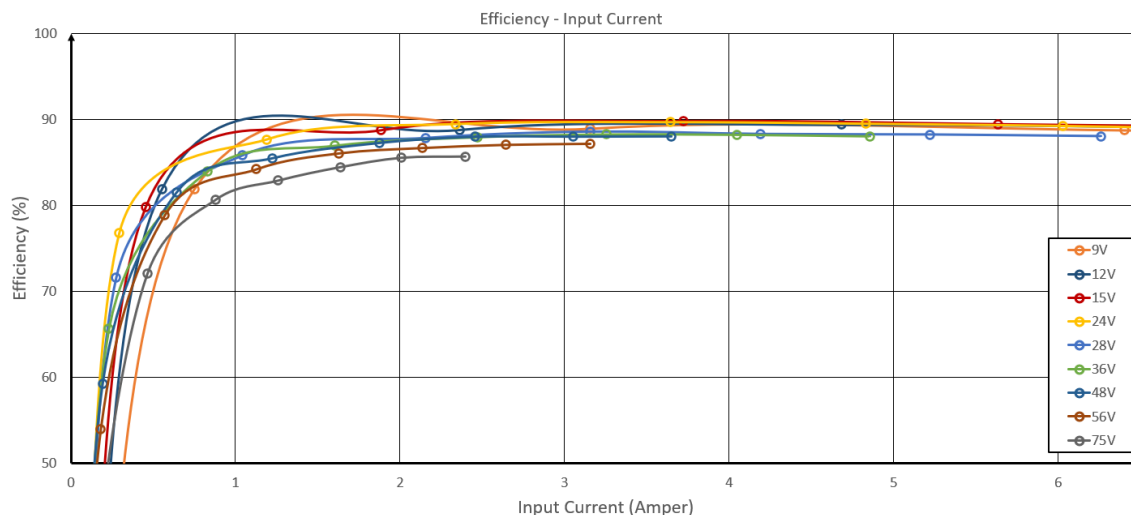


Figure-3b

Note: The Efficiency-Output Power graph provides a clearer view of the relationship between output power and efficiency for each load value. (Figure-4 / Efficiency - Output Power Graph)

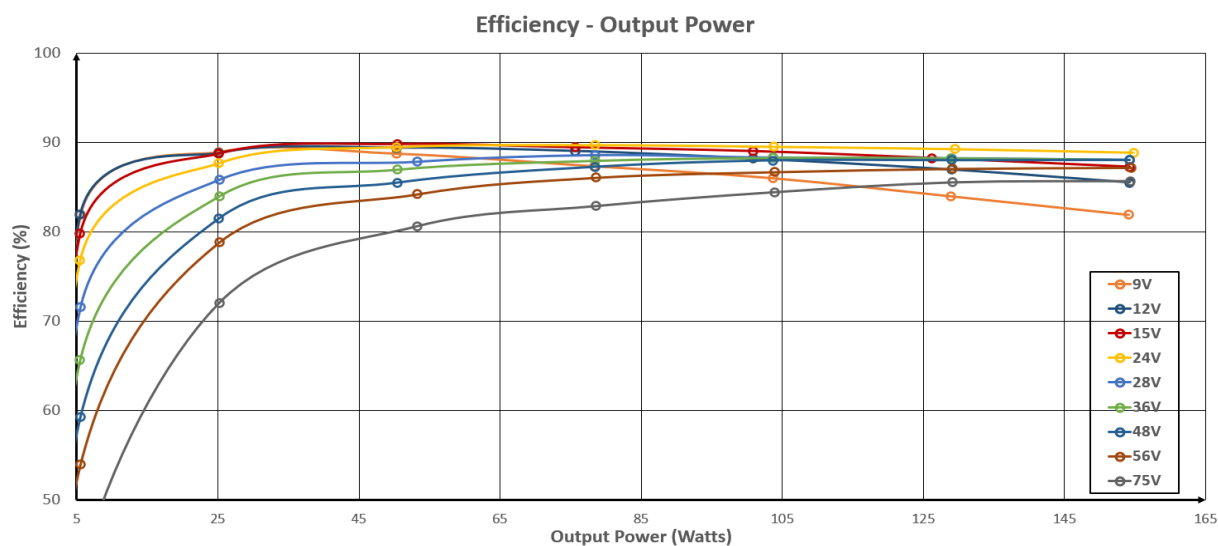


Figure-4

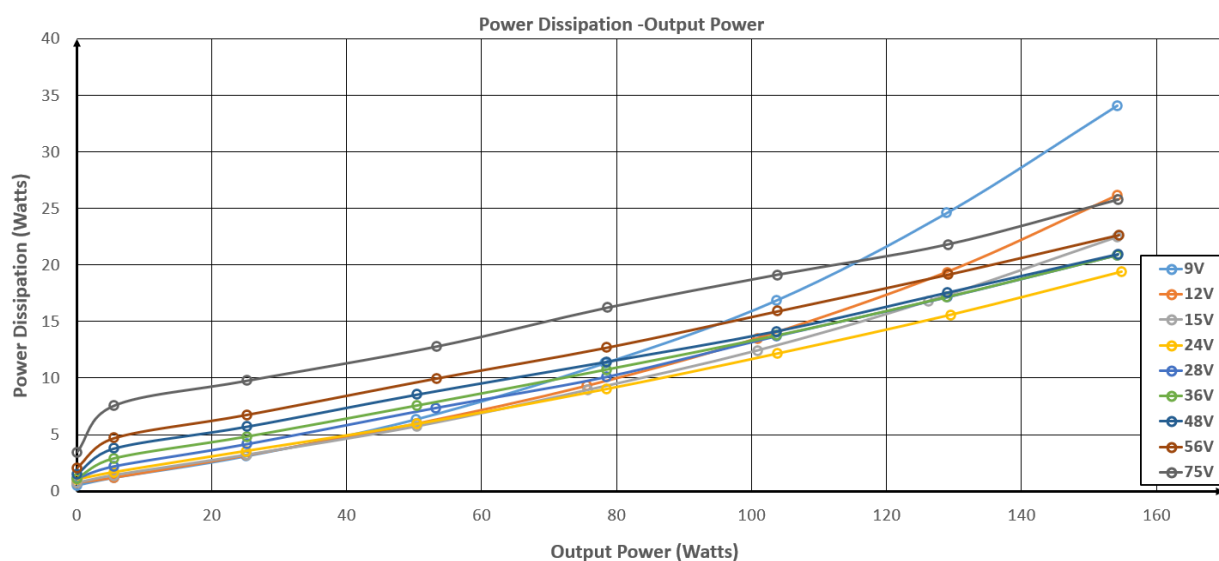
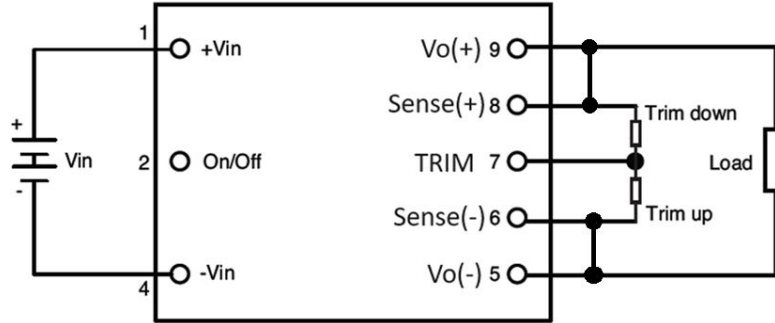


Figure-5

OUTPUT VOLTAGE ADJUSTMENT:

The Trim input permits the user to adjust the output voltage up or down 10%. This is accomplished by connecting an external resistor between the Trim pin and either the Vo (+) pin or the Vo (-) pin (TRIM pin). Please see Figure.



TOP VIEW

Figure-6

The Trim pin should be left open if trimming is not being used. Connecting an external resistor (Rtrim-down) between the Trim pin and the Vout(+) (or Sense(+)) pin decreases the output voltage.

The following equation determines the required external resistor value to obtain a down percentage output voltage change of $\Delta\%$.

Vout = 28V:

$$R_{trim_down} = 23.7 * \frac{(V_{o,set} - \Delta\% * V_{o,set} - 2.5)}{\Delta\% * V_{o,set}} - 150K\Omega$$

Where

For example, to trim-down the output voltage of 28V module (ATQ150-WH36S28) by 5% to 26.6V, Rtrim-down is calculated as follow:

$$\Delta\% = 5\%$$

$$R_{trim_down} = 23.7 * \frac{(28 - 5\% * 28 - 2.5)}{5\% * 28} - 150K\Omega$$

$$R_{trim_down} = 257.979K\Omega$$

Connecting an external resistor (Rtrim-up) between the Trim pin and the Vout (-) (or Sense (-)) pin increases the output voltage. The following equations determine the required external resistor value to obtain an up percentage output voltage change of $\Delta\%$.

Vout=28V:

Where

$$V_{out} = V_{o,set}, \Delta\% = \left(\frac{V_{desired} - V_{o,set}}{V_{o,set}} \right) \times 100$$

For example, to trim-up the output voltage of 28V module (ATQ150-WH36S28) by 5% to 30.8V, Rtrim-up is calculated as follow:

$$\Delta \% = 5\%$$

$$R_{trim_up} = 23.7 * \frac{(2.5 - \frac{0.46 * 150}{150 + 5.6})}{\Delta \% * V_{o,set}} - \frac{5.6 * 150}{150 + 5.6} K\Omega$$

$$R_{trim_up} = 23.7 * \frac{(2.5 - \frac{0.46 * 150}{150 + 5.6})}{5\% * 28} - \frac{5.6 * 150}{150 + 5.6} K\Omega$$

$$R_{trim_up} = 29.416 K\Omega$$

Note:

Although the output voltage can be increased by both the remote sense and by the trim, the maximum increase for the output voltage is not the sum of both.

The maximum increase is the larger of either the remote sense or the trim. The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased and consequently increase the power output of the module if output current remains unchanged.

Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power (Maximum rated power = $V_{o,set} \times I_{o,max}$)

28VDC Output Voltage Trim Range:

- ❖ **V_{in} = 9-13V, I_{out} = max rated current** : Minimum -10% , maximum 0%
- ❖ **V_{in} = 13-75V, P_{out}=max rated power, I_{out}=max rated current** : Minimum %-10 , maximum +10%

Only one adjustment resistor should be used for trim-up or trim-down of the output voltage. Only a trim-up resistor or only a trim-down resistor should be used.

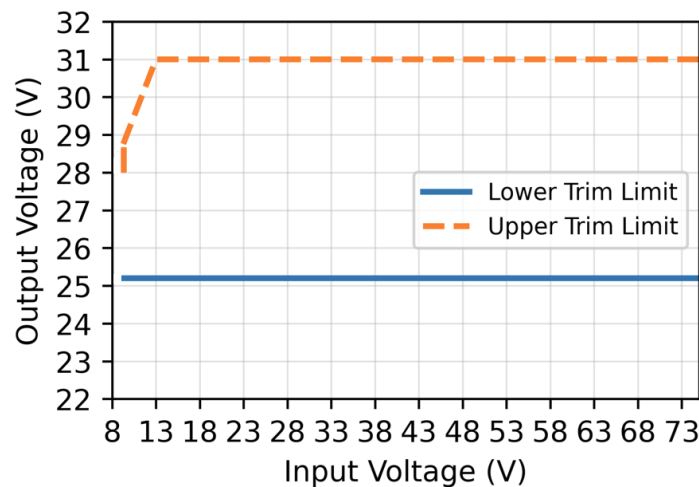


Figure-7

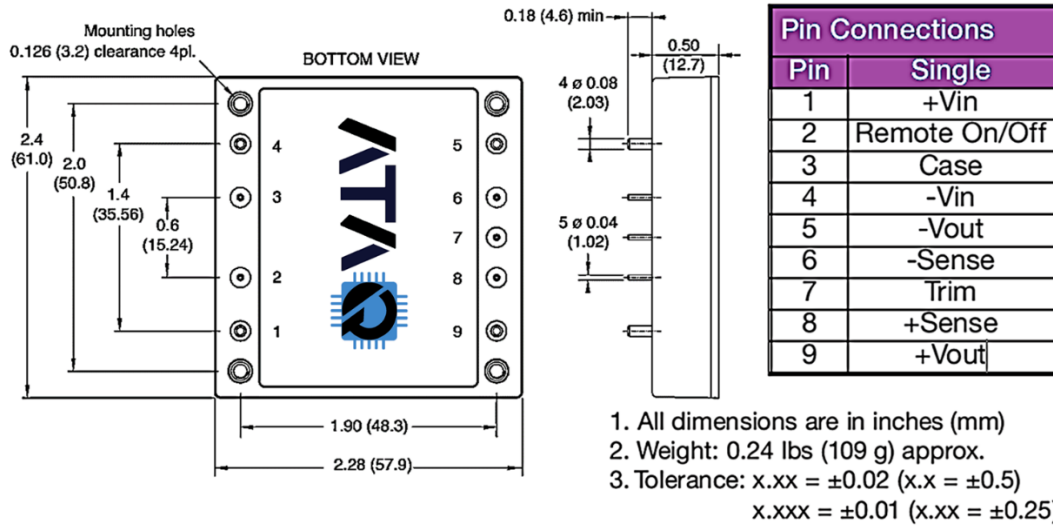


Figure-8

MECHANICAL SPECIFICATION:

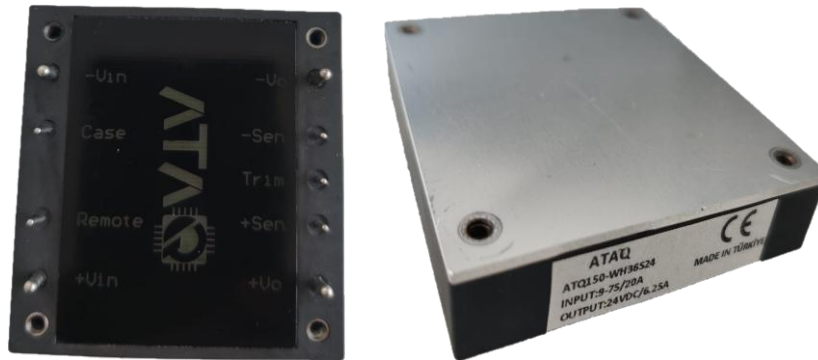


Figure-9

PACKAGING:

Due to ATAQ's value-added services, the packaging type may change when purchasing quantities below the standard package.



Figure-10

Contact ATAQ for further information and to order.