Figure 1.1. PCB Mount without Heat Sink

Figure 1.2. PCB Mount with Heat Sink

Figure 1.3. Terminal Block Mount without Heat Sink

Figure 1.4. Terminal Block with Heat Sink

Figure 1.5. Terminal Block DIN-Rail without Heat Sink

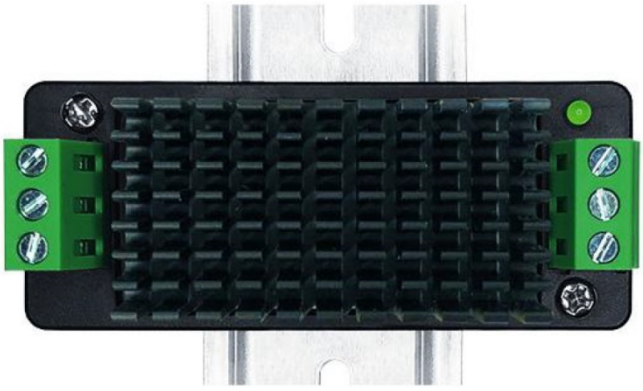


Figure 1.6. Terminal Block DIN-Rail with Heat Sink

FEATURES

- Wide Input Range: 18V ~ 36V
- Output Voltage: 5V
- Max. Output Current: 10A
- High Efficiency: 90% @V_{IN} = 18V & I_{OUT} = 10A
- Switching Frequency: 350kHz
- High Isolation Voltage: 1500VDC
- Low Standby Power Consumption ≤ 0.3W
- Output Start time ≤ 20ms
- Fully Protected: OCP, SCP, OVLO & UVLO
- Durable Construction: Aluminum Housing for EMI Shielding and Durable Construction
- Wide Operating Temperature Range: −40°C ~ +85°C
- Robust Protections: OCP, SCP, OVLO and UVLO

APPLICATIONS

Our ATDC24V5V10AP power module is designed to convert an unregulated voltage of 18V to 36V into a regulated 5V output with a maximum current of 10A, making it an ideal power supply source for industrial applications that require high voltage isolation. With various packaging options for different mounting and power consumption needs (as shown in Figure 1), our power module is a versatile solution that can meet the demands of a wide range of applications.

Our power supply unit is 90% efficient at V_{IN}=18V and I_{OUT}=10A, reducing power consumption and temperature rise. This eliminates the need for large heat sinks and prolongs the unit's lifespan. The power supply unit has low standby power consumption of less than or equal to 0.3W, making it energy-efficient and eco-friendly. The unit has an isolation voltage of 1500VDC, ensuring complete isolation between the input and output circuits. The power supply unit has low standby power consumption of less than or equal to 0.3W, making it energy efficient and eco-friendly.

DESCRIPTION AND SPECIFICATIONS

Our power module is designed to operate reliably under extreme conditions, with built-in over-current, short-circuit, over-voltage, and under-voltage protections. With a mean time between failure of 2×10^5 hours (equivalent to 23 years of continuous use), you can trust that it will keep your equipment running smoothly for years to come. Our power module comes in three different mounting packages - PCB, terminal block, and DIN-Rail with or without heat sinks. Heat sinks are recommended for applications with output currents greater than 6A, while applications with output currents below 6A can operate without the need for a heat sink. Our power supply unit features a sturdy aluminum housing that provides both EMI shielding and durable construction, making it an ideal choice for demanding environments. Our power supply unit is designed to withstand extreme temperatures, with a wide operating range of −40°C to +85°C. This makes it a versatile and reliable choice for use in a variety of industrial and commercial settings.

Table 1. Pin Names AND Functions.

No.	Name	Type	Description
1	SDN	Digital Input	Shutdown Control
2	VIN−	Power Input	Negative Input Voltage
3	VIN+	Power Input	Positive Input Voltage
4	VOUT+	Power Output	Positive Output Voltage
5	VOUT−	Power Output	Negative Output Voltage
6	Trim	Analog Input	Trimming Input

Table 2. Specifications

INPUT						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit/Note**
Input Voltage	V_{IN}		18	24	36	V
Input Current	I_{IN}	Full Load		2315		mA
		No Load		50		mA
Surge Voltage (1sec. max.)					50	VDC
Under Voltage Lockout	UVLO			16		V
Shutdown	V_{SDNH}	ON	3.5		12	V
	V_{SDNL}	OFF	0		1.2	V
	I_{SDN}			150		mA
Start-up time	t_s			20		ms
Filter			Pi Filter			
OUTPUT						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit/Note**
Output Voltage	V_{OUT}			5		V
Output Current	I_{OUT}				10	A
Output Voltage Accuracy					±2	%
Line Regulation	$\Delta V_{OUT}/\Delta V_{VPS}$				±1	%
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	Load change from 10% to 100%			±2	%
Ripple & Noise					100	mV_{p-p}
Output Over Voltage Lockout	OVLO		$1.1V_{OUT}$		$2V_{OUT}$	
Output Over Current Protection			$1.1I_{OUT}$	$1.5I_{OUT}$	$2I_{OUT}$	
Capacitive Load					8000	μF
Efficiency	η			90		%
Output Voltage Regulation		Trim Pin Function		±10		%
Output Voltage Drift	$\Delta V_{OUT}/\Delta t$		≤±8%/500us			
GENERAL CHARACTERISTIC						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit/Note**
Isolation Voltage	V_{IS}			1500		VDC
Isolation Capacitance				2000		pF
Isolation Resistance			100			MΩ
Switching Frequency	f_{SW}			350		kHz

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Operating Temperature Range		T_{opr}		−40		85	°C
Storage Temperature Range		T_{stg}		−55		125	°C
Maximum Case Temperature		T_{cs}	T_A = 25°C			105	°C
Storage Relative Humidity Range		RH		5		95	%
Mean Time Between Failure		MTBF	MIL-HDBK-217F@25°C		2×10^5		Hrs
Case Material				Aluminum			
Weight					28		g
					0.062		lbs
					0.988		Oz
EMC CHARACTERISTIC							
EMI	Conducted Emissions	CISPR32/EN55032 CLASS B					
	Radiated Emissions	CISPR32/EN55032 CLASS B					
EMS	ESD	IEC/EN61000-4-2 Contact ±4kV	perf.Criteria B				
	Radiated Immunity	IEC/EN61000-4-3 10V/m	perf.Criteria A				
	EFT/Burst	IEC/EN61000-4-4 ±2kV	perf.Criteria B				
	Surge	IEC/EN61000-4-5 ±2kV	perf.Criteria B				
	Conducted Immunity	IEC/EN61000-4-6 3Vr.m.s	perf.Criteria A				

TYPICAL PERFORMANCE CHARACTERISTICS

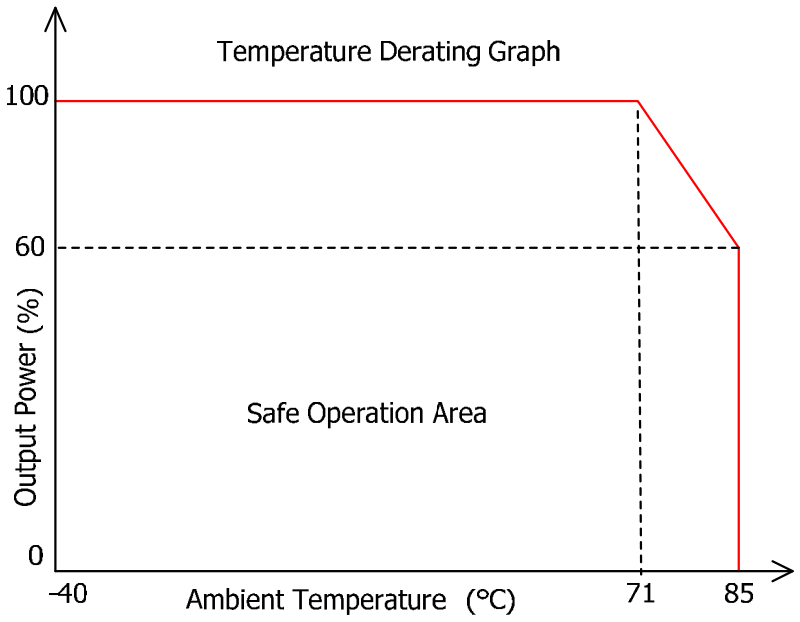


Figure 2. Derating Curve

TRIM APPLICATIONS CIRCUITS

The output voltage can be trimmed in 3 ways: up, down and both.

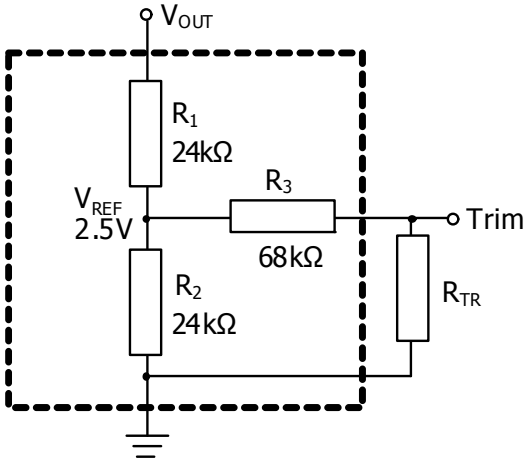


Figure 3. Trimming Up Output Voltage

$$V_{REF} = \frac{R_2//(R_3 + R_{TR})}{R_1 + R_2//(R_3 + R_{TR})} \times V_{OUT}$$

$$V_{OUT} = \left[1 + \frac{R_1}{R_2//(R_3 + R_{TR})}\right] \times V_{REF}$$

$$V_{OUT} = 5 + \frac{60}{R_{TR} + 68}$$

$$R_{TR} = \frac{110}{V_{OUT} - 5} - 68$$

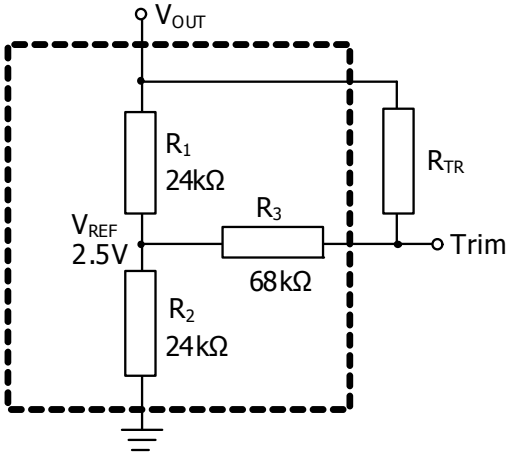


Figure 4. Trimming Down Output Voltage

$$V_{REF} = \frac{R_1//(R_3 + R_{TR})}{R_2 + R_1//(R_3 + R_{TR})} \times V_{OUT}$$

$$V_{OUT} = \left[1 + \frac{R_2}{R_1//(R_3 + R_{TR})}\right] \times V_{REF}$$

$$V_{OUT} = 5 + \frac{60}{R_{TR} + 68}$$

$$R_{TR} = \frac{110}{V_{OUT} - 5} - 68$$

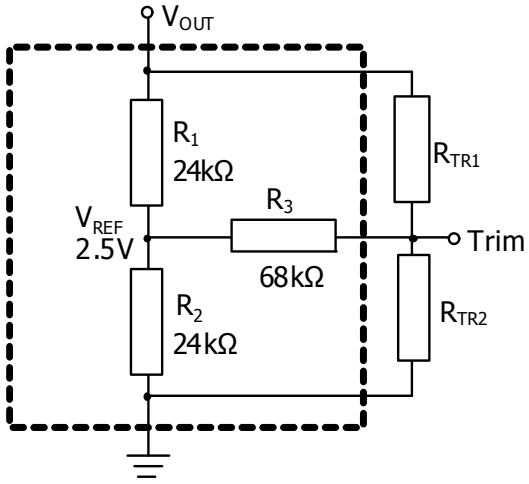


Figure 5. Trimming Up and Down Output Voltage

$$V_{REF} = \frac{R_2//(R_3 + R_{TR1}//R_{TR2})}{R_1 + R_2//(R_3 + R_{TR1}//R_{TR2})} \times V_{OUT}$$

$$+ \frac{R_{TR2}//(R_3 + R_1//R_2)}{R_{TR1} + R_{TR2}//(R_3 + R_1//R_2)} \times V_{OUT}$$

$$V_{OUT} =$$

$$\frac{14985R_{TR1}R_{TR2} + 2000{R_{TR2}}^2 + 25600R_{TR1}}{5492R_{TR1}R_{TR2} + 69R_{TR1}{R_{TR2}}^2 + 5460{R_{TR2}}^2 + 2176R_{TR1} + 2176R_{TR2}}$$

TYPICAL APPLICATIONS

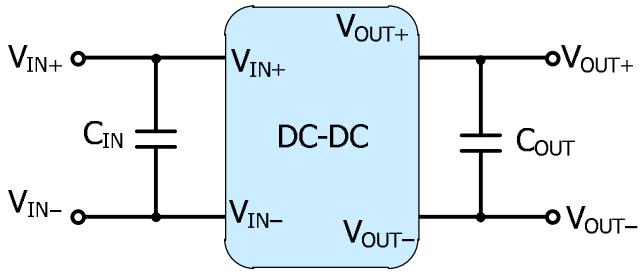


Figure 6. DC-DC Test Circuit

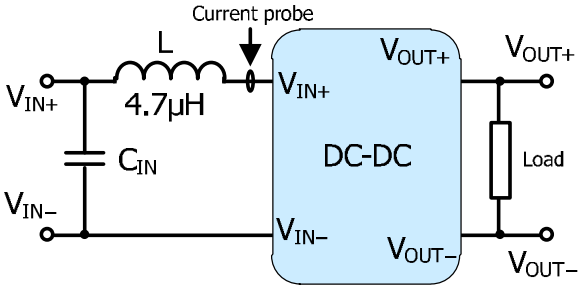


Figure 7. Input ripple Test Current Circuit

Recommended Values:

C_{IN}: 47μF ~100μF, C_{OUT}: 10μF ~ 22μF

Choose a low ESR capacitor with a voltage tolerance higher than the maximum input voltage.

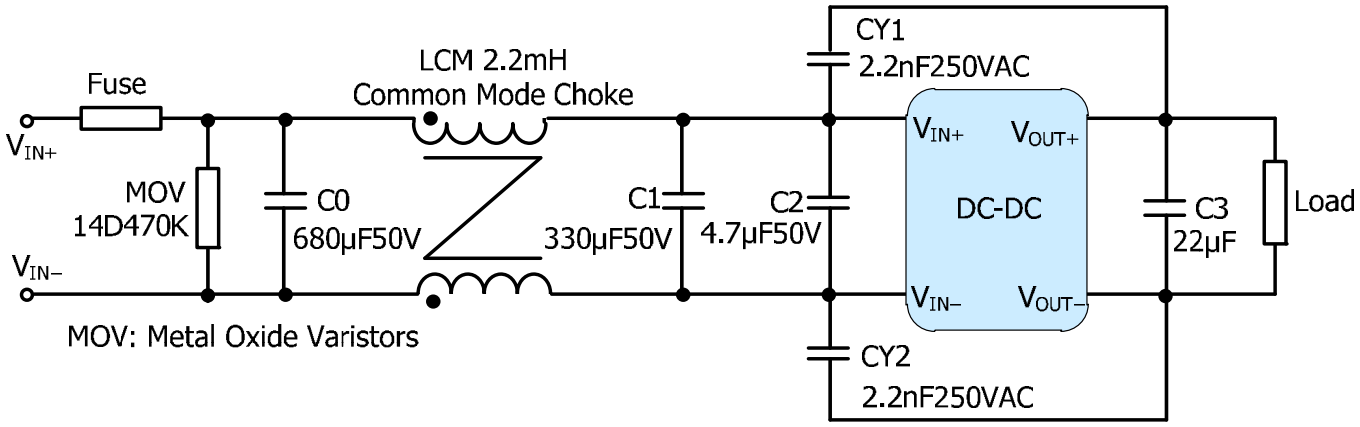
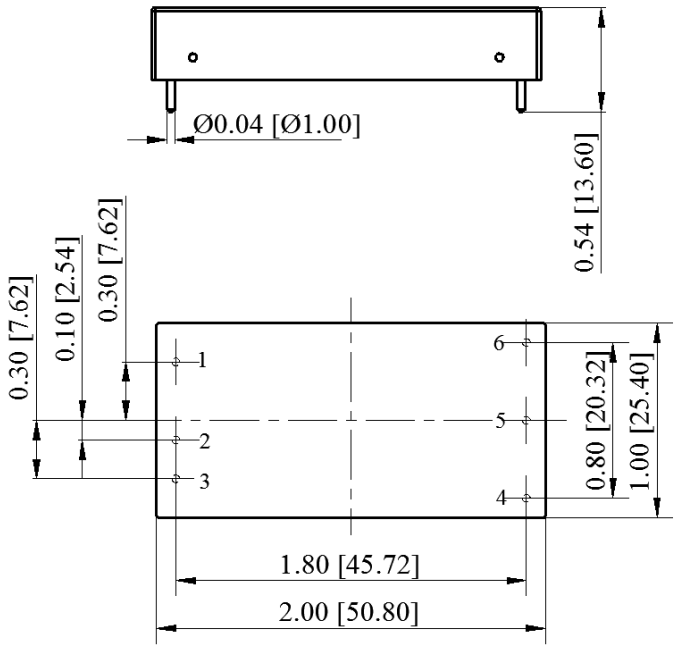
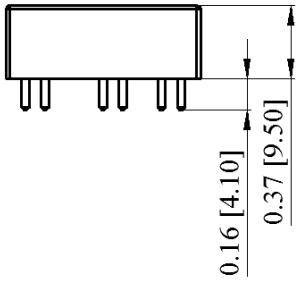


Figure 8. EMC Recommended Circuit

OUTLINE DIMENSIONS

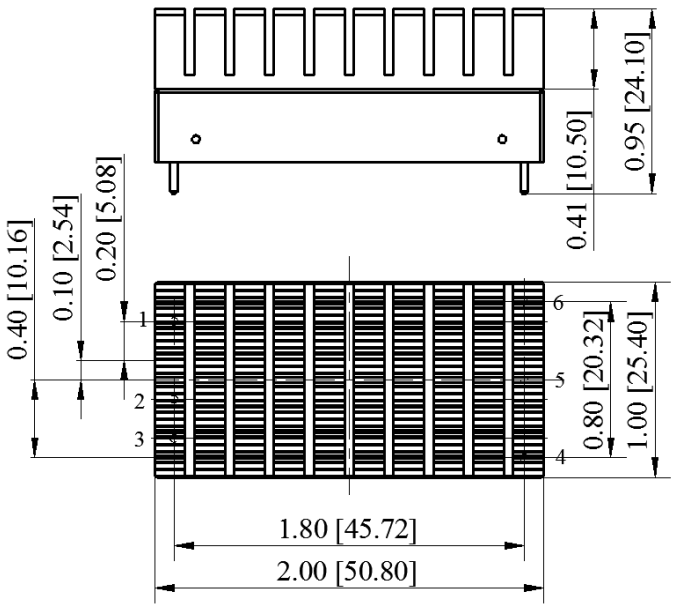
PCB Mount without Heat Sink(P)

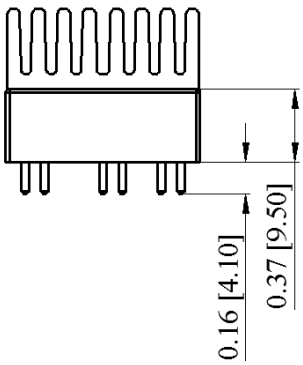




End View	Side View
Top View	Unit: inch [mm]

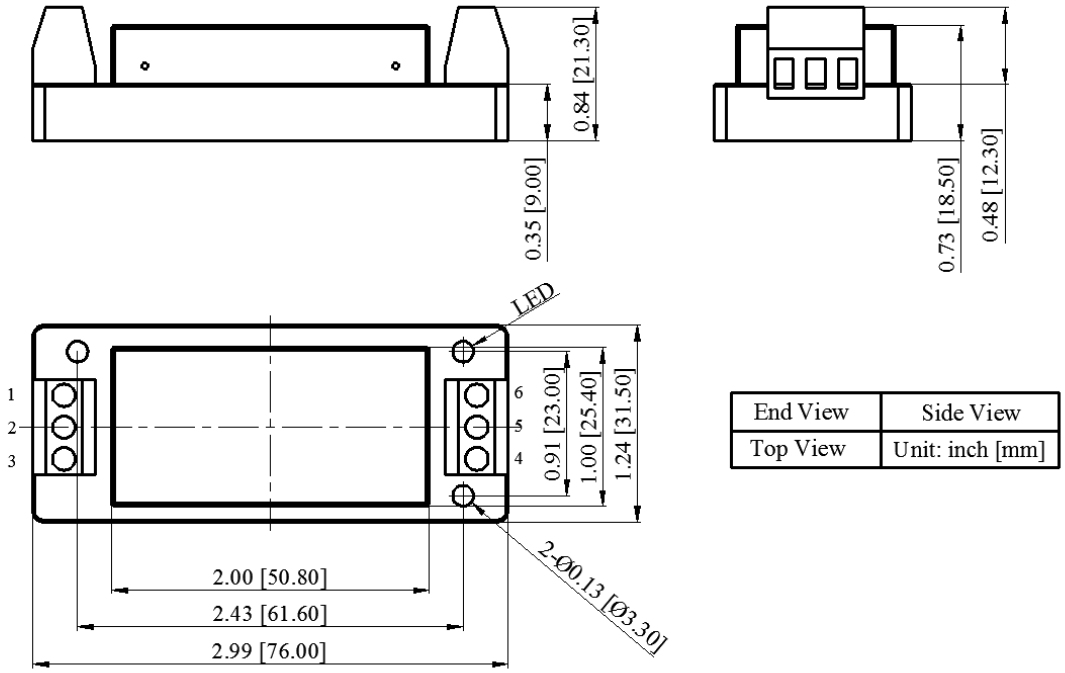
PCB Mount with Heat Sink (PH)





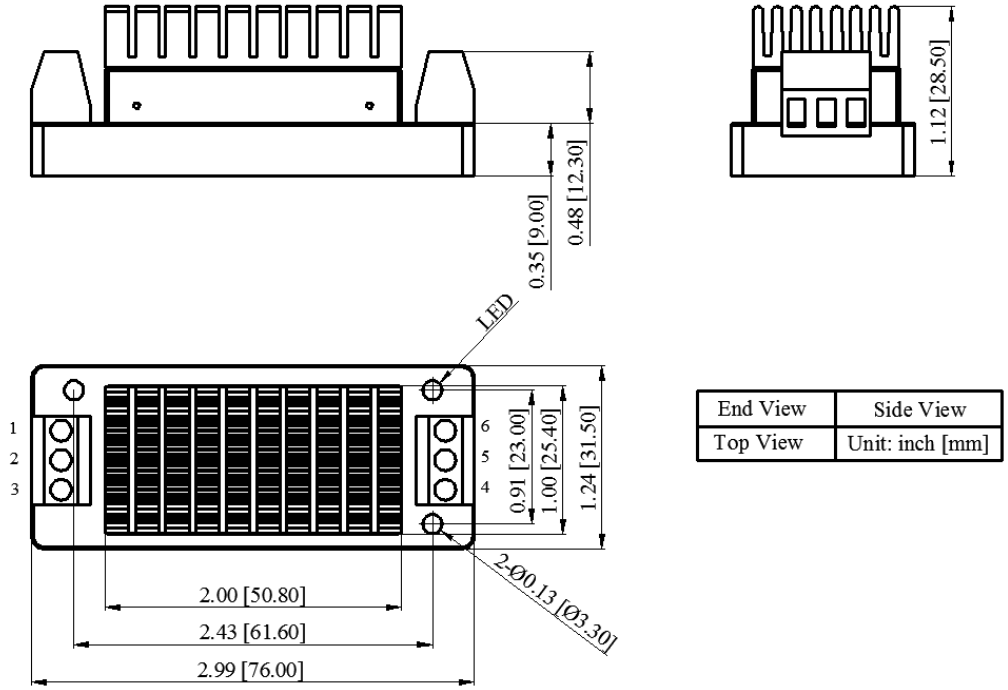
End View	Side View
Top View	Unit: inch [mm]

Terminal Block Mount without Heat Sink(T)



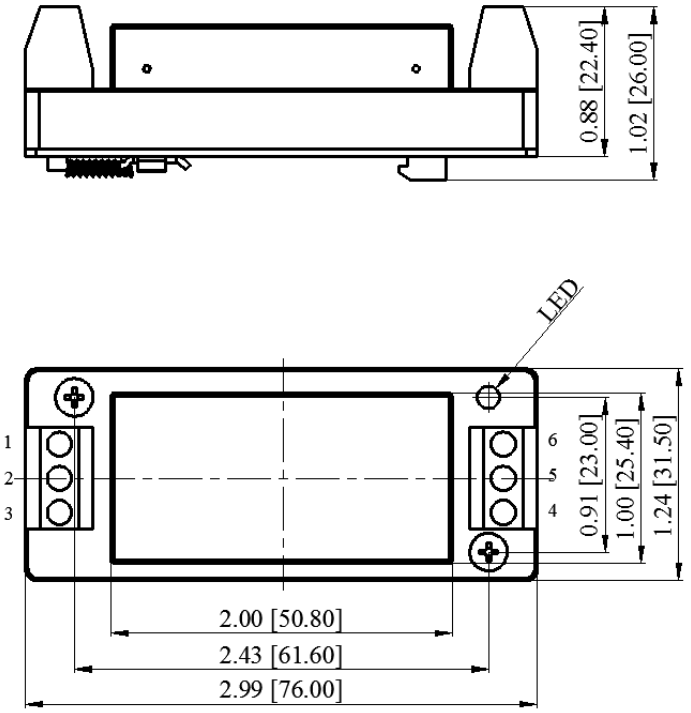
End View	Side View
Top View	Unit: inch [mm]

Terminal Block Mount with Heat Sink(TH)



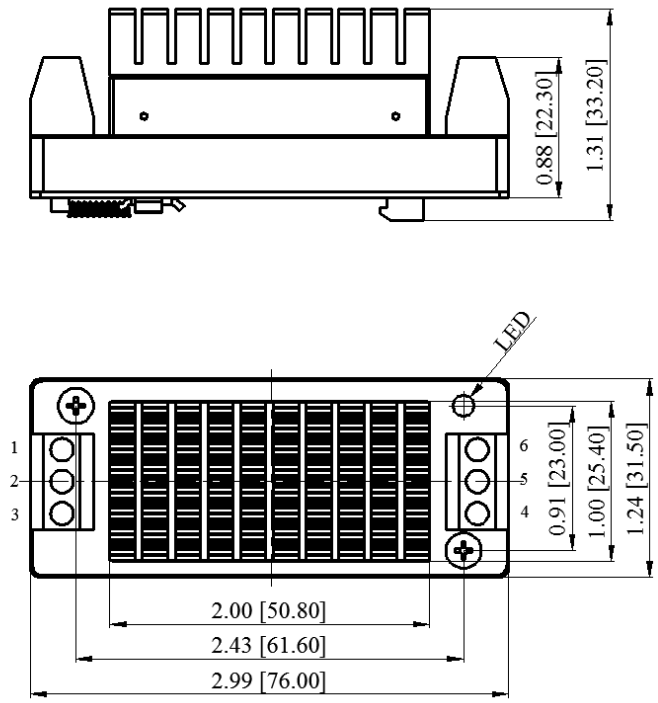
End View	Side View
Top View	Unit: inch [mm]

Terminal Block DIN Rail without Heat Sink(TD)



End View	Side View
Top View	Unit: inch [mm]

Terminal Block DIN Rail with Heat Sink (TDH)



End View	Side View
Top View	Unit: inch [mm]

ORDING INFORMATION

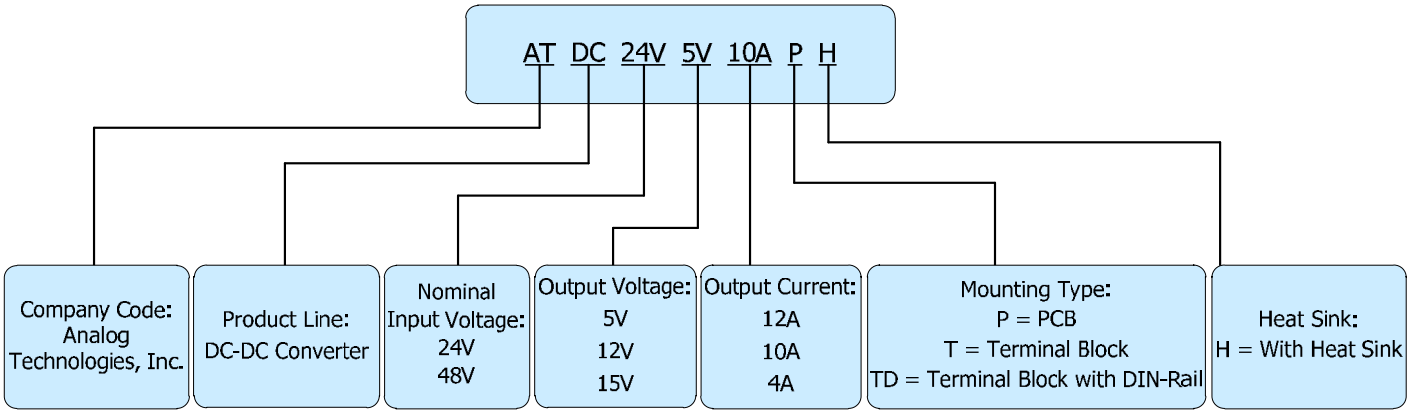


Figure 9. Naming Principle of ATDC24V5V10AP

Table 4. ATDC24V5V10AXXX and Its Families.

Product Model	Input Voltage		Output Voltage	Output Current	Input Current (mA)		MAX. Capacitive Load	Ripple & Noise 20MHz(Max)	Efficiency (%)	
	Typ.	Range	V	A	Full Load	No Load	μF	mV_{p-p}	Min.	Typ.
ATDC24V3R3V12AXXX*	24	18~36	3.3	12	1885	50	10000	100	84	87
ATDC24V5V10AXXX*			5	10	2315	50	8000	100	87	90
ATDC24V12V4AXXX*			12	4.16	2350	2	2000	100	86	89
ATDC24V15V3R3AXXX*			15	3.33	2315	2	1000	100	87	90
ATDC24V24V2AXXX*			24	2.08	2315	2	500	100	87	90
ATDC48V3V310AXXX*	48	36~75	3.3	10	790	50	10000	100	84	87
ATDC48V5V10AXXX*			5	10	1158	50	8000	100	85	87
ATDC48V12V4AXXX*			12	4.16	1158	2	2000	100	87	89
ATDC48V15V3R3AXXX*			15	3.33	1158	2	1000	100	87	90
ATDC48V24V2AXXX*			24	2.08	1158	2	500	100	87	90

*Note: See Figure 9.

NOTICE

1. ATI warrants its products to perform according to specifications for one year from the date of sale, except when damaged due to excessive abuse. If a product fails to meet specifications within one year of the sale, it can be exchanged free of charge.
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