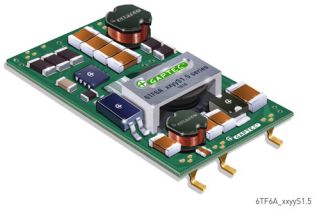
GAPTEC®
GREEN TECHNOLOGY

6T6AW_1.5RP Series

6W Single Output - Wide Input - Isolated & Regulated
SMT PACKAGE



DC-DC Converter 6 Watt

- **Wide input voltage range**
- **1.5KVDC/500VAC isolation**
- **High efficiency up to 86%**
- **Operation temperature range: -40°C ~ +85°C**
- **No-load power consumption as low as 0.12W**
- **Input under-voltage, over-current, over-voltage protection**
- **SMT package**
- **Industry standard pinout**
- **RoHS compliance**

The 6T6AW_1.5RP series are isolated 6W DC-DC products with 2:1 input voltage, featuring 500VAC/500VDC isolation, input under-voltage protection, output over-voltage, over-current, and short circuit protection.

This makes them widely applied in industrial control, electricity, instruments and communication fields.

Common specifications

Short circuit protection:	Continuous, automatic recovery
Cooling:	Free air convection
Operation temperature range:	-40°C to +85°C
Storage temperature range:	-55°C to +125°C
Reflow soldering temperature:	Peak temp. ≤245°C, maximum duration time ≤60s at 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1.
Vibration:	10-150Hz, 5G, 90 Min. along X, Y and Z
Storage humidity range:	< 95%
Case material:	Aluminium alloy
MTBF:	>1,000,000 hours
Dimensions:	31.60*18.10*6.30mm (without housing) 32.60*19.10*7.00mm (with housing)
Weight:	4.7g / 5.7g with housing

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/no load)	• 12VDC input				
	- 5V output		617/7	633/25	mA
	- 12V output		595/10	610/30	mA
	- 15V output		588/9	603/30	mA
	• 24VDC input				
	- 3.3V output		261/3	268/15	mA
	- 5V output		301/4	308/18	mA
	- 12V output		294/5	302/20	mA
	- 15V output		291/5	398/20	mA
Reflected ripple current			20		mA
Surge voltage (1 sec. max)	• 12VDC input	-0.7		25	VDC
	• 24VDC input	-0.7		50	VDC
Starting voltage	• 12VDC input			9	VDC
	• 24VDC input			18	VDC
Input under voltage protection	• 12VDC input	5.5	6.5		VDC
	• 24VDC input	13	15		VDC
Input filter	Capacitance filter				
Hot plug	Unavailable				
Ctrl*	• Module switch on	Ctrl suspended or connected to TTL low level (0-0.3VDC)			
	• Module switch off	Ctrl pin connected to high level (2-12VDC)			
	• Input current when switched off		5	10	mA

* The voltage of Ctrl pin is relative to input pin GND.

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	0%-100% load		±1	±3	%
Line regulation	full load, input voltage from low to high		±0.2	±0.5	%
Load regulation*	5%-100% load		±0.5	±1	%
Temperature drift	100% full load			±0.03	%/°C
Transient response deviation	25% load step change				
	• 3.3V/5V output		±5	±8	%
	• others		±3	±5	%
Transient recovery time	25% load step change		300	500	µs
Temperature coefficient	full load			±0.03	%/°C
Ripple&Noise**	20MHz Bandwidth			100	mVp-p
Trim			±5		%Vo
Output over voltage protection	Input voltage range	110		160	%Vo
Output over current protection	Input voltage range	110	140	200	%Io
Switching frequency	PWM mode		330		KHz

* When testing from 0% -100% load working conditions, load regulation index of ±5%;
** 0% - 5% load ripple&Noise is no more than 5%Vo Ripple and noise are measured by "parallel cable" method.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output; 1 min./ leak current <5mA	500 1500			VAC VDC
Isolation resistance	Input-output, isolation voltage 500VDC	100			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		1000		pF

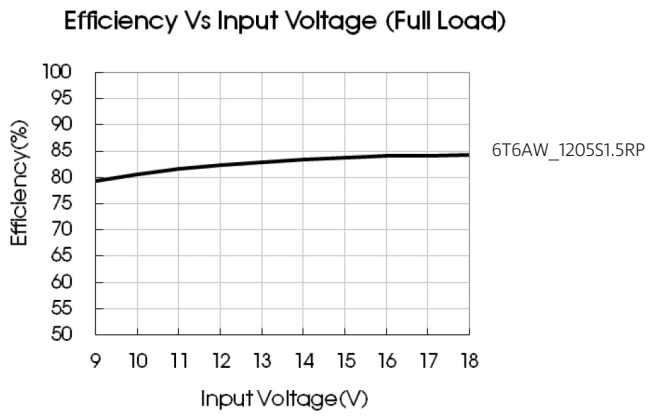
Example:
6T6AW_0505S1.5RP
6= 6 Watt; T6= SMT6; A= Pinning; W= Wide input; 5Vin; 5Vout; S = Single Output; 1.5= 1.5kVDC; R= Regulated Output; P= Short Circuit Protection

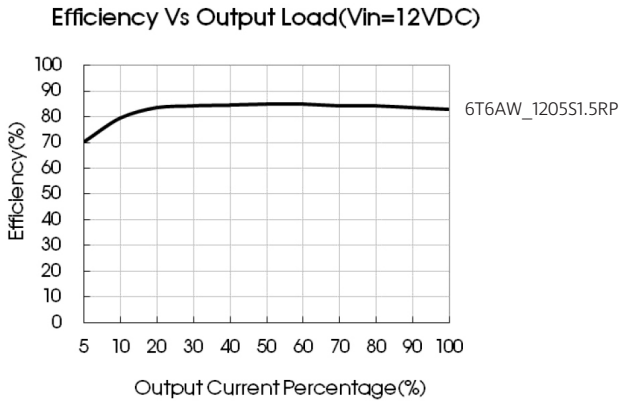
EMC specifications				
EMI	CE	CISPR22/EN55032	CLASS B	(see EMC recommended circuit, ②)
EMI	RE	CISPR22/EN55032	CLASS B	(see EMC recommended circuit, ②)
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
EMS	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EMS	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B (see EMC recommended circuit, ①)
EMS	Surge	IEC/EN61000-4-5	line to line ±2KV	perf. Criteria B (see EMC recommended circuit, ①)
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

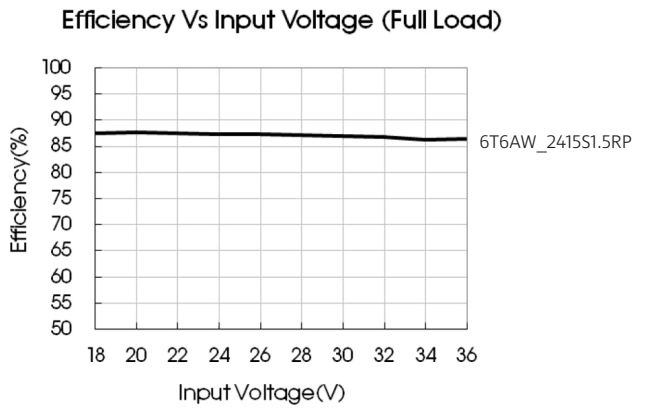
Part Number	Input Voltage [V]			Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [%, max]
	Nominal	Range	Max				
6T6AW_1205S1.5RP	12	9-18	20	5	1200	81	1000
6T6AW_1212S1.5RP	12	9-18	20	12	500	84	680
6T6AW_1215S1.5RP	12	9-18	20	15	400	85	470
6T6AW_2403S1.5RP	24	18-24	40	3.3	1500	79	1800
6T6AW_2405S1.5RP	24	18-24	40	5	1200	83	1000
6T6AW_2412S1.5RP	24	18-24	40	12	500	85	680
6T6AW_2415S1.5RP	24	18-24	40	15	400	86	470

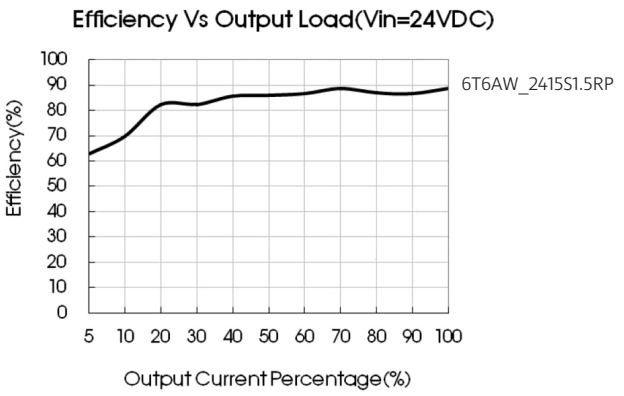
Notes: SMT package without housing: 6TF6AW_xxyyS1.5RP

Efficiency



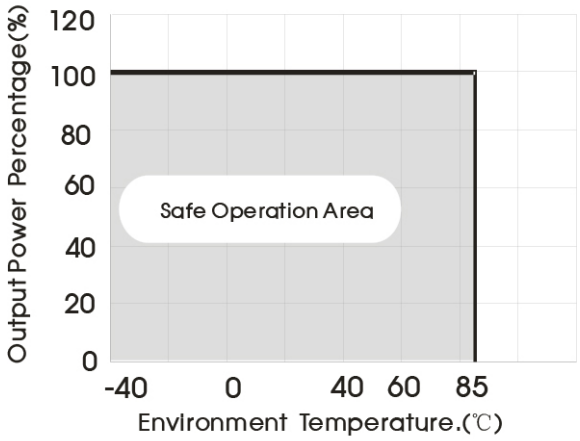






Typical characteristics

Temperature derating graph



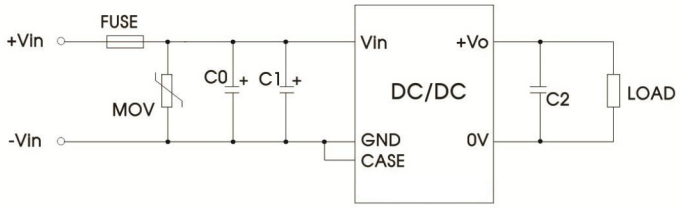
Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see below) before delivery.

If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

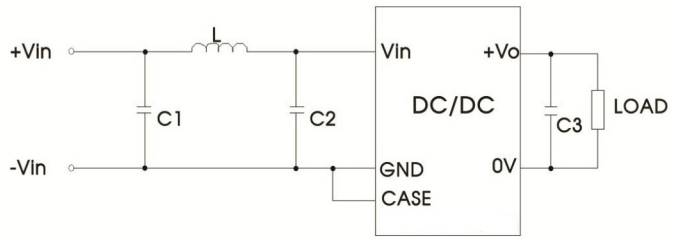
Vout(VDC)	Cin(uF)	Cout(uF)
3.3/5/12/15	10	10

EMC solution-recommended circuit



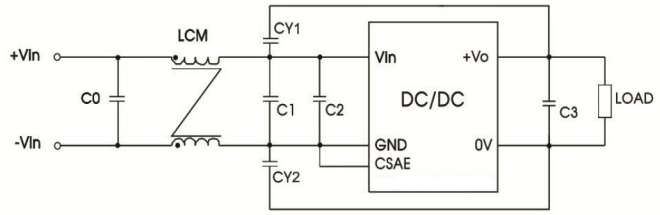
Parameter description:

Model	Vin: 12VDC/24VDC
FUSE	Choose according to actual input current
MOV	S20K30
C0	680μF/100V
C1	330μF/100V
C2	10μF/25V



Parameter description:

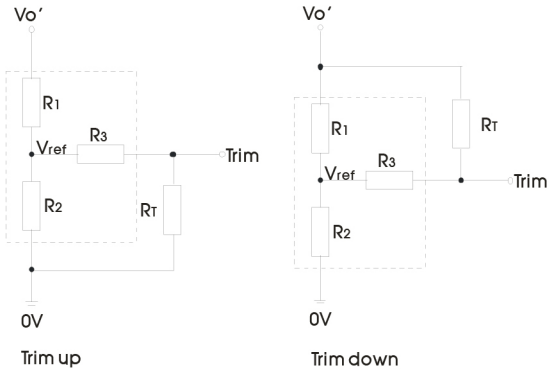
Vin(VDC)	C1/C2	L	C3
12/24	4.7μF/50V	4.7μH	10μF/25V



Parameter description:

Model	Vin: 12VDC/24VDC
C0	4.7μF/50V
C1	4.7μF/50V
C2	4.7μF/50V
C3	10μF/25V
LCM	3.3mH
CY1/CY2	1000pF/≥2000VDC

Application of Trim and calculation of Trim resistance



Calculation formula of Trim resistance:

up: $R_T = \frac{aR_2}{R_2 - a} - R_3$ $\quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$

down: $R_T = \frac{aR_1}{R_1 - a} - R_3$ $\quad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$

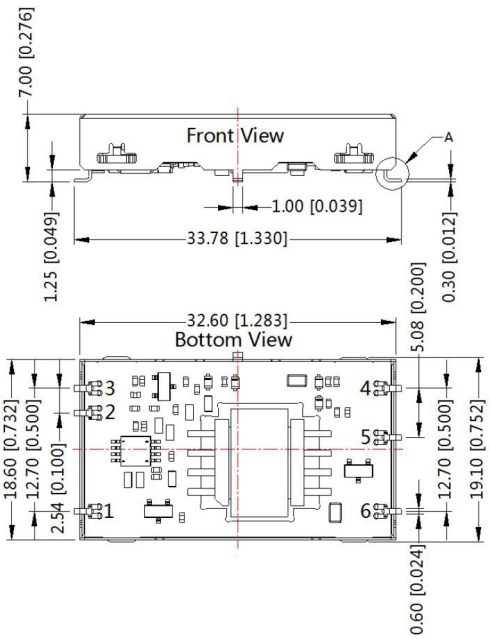
R_T is Trim resistance ,a is a self-defined parameter, with no real meaning.
Vo' for the actual needs of the up or down regulated voltage

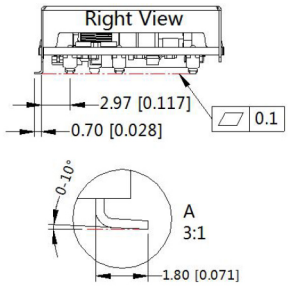
Applied circuits of Trim (Part in broken line is the interior of models)

Model	R1 (KΩ)	R1 (KΩ)	R1 (KΩ)	Vref (V)
6T6AW_1205S1.5RP	2.94	2.87	10	2.5
6T6AW_1212S1.5RP	11	2.87	15	2.5
6T6AW_1215S1.5RP	14.5	2.87	15	2.5
6T6AW_2403S1.5RP	4.8	2.87	12	1.24
6T6AW_2405S1.5RP	2.94	2.87	15	2.5
6T6AW_2412S1.5RP	11	2.87	33	2.5
6T6AW_2415S1.5RP	14.5	2.87	15	2.5

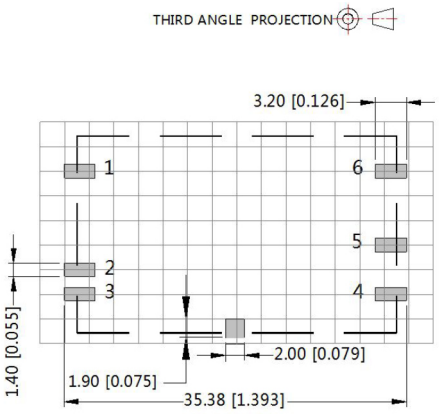
It is not allowed to connect modules output in parallel to enlarge the power.

Mechanical dimensions with housing





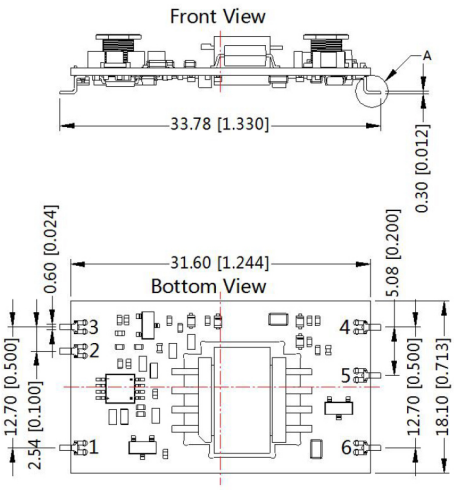
Pin-Out	
Pin	Function
1	Vin
2	Ctrl
3	GND
4	0V
5	Trim
6	+Vo

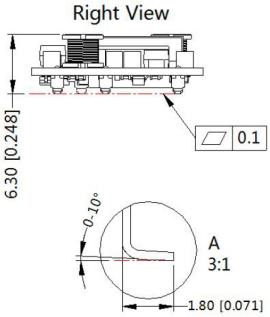


Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
The layout of the device is for reference only , please refer to the actual product

Mechanical dimensions without housing





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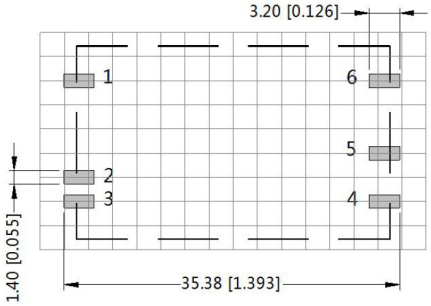

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Note:

1. The maximum capacitive load offered were tested at nominal input voltage and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
5. We can provide product customization service;
6. Specifications are subject to change without prior notice.