

WKP28***-20 DC-DC Converters

FEATURES :

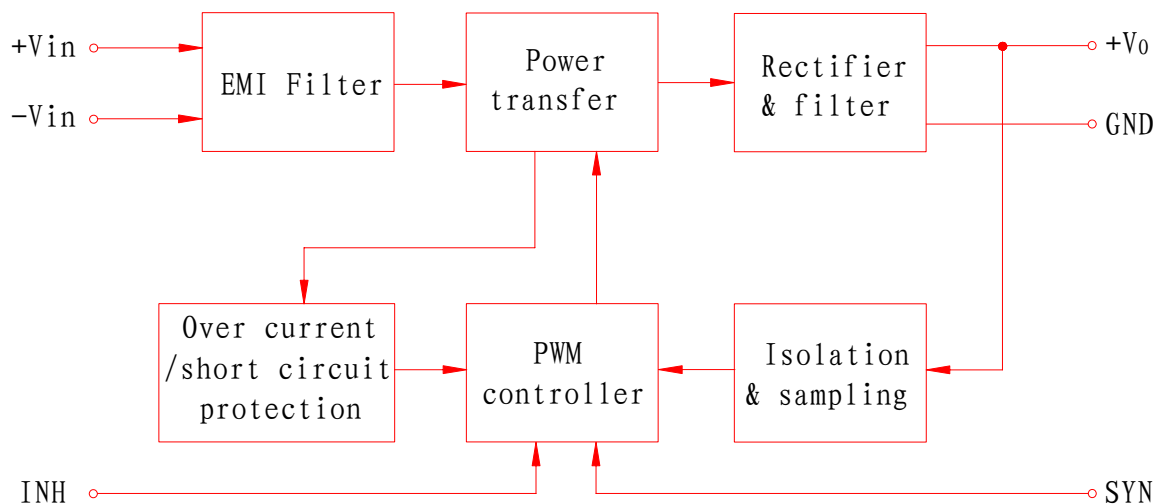
- High Reliability, Small Size
- Input Voltage Range: 16V_{DC}~40V_{DC}
- Output Power: 15W~20W
- Inhibit and Synchronization Functions
- Over Current /Short Circuit Protection
- In Photoelectric Isolation
- DIP Hermetical



DESCRIPTION :

The WKP28***-20 series module, which adopts thick-film microcircuit technology, stannic seam welding process, is a kind of perfect converter with high reliability necessary for some applications such as aviation, aerospace and military. The single output voltage is 5V, 12V, 15V; the dual output voltage is $\pm 12V$, $\pm 15V$. The output power is 15W~20W. The switching frequency is fixed at 265 KHz to minimize noise. The input filter circuit is designed to reduce the electro-magnetic interference. The typical input voltage is 28V, and the ranges from 16V to 40V. The WKP28***-20 series also provides some control functions such as shut down, and short circuit protection.

BLOCK DIAGRAM:



ABSOLUTE MAXIMUM RATINGS:

Input Voltage:	50V _{DC} /50ms
Operating Temperature(T _C):	-40°C~85°C(E/I)
Storage Temperature Range:	-55°C~125°C(E/I)
Pin-Solder Temperature (10s):	300°C

**THE ELECTRICAL CHARACTERISTICS:
SINGLE:**

Parameter	Conditions ¹⁾	WKP2805S-15			WKP2812S-20			WKP2815S-20			Unit	
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
Output voltage	$V_{IN}=(16\sim 40)V_{DC}$ No load~full load	4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	V	
Output current	$V_{IN}=(16\sim 40)V_{DC}$	0	-	3	0	-	1.67	0	-	1.33	A	
Output power	$V_{IN}=(16\sim 40)V_{DC}$	0	-	15	0	-	20	0	-	20	W	
Output ripple voltage ²⁾	20MHz	-	35	50	-	25	50	-	25	50	mV _{P-P}	
	MIN~MAX T _C	-	50	90	-	40	90	-	40	90		
Line regulation	$V_{IN}=(16\sim 40)V_{DC}$	-	10	50	-	10	50	-	10	50	mV	
	MIN~MAX T _C	-	15	50	-	15	50	-	15	50		
Load regulation	No load~full load	-	5	50	-	5	50	-	5	50		
	MIN~MAX T _C	-	15	50	-	15	50	-	15	50		
Input voltage	Range	16	28	40	16	28	40	16	28	40	V	
	50V/50ms	-	-	50	-	-	50	-	-	50		
Input current	No load	-	35	75	-	35	75	-	35	75	mA	
	Full load	-	700	-	-	870	-	-	850	-		
	Inhibit	-	7	8	-	7	8	-	7	8		
Input ripple current ⁵⁾	20MHz	-	20	50	-	20	50	-	20	50	mA _{P-P}	
Efficiency		76	78	-	80	83	-	81	84	-	%	
Short circuit	Dissipation	Short circuit		-	-	12	-	-	12	-	12	W
	Recovery	Short circuit		-	1.4	5	-	1.4	5	-	1.4	5
Step load response	50%~100%~50%	-	±200	±300	-	±250	±400	-	±350	±500	mV	
Step load recovery ⁶⁾	load	-	60	200	-	60	200	-	60	200	μs	
Step line response ⁵⁾	(16~40~16)V _{DC}	-	±200	±300	-	±400	±500	-	±500	±600	mV	
Step line recovery ⁵⁾		-	-	300	-	-	300	-	-	300	μs	
Start-up delay		-	1.4	5	-	1.4	5	-	1.4	5	ms	
Start-up overshoot	Full load	-	0	50	-	0	120	-	0	150	mVpk	
Insulation resistance ⁷⁾	≥100MΩ@500V _{DC} (input to output, any pins to case)											

DUAL:

Parameter		Conditions ¹⁾	WKP2812D-15			WKP2815D-15			Unit
			MIN	TYP	MAX	MIN	TYP	MAX	
Output voltage	+V _O	V _{IN} =(16~40)V _{DC} No load~full load	11.88	12.00	12.12	14.85	15.00	15.15	V
	-V _O		11.82	12.00	12.18	14.77	15.00	15.23	
Output current	±I _O	V _{IN} =(16~40)V _{DC}	0	-	0.625	0	-	0.5	A
Output power		V _{IN} =(16~40)V _{DC}	0	-	15	0	-	15	W
Output ripple voltage ²⁾		20MHz	-	30	80	-	25	80	mV _{P-P}
		MIN~MAX T _C	-	40	120	-	40	120	
Line regulation		V _{IN} =(16~40)V _{DC}	-	10	50	-	10	50	mV
		MIN~MAX T _C	-	50	150	-	50	180	
Load regulation		No load~full load	-	15	50	-	15	50	mV
		MIN~MAX T _C	-	30	150	-	30	180	
Cross regulation		20%~80% ³⁾	-	4	8.3	-	3	8	%
		10%~50% ⁴⁾	-	4	6	-	4	6	
Input voltage		Range	16	28	40	16	28	40	V
		50V/50ms	0	-	50	0	-	50	
Input current		No load	-	50	75	-	50	75	mA
		Full load	-	880	-	-	860	-	
		Inhibit	-	7	8	-	7	8	
Input ripple current ⁵⁾		20MHz	-	20	50	-	20	50	mA _{P-P}
Efficiency			79	81	-	80	83	-	%
Short circuit	Dissipation	Short circuit	-	-	12	-	-	12	W
	Recovery		-	1.4	5.0	-	1.4	5.0	ms
Step load response		50%~100%~50% load	-	±150	±300	-	±200	±400	mV
Step load recovery ⁶⁾			-	100	200	-	100	200	μs
Step line response ⁵⁾		(16~40~16)V _{DC}	-	±200	±400	-	±400	±500	mV
Step line recovery ⁵⁾			-	-	300	-	-	300	μs
Start-up delay			-	1.4	5	-	1.4	5	ms
Start-up overshoot		Full load	-	0	120	-	0	150	mVpk
Insulation resistance ⁷⁾		≥100MΩ@500V _{DC} (input to output, any pins to case)							

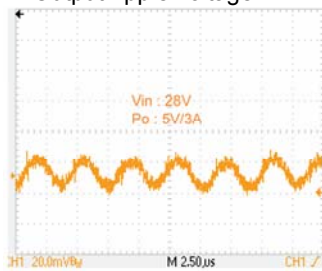
Note:

- 1) Unless otherwise specified, T_A=25°C, V_{IN} = 28V_{DC}, 100% load.
- 2) Ripple voltage measure: Using twisted-pair measurement.
- 3) -Pout 20%,+Pout 20%~80%.
- 4) -Pout 10%,+Pout 10%~50%.
- 5) Guaranteed by design.
- 6) To need times that output voltage is renewed to 1% range of the stability value.
- 7)Only under the control of being machining for insulation resistance, each circuit should be assured to suffice need.

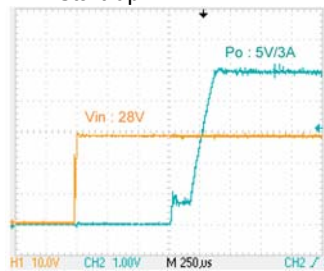
TYPICAL PERFORMANCE CURVES:

SINGLE (E.g. WKP2805S-15):

1: Output ripple voltage



2: Start-up

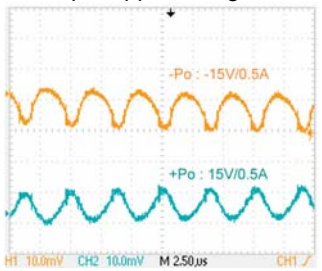


3: Step load

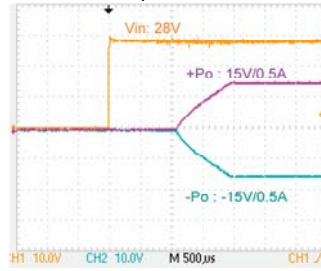


DUAL (E.g. WKP2815D-15):

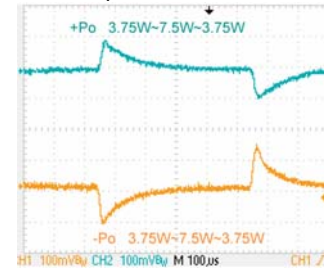
1: Output ripple voltage



2: Start-up

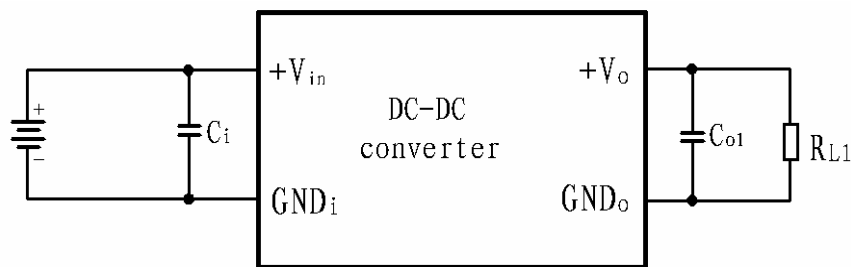


3: Step load



APPLICATION NOTE:

- DC-DC converter typical connection shown as below:



- **Over Current/Short Circuit Protection**

The WKP28***-20 series of DC-DC converters feature internal over current/short circuit protection. When it is operating under a load fault condition, the converter will automatically activate the over current/short circuit protection feature and restore the converter to normal operating conditions when the load fault is removed. It is suggested that the duration of the current/short must be less than 10s and the case temperature lower than $T_{C_{MAX}}$. Otherwise, the module will be disabled.

- **Inhibit Function**

The INH pin is used to control the on/off inhibit function. No connection to the pin is necessary for normal operation of the converter. Shut down may be implemented by simply pulling the pin below 0.3V referenced to input common. The INH pin should be empty when not in use.

- **Ripple Voltage Suppress**

While the output ripple voltage can't satisfy your application, it can still be suppressed by adding a filter capacitor between Vo+ and Vo- outputs. The optimal value for this capacitor is recommended at around 50V/10 μ F with film or ceramic capacitor as preferable options.

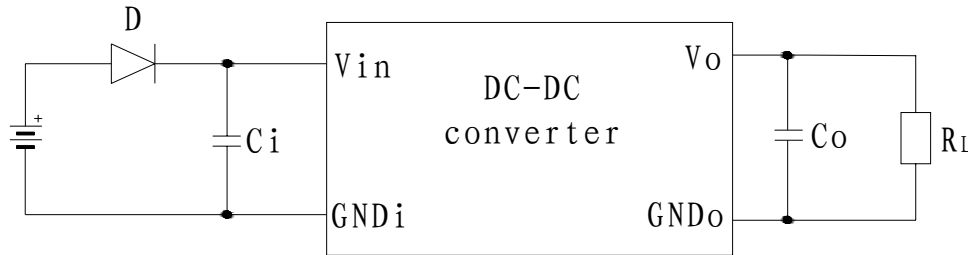
- **Synchronization**

The WKP28***-20 series of DC-DC converters allow the designers to match the switching

frequency of the converter to the frequency of an external system clock or synchronize several modules by synchronization pin. Frequency ranges from 200 KHz to 300 KHz, the level from -0.3 to 10V, and duty cycle from 40% to 60%. Under master and slave configuration, the master module will deliver $\pm 3\text{mA}$ current and the slave will deliver $\pm 0.5\text{mA}$ in maximum. The sync pin should be empty when not in use.

● Reverse Polarity Protection

To avoid damage to the converter caused by reverse input connections, it's advised to connect a diode in series with the input pin of the converter (Shown as below).



● Normal Output

Every dual output voltage, connect the load between $+V_o$ and $-V_o$, common pin is left, that output voltage will be double. E.g. $\pm 12\text{V}$ output module will be 24V.

Notes:

- 1) Please properly connect pins of power module to PCB following instructions of part's specification.
- 2) To prevent pins of power module from being stressed to cause glass insulators cracked and power module leaked, please install power module with fixed flanges or screws prior to welding pins of power module.
- 3) The bottom of power module should be stressed to heat sink tightly. If necessary, thermal washers and shockproof gaskets are employed.
- 4) In any case, bending of pins should be avoided to keep glass insulators from cracking and prevent power module from leaking.

ENVIRONMENTAL SCREENING:

No.	TEST ITEMS		METHODS	CONDITIONS	E	I
1	Internal Visual		MIL-STD-883 Method 2017	---	100%	100%
2	Temp-Cycle		MIL-STD-883 Method 1010	-55°C - $+125^{\circ}\text{C}$ 10 times	100%	—
3	Constant Acceleration		MIL-STD-883 Method 2001	500g Y1, 1min	100%	—
4	Burn-in		MIL-STD-883 Method 1015	$T_c + 85^{\circ}\text{C}$ 96h	100%	—
				$T_c + 85^{\circ}\text{C}$ 48h	—	100%
5	Final Electrical Test	Natural temperature	MIL-PRF-38534	$+25^{\circ}\text{C}$	100%	100%
		High temperature		$T_c + 85^{\circ}\text{C}$	100%	—
		Low temperature		-40°C	100%	—
6	External Visual		MIL-STD-883 Method 2009	---	100%	100%

DIMENSIONS & CONNECTIONS:

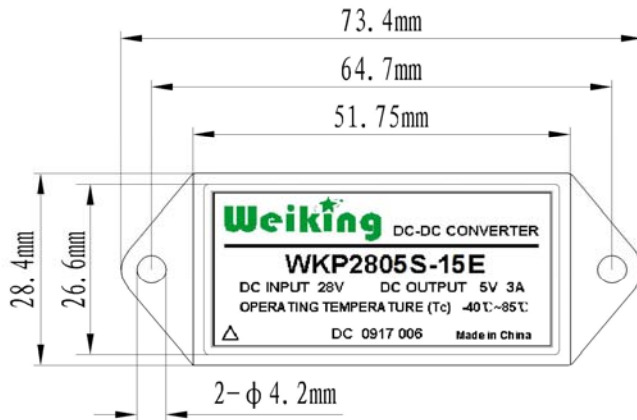
Volume: 18.6 cm³

Encapsulation: Hermetically Sealed Welded Seam

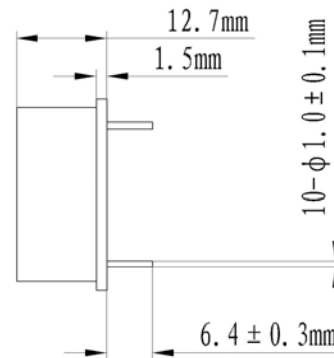
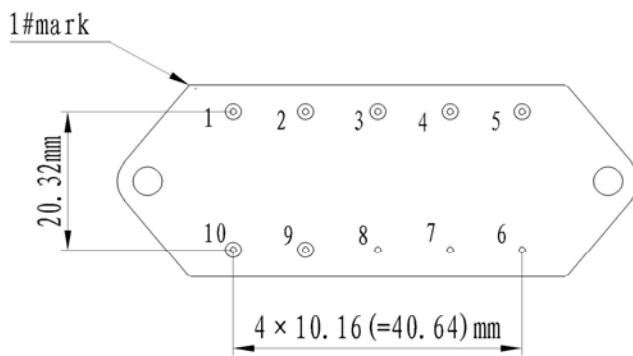
Weight: ≤45g

Shell Material: Cold Rolled Steel

DIMENSIONS (E.g. WKP2805S-15E):



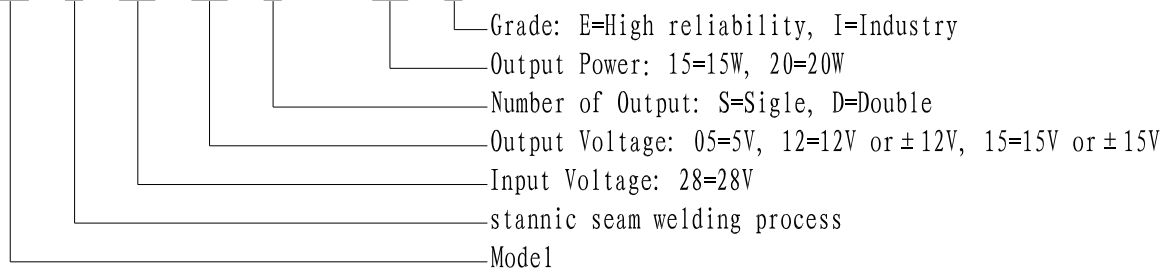
PIN	PIN FUNCTIONS			
	SINGLE		DUAL	
1	+Vin	POSITIVE INPUT	+Vin	POSITIVE INPUT
2	INH	INHIBIT	INH	INHIBIT
3	NC	NO CONNECTION	+Vo	POSITIVE OUTPUT
4	GND _o	OUTPUT COMMON	GND _o	OUTPUT COMMON
5	+Vo	POSITIVE OUTPUT	-Vo	NEGATIVE OUTPUT
6	CASE	CASE GROUND	CASE	CASE GROUND
7	CASE	CASE GROUND	CASE	CASE GROUND
8	CASE	CASE GROUND	CASE	CASE GROUND
9	SYN	SYNC	SYN	SYNC
10	-Vin	INPUT COMMON	-Vin	INPUT COMMON



TOLERANCE: ± 0.2mm

ORDERING INFORMATION:

WK P 28 05 S - 15 M



MARK SPECIFICATION:

Serials Number: 0917006, which indicates this product has been manufactured in the 6th week of 2009, and the sequence number is 006.