

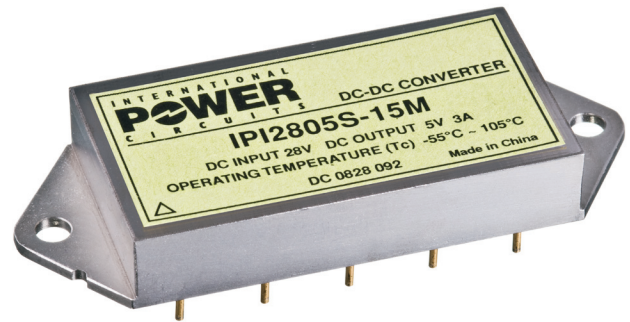


IPI28XXS-20

Single Output Series High Reliability DC-DC Converters

FEATURES

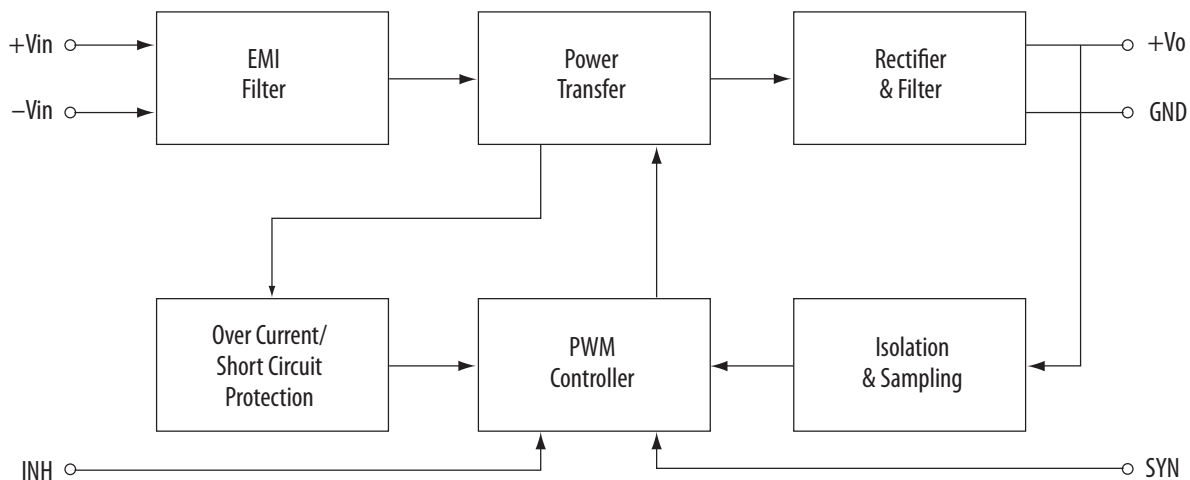
- High reliability, compact size
- Fully Isolated
- Input Voltage range: 16V_{DC} to 40V_{DC}
- Output Power: 15W to 20W
- Inhibit and synchronization functions
- Over-current / short-circuit protection
- Hermetically sealed metal DIP package



DESCRIPTION

The IPI28XXS-20 single output series DC-DC converter is an integrated, hermetically sealed thick-film microcircuit, and is a perfect fit for a variety of demanding hi-rel industrial, aerospace, and military applications. The output voltage options are 5V, 12V or 15V with output power rated from 15W to 20W. The switching frequency is fixed at 265KHz to minimize noise and includes an internal input filter circuit designed to reduce electromagnetic interference. The typical input voltage is 28V_{DC}, and covers input ranges from 16V_{DC} to 40V_{DC}. The IPI28XXS-20 series also provide control functions such as synchronization, shut down, and over-current / short-circuit protection.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

INPUT VOLTAGE:	16V _{DC} – 40V _{DC}	
OUTPUT POWER:	15W to 20W	
OPERATING TEMP (T _c):	–55°C to +105°C (M)	–40°C to +85°C (E)
STORAGE TEMP:	–55°C to +125°C	
PIN SOLDER TEMP (10S):	300°C	

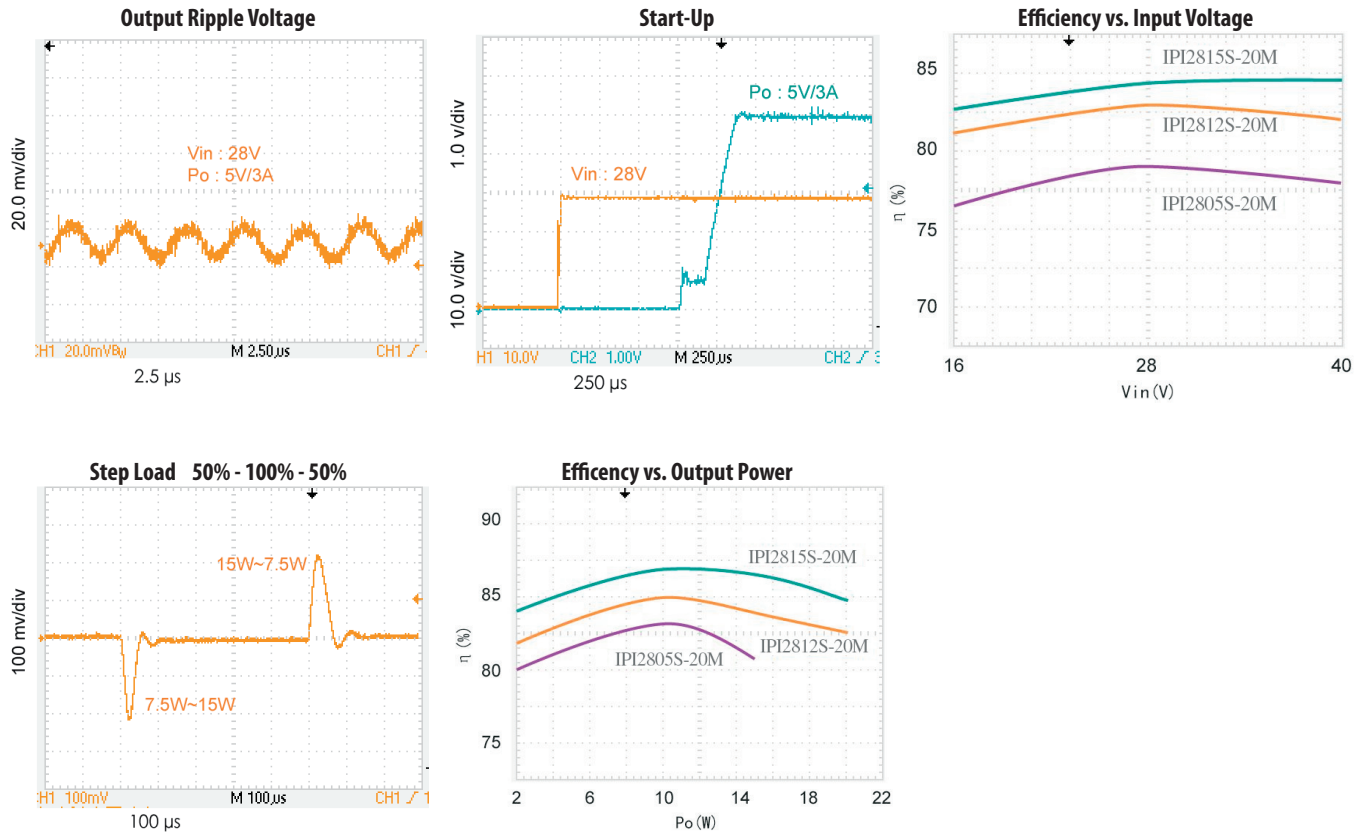
ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS ³	IPI2805S-15			IPI2812S-20			IPI2815S-20			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
OUTPUT VOLTAGE	V _{IN} =16V _{DC} –40V _{DC} +Vo	4.95	5.00	5.05	11.88	12.00	12.12	14.85	15.00	15.15	V _{DC}
OUTPUT CURRENT	V _{IN} =28V _{DC}	0	–	3	0	–	1.67	0	–	1.33	A
OUTPUT POWER	V _{IN} =28V _{DC}	0	–	15	0	–	20	0	–	20	W
OUTPUT RIPPLE VOLTAGE ¹	V _{IN} =28V _{DC} FULL LOAD 20MHZ	–	35	50	–	25	50	–	25	50	mV _{pp}
	MIN-MAX T _c	–	50	90	–	40	90	–	40	90	
LINE REGULATION	V _{IN} =16V _{DC} 40V _{DC}	–	10	50	–	10	50	–	10	50	mV
	MIN-MAX T _c	–	15	50	–	15	50	–	15	50	
LOAD REGULATION	NO LOAD TO FULL	–	5	50	–	5	50	–	5	50	mV
	MIN-MAX T _c	–	15	50	–	15	50	–	15	50	
INPUT VOLTAGE	CONTINUOUS	16	28	40	16	28	40	16	28	40	V _{DC}
	TRANSIENT 50ms	–	–	50	–	–	50	–	–	50	
INPUT CURRENT	NO LOAD	–	35	75	–	35	75	–	35	75	mA
	FULL LOAD	–	0.70	–	–	0.87	–	–	0.85	–	A
	INHIBITED	–	7	8	–	7	8	–	7	8	mA
INPUT RIPPLE CURRENT	V _{IN} =28V _{DC} FULL LOAD 20MHZ	–	20	50	–	20	50	–	20	50	mApp
EFFICIENCY		76	78	–	80	83	–	81	84	–	%
LOAD FAULT SHORT CIRCUIT TO FULL LOAD	SHORT CIRCUIT POWER DISSIPATION	–	–	12	–	–	12	–	–	12	W
	RECOVERY	–	1.4	5	–	1.4	5	–	1.4	5	ms
STEP LOAD RESPONSE, TRANSIENT	50%-100%-50%	–	±200	±300	–	±250	±400	–	±350	±500	mV
STEP LOAD RESPONSE, TRANSIENT RECOVERY		–	60	20	–	60	20	–	60	20	µs
STEP LINE RESPONSE, TRANSIENT	16-40-16V _{DC}	–	±200	±300	–	±400	±500	–	±500	±600	mV
STEP LINE RESPONSE, TRANSIENT RECOVERY ²		–	–	300	–	–	300	–	–	300	µs
START-UP	DELAY	–	1.4	5	–	1.4	5	–	1.4	5	ms
	FULL LOAD OVERSHOOT	–	0	50	–	0	120	–	0	150	mVpk
	NO LOAD OVERSHOOT	–	50	250	–	120	600	–	150	750	
INSULATION RESISTANCE	≥100M @ 500 V _{DC} (input-output any pins to case)										

NOTES

- Using tip and barrel measurement.
- Recovery time is measured from application of the transient to the point at which Vout is within 1% of final value.
- 25°C T_c, V_{in}= 28V_{DC}, 100% load, unless otherwise specified.

TYPICAL PERFORMANCE CURVES



APPLICATION NOTES

Inhibit Function

The INH pin is used to control the on/off inhibit function. A connection to Pin 2 is not necessary for normal operation of the converter. Shut down may be implemented by simply pulling Pin 2 below 0.3V referenced to common input.

Over-Current / Short-Circuit Protection

The IPI28XXS-20 series of DC-DC converters feature internal over-current / short-circuit protection. When 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 condition when the load fault is removed. It is suggested that the duration of the over-current / short-circuit be less than 10s, and the case temperature lower than 105°C, or the module will shut down.

Ripple Voltage Suppress

If the output voltage ripple needs to be reduced for a particular application, adding a high quality 50V / 10 μ F film or ceramic filter capacitor between Vo+ and Vo- outputs is recommended.

Synchronization

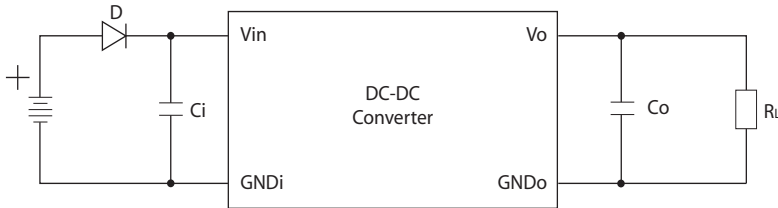
The IPI28XXS-20 series of DC-DC converters allows the designer to match the switching frequency of the converter to the frequency of an external system clock or synchronize several modules by use of the synchronization pin. The frequency range is from 270KHz to 350KHz, the voltage level range is from -0.3V to 10V, and the duty cycle range is from 40% to 60%. Under a master and slave configuration, the master module will deliver $\pm 3mA$, and the slave will deliver $\pm 0.5mA$ maximum.

Remote Sensing

Remote sense allows the user to compensate for voltage drop between the output of the converter and the point of regulation. The total voltage which may be compensated for is 0.5V in both leads (+) and (-). Mark the connection to the regulation point within 1.2meters of the converter output terminals.

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, as shown below.



ORDERING INFORMATION

IP	I	28	05	S	-	15	H	M
Grade: M = Military E = High Reliability								
Package Style: H = H Style Blank = K Style								
Output Power: 15 = 15W								
Number of Outputs: S = Single								
Output Voltage: 05 = 5V								
Input Voltage: 28 = 28V								
Hermeticity: I = Hermetically Sealed								
Model Number								

MARKING SPECIFICATION

Serial Number: DC 0921 001, for example indicates this product has been manufactured in the 21st week of 2009, and the sequence number is 001.

ENVIRONMENTAL SCREENING

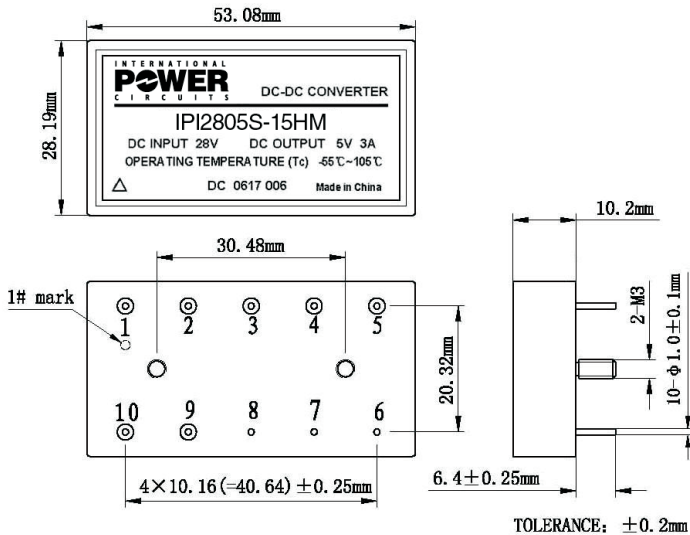
TEST ITEM	METHOD	REQUEST	CONDITION
PRE-CAP INSPECTION	MIL-STD-883 METHOD 2017	100%	-
TEMP-CYCLE	MIL-STD-883 METHOD 1010	100%	-55°C to +125°C, 10 Times
CONSTANT ACCELERATION	MIL-STD-883 METHOD 2001	100%	3000 g, Y1, 1 Minute
BURN-IN	MIL-STD-883 METHOD 1015	100%	T _c +105°C (M) / +85°C (E), 160 Hours
FINAL ELECTRICAL TEST	MIL-PRF-38534	100%	-55°C, +25°C, +105°C (M) -40°C, +25°C, +85°C (E)
HERMETICITY TESTING	MIL-STD-883 METHOD 1014	100%	Fine Leak, Cond. A1 Gross Leak, Cond. C1
FINAL VISUAL INSPECTION	MIL-STD-883 METHOD 2009	100%	-

MECHANICAL SPECIFICATIONS

WEIGHT:	≤ 56 g
VOLUME:	15.1 cm ³
ENCAPSULATION:	HERMETICALLY SEALED WELDED SEAM
SHELL MATERIAL:	COLD ROLLED STEEL
PACKAGE STYLES:	H or K, PLEASE INDICATE PACKAGE STYLE WHEN ORDERING

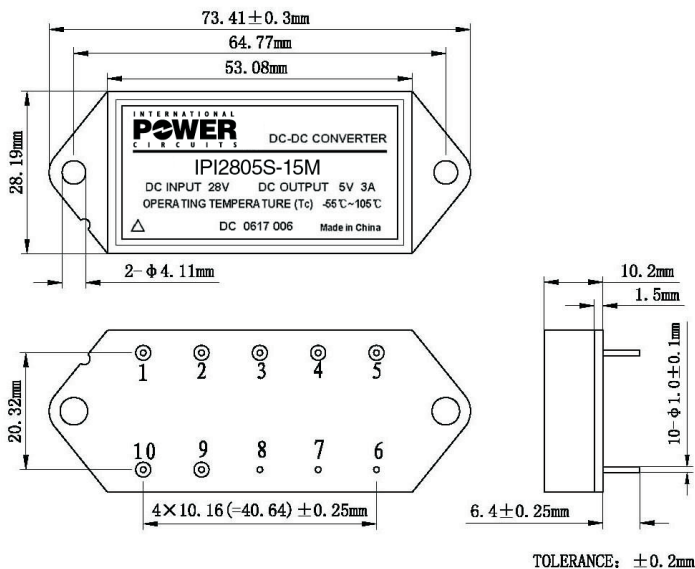
PACKAGES

Package Style H



PIN FUNCTIONS (M/E)		PIN
POSITIVE INPUT	+V _{IN}	1
INHIBIT	INH	2
NO CONNECTION	NC	3
OUTPUT COMMON	GND ₀	4
POSITIVE OUTPUT	+V ₀	5
CASE GROUND	CASE	6
CASE GROUND	CASE	7
CASE GROUND	CASE	8
SYNC	SYN	9
INPUT COMMON	-V _{IN}	10

Package Style K



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.