

## DATASHEET IND060SIP Hornet: Non-Isolated DC-DC Voltage Regulator Modules

#### 12V<sub>dc</sub> input; 0.59Vdc to 5.5V<sub>dc</sub> output; 60W Max Power





### **Applications**

- Industrial Equipment
- Control Boards
- Test Equipment

#### **Electrical Features**

- 12V Input voltage with wide Tolerance
- Output voltage programmable from 0.59V<sub>dc</sub> to 5.5V<sub>dc</sub> via external resistor
- Remote On/Off for optional external control
- Fixed switching frequency
- Output overcurrent protection (non-latching)

#### **Mechanical Features**

- Small size: 10.4 mm x 16.5 mm x 8.4 mm (0.41 in x 0.65 in x 0.33 in)
- Operating range: -40°C to 85°C ambient

#### **Process and Safety**

- ANSI/UL\*62368-1 and CAN/CSA<sup>†</sup> C22.2 No. 62368-1 Recognized, DIN VDE<sup>‡</sup> 0868-1/A11:2017 (EN62368-1:2014/A11:2017)
- ISO<sup>\*</sup> 9001 and ISO 14001 certified manufacturing facilities
- Compliant to RoHS Directive 2011/65/EU and amended Directive (EU) 2015/863
- Compliant to REACH Directive (EC) No 1907/2006
- Compatible in a Pb-free or SnPb reflow environment.
- Suitable for aqueous clean.
- Suitable for conformal coating with dip and vapor deposition. Conformal coating can provide the protection to meet Salt. Fog Test per IEC 60068-2-52 (Severity 3) and Mixed Gas Flow test per Telcordia GR-3108 Outdoor Levels.
- 3 year warranty



### **Technical Specification**

#### Process and Safety (continued)

Device Code	Input Voltage	Output Voltage	Output Current (Max.)	On/Off Logic	Ordering Code
IND060SIP	9.6 – 14.4V <sub>dc</sub>	0.59 – 5.5V <sub>dc</sub>	10A	Positive	1600102908A

#### **Thermal Performance**

Full rated output with natural convection up to 40°C at 0.6Vout and up to 45°C at 6Vout. Thermal curves for 0.6V, 1.8V and 5.5Vout below.



#### **Electrical Specifications**

Parameter	Device	Symbol	Min	Тур	Max	Unit
Operating Input Voltage	All	VIN	9.6	12	14	V <sub>dc</sub>
Input No Load Current $(4 - 32)(4 + 3$	$V_{O,set}$ = 0.6 $V_{dc}$	I <sub>IN,No load</sub>		29		mA
$(V_{IN} = 12.0V_{dc}, I_0 = 0, module enabled)$	V <sub>O,set</sub> =5V <sub>dc</sub>	I <sub>IN,No load</sub>		58		mA
External Capacitance, Ceramic ESR ≥ 1 mΩ	All	C <sub>O, max</sub>	100	-	1500	μF
Efficiency 12V <sub>INDC</sub> , $T_A$ =25°C, I=12A, V <sub>o</sub> =32 to 54V <sub>dc</sub>		η	73(0.59∖	∕), 87(1.8V), 9	5(6V)	%
Switching Frequency	All	f <sub>sw</sub>	-	600	-	kHz
Output Voltage (Over all line, load, and temperature conditions)	All	V <sub>O, set</sub>	-3.0	-	+3.0	$\% V_{O,  set}$
On/Off Logic High (MODULE OFF) Input High Voltage	All	VIH	1	-	14	$V_{dc}$
On/ Off Logic Low (MODULE ON) Input Low Voltage	All	VIL	-0.3	-	0.4	$V_{dc}$

#### **Characteristic Curves**

The following figures provide typical characteristics for the 10A Hornet at 25°C.



Figure 1. Output Ripple Voltage for various output voltages and external caps @12Vin. Additional Decoupling cap of 0.01uF used on input and output side





## Technical Specification (continued)

#### Trim

Without an external resistor between Trim and GND pins, the output of the module will be  $0.6V_{dc}$ . Rtrim for a desired output voltage, should be as per the following table. The formula in the last column helps determine Rtrim for other voltages.

$V_{\circ}$ (V)	0.59	1.0	1.2	1.5	1.8	2.5	3.3	5.0	Ptrim= 1.182
R <sub>trim</sub> (kΩ)	Open	2.89	1.941	1.3	0.978	0.619	0.436	0.268	(√₀-0.591)

#### Safety Considerations

For safety agency approval, the power module must be installed in compliance with the spacing and separation requirements of the end-use safety agency standards listed on the first page of this document. For the converter output to be considered meeting the requirements of safety extra-low voltage (SELV) or ESI, the input must meet SELV/ESI requirements. The power module has extra-low voltage (ELV) outputs when all inputs are ELV. A 15A quick acting input fuse for the module is required.

#### **Recommended Pad Layout**

Dimensions are in millimeters and (inches).

Tolerances: x.x mm ± 0.5 mm (x.xx in. ± 0.02 in.) [unless otherwise indicated] x.xx mm ± 0.25 mm (x.xxx in ± 0.010 in.)



Pin	Function
1	On/Off
2	VIN
3	GND
4	Vout
5	Trim+

L = 3.29 [0.13] ± 0.25 [0.112 ± 0.01]





## Technical Specification (continued)

## Through-Hole Lead-Free Soldering Information

These RoHS-compliant through-hole products use the SAC (Sn/Ag/Cu) Pb-free solder a RoHS-compliant components. They are designed to be processed through single or dual wave soldering machines. The pins have an RoHS-compliant finish that is compatible with both Pb and Pb-free wave soldering processes. A maximum preheat rate of 3°C/s is suggested. The wave preheat process should be such that the temperature of the power module board is kept below 210°C. For Pb solder, the recommended pot temperature is 260°C, while the Pb-free solder pot is 270°C max. Not all RoHS-compliant through-hole products can be processed with paste-through-hole

#### **Contact Us**

For more information, call us at 1-877-546-3243 (US) 1-972-244-9288 (Int'I)



## Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
4.3	10-11-2021	Updated as per template
4.4	1-4-2023	Corrected Vout, min in page header from 0.6 to 0.59 already correctly noted in electrical specification table.
4.5	11-09-2023	Updated as per OmniOn template



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