Arc Power GmbH
www.arc-power.com

ARC-SGHF2800 19V-39V Input 15W output DC/DC converters

Space application

Design

ARC-SGHF2800S and ARC-SGHF2800D isolated hybrid DC/DC converter series is a design, based on European components, made to keep robust performance in the harsh space environment.
The design complies with the derating rules specified in ECSS-Q-ST-30-11C, up to 80°C, and the qualification and production meet the generic procurement requirements for hybrids ECSS-Q-ST-60-05C.
The converter is switching at a fix frequency, in the range 360kHz-420khz, and take the advantages of a magnetic feedback (no optocoupler used) resulting in high radiation tolerance levels.
The metal sealed package is designed to dissipate the power reducing the temperature stress on junctions of silicon devices. The case is also flanged to achieve robustness against vibrations.
The design documentation is including worst case, part stress analysis and reliability analysis.

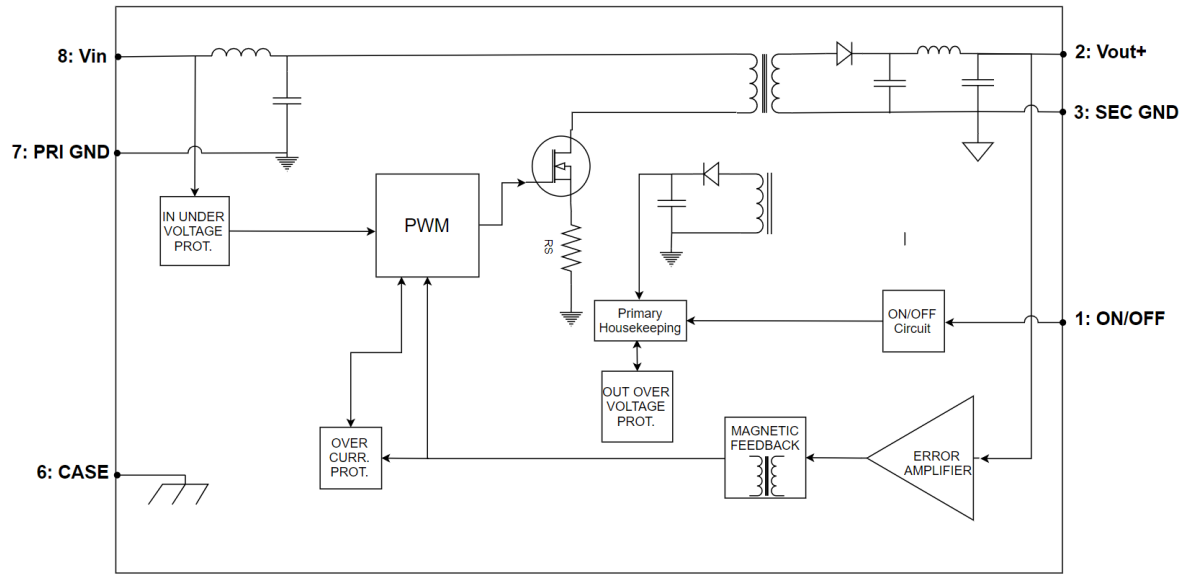
Features

- Input voltage 19V-39V
- Input fault tolerance 50V
- Operating temperature range: -45°C ÷ +80°C (15W @80°C, within ECSS-Q.ST-30-11C derating rules)
- ON/OFF capability
- Input under-voltage protection with activation hysteresis
- Output over-voltage latching protection
- Overcurrent/short circuit protection
- Radiation tolerance[1]:
  - TID: 50Krad
  - SEE 62 MeV-cm2/mg
- Magnetic coupled feedback
- Export restriction free

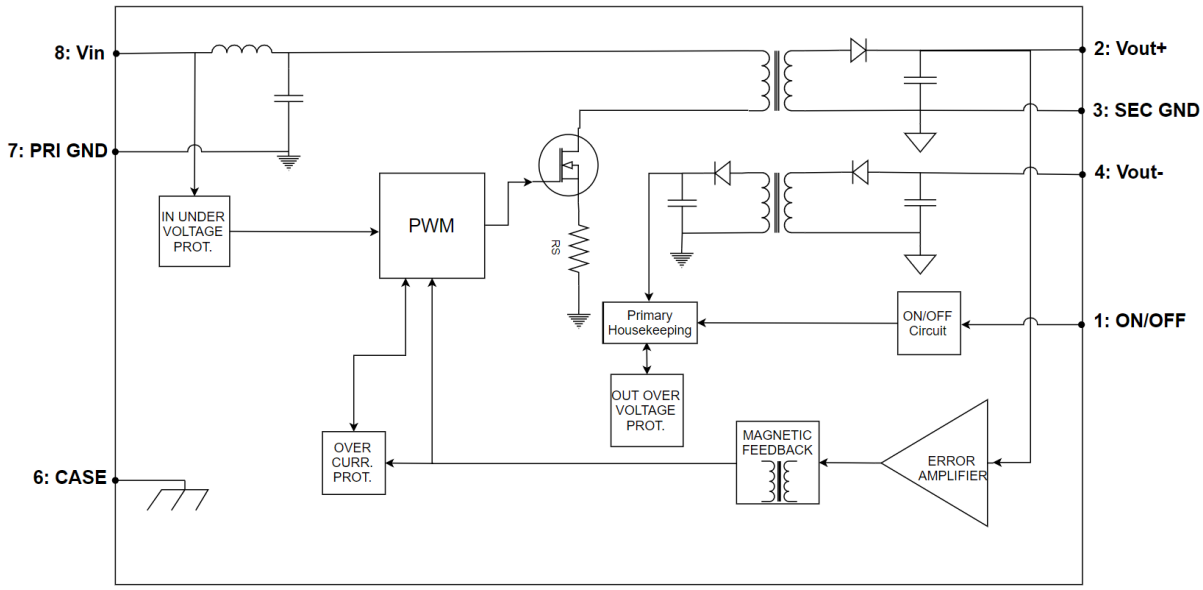
[1] Radiation tolerance based on components screening and unit level analysis. Unit level screening to be performed.

Block diagrams

ARC-SGHF2800S:



ARC-SGHF2800D:



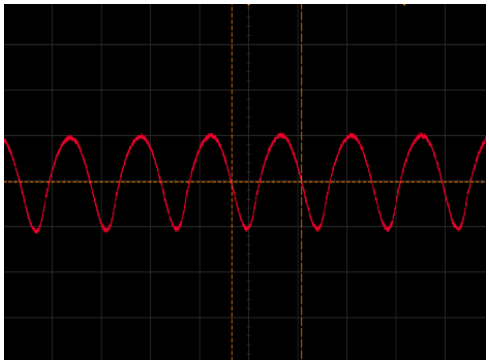
Electrical characteristics and performances

Performances in the range -45°C ÷ +80°C, input voltage 28V, full load; unless otherwise specified.

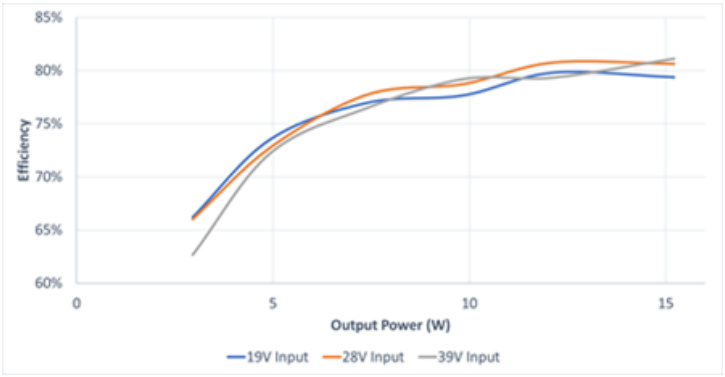
		ARC-SGHF2805S			ARC-SGHF2812D			
Parameter	**Description**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
Input Section								
Operating input voltage	ECSS-Q-ST-30-11C compliant	19	28	39	19	28	39	V
Fault input voltage tolerance	Continuous	-	-	50	-	-	50	V
Under voltage lockout	ON threshold	15.8	-	16.2	15.8	-	16.2	V
	OFF threshold	14.4	-	15.0	14.4	-	15.0	V
Ripple current	20Hz to 10Mhz	-	100	120	-	100	120	mApp
No load current	On condition no load connected @25°C	-	37	-	-	40	-	mA
OFF condition current		-	2	4	-	2	4	mA
Output Section								
Voltage positive output	-45°C ÷ +80°C	4.92	5.00	5.08	11.90	12.00	12.10	V
Power	-45°C ÷ +80°C (ECSS-Q-ST-30-11C compliant)	0	-	15	0	-	15	W
Current positive output	-45°C ÷ +80°C (ECSS-Q-ST-30-11C compliant)	0	-	3	0	-	1.25	A
Current positive output	-45°C ÷ +80°C (ECSS-Q-ST-30-11C compliant)		N/A		0	-	0.62	A
Ripple voltage	Switching frequency	-	15	30	-	60	80	mVpp
Spikes	High frequency	-	-	100	-	-	100	mVpp
Line regulation	19V to 39V input	-	1	5	-	1	5	mV
Load regulation	0A to 3A load	-	10	20	-	10	20	mV
Load step positive output	Half to full load	-	80	100	-	60	80	mV
	Recovery time	-	300	400		250	300	µsec
Start up overshot pos. out.	0V to 28V	-	-	100	-	-	400	mV
Start up rise time	0V to nominal output voltage	-	-	20	-	-	20	msec
Load fault power dissipation	Overload	-	-	8	-	-	8	W
Functions								
	OFF (PIN 1 grounded to PRI_GND)	0	-	1.5	0	-	1.5	V
Inhibit	ON (high impedance on PIN1)	Open collector or unconnected			Open collector or unconnected			-

		ARC-SGHF2805S			ARC-SGHF2812D			
Parameter	**Description**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
Overvoltage Protection	Activation above nominal output voltage (load positive output from 1.5W to 15W)	110	-	125	110	-	125	%
Other data								
Efficiency	@ 25°C		75			80		%
Capacitive load (per output)		-	-	300	-	-	100	µF
Switching frequency	Fix frequency	360	-	420	360	-	420	kHz
Isolation	500V DC (case temperature 25 °C)	100	-	-	100	-	-	MΩ
Storage temperature		-65	-	155	-65	-	155	°C
Soldering temperature		-	-	300	-	-	300	°C
Weight		-	-	40	-	-	40	g

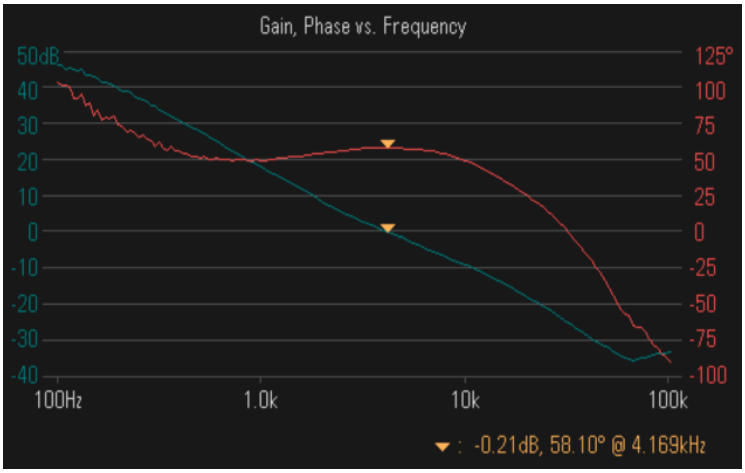
Typical input ripple current @ switching frequency; 28V In; 3A Out (50m amp/div)



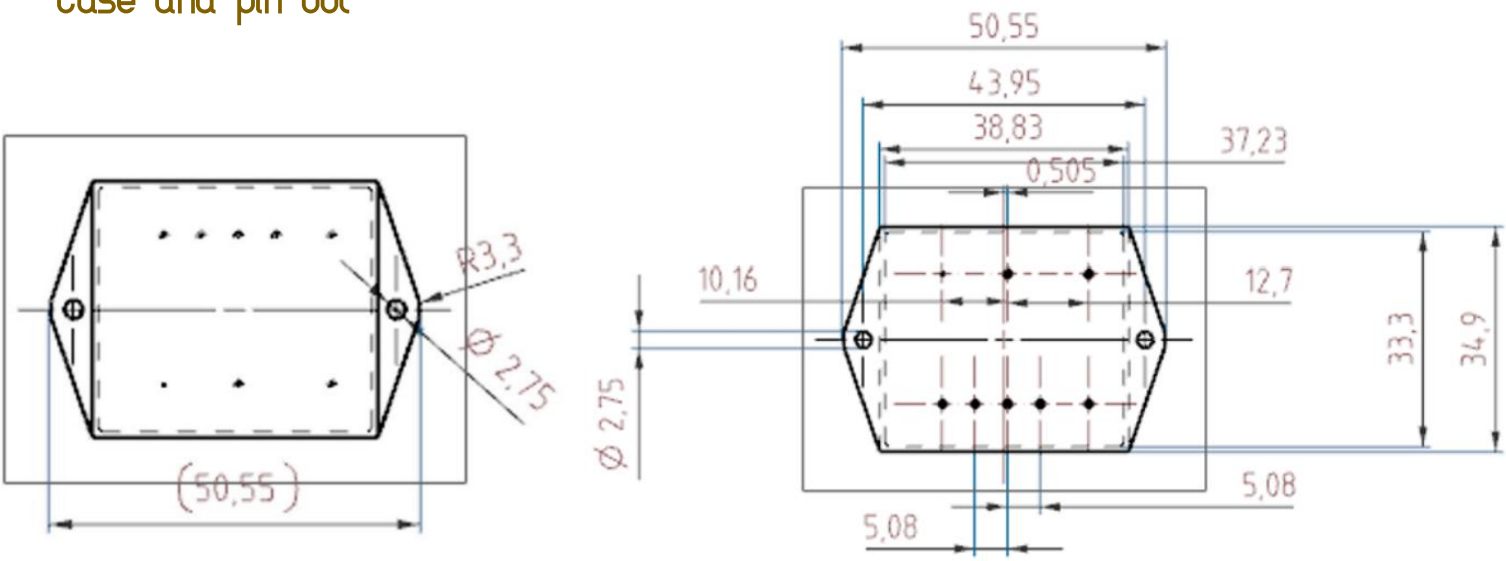
Efficiency dual out 12V @ 25°C

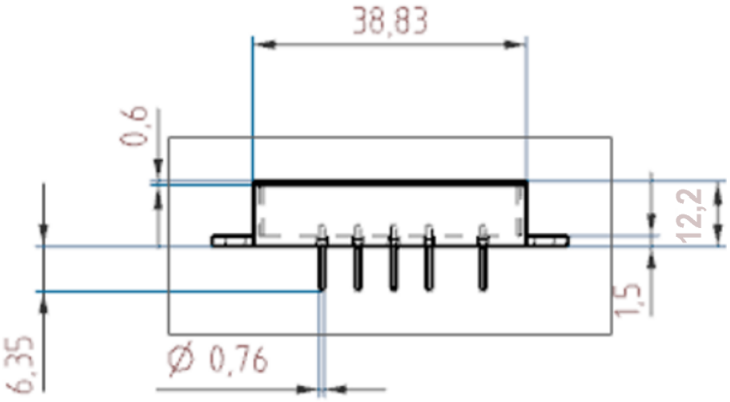


Stability @10W output



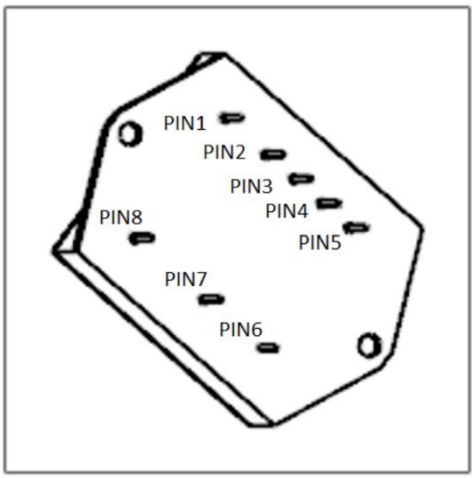
Case and pin out





Case Dimension in mm
Tolerance: +/-0.13 for three decimal places; +/-0.3 for two decimal places
Soldering
Heat from may damage the device. Solder pins individually with heat application not exceeding 300°C for10 seconds.
Materials:
Header: Steel/Nickel/Gold
Cover: Steel/Nickel/Gold
Pins: Iron-Nickel Alloy 52/Gold compression glass seal; Gold Plating of 1.27-3.81 µm included in pin diameter
Seal Hole: 2 ±0.05 glass

PIN number	Function
1	ON/OFF
2	+Vout
3	SEC_GND
4	-Vout (or NC is case of single output)
5	NC
6	CASE
7	PRI_GND
8	Vin



Products and developments

Series Part Number	Input Voltage	Output Power	Output Voltages
ARC-SGHF2800S	19V-39V	15W (12W for 3.3V)	3.3V, 5V, 5.2V, 12V, 15V Single
ARC-EMHF2800S	19V-39V	15W (12W for 3.3V)	3.3V, 5V, 5.2V, 12V, 15V Single
ARC-SGHF2800D	19V-39V	15W	±5V, ±12V, ±15V Dual
ARC-EMHF2800D	19V-39V	15W	±5V, ±12V, ±15V Dual
ARC-SGHF5000S	40V-60V	15W (12W for 3.3V)	3.3V, 5V, 5.2V, 12V, 15V Single
ARC-EMHF5000S	40V-60V	15W (12W for 3.3V)	3.3V, 5V, 5.2V, 12V, 15V Single
ARC-SGHF5000D	40V-60V	15W	±5V, ±12V, ±15V Dual
ARC-EMHF5000D	40V-60V	15W	±5V, ±12V, ±15V Dual

Arc Power is also developing the 28V input, 5W output series and 100V input, 5W and 15W output series.

Arc Power is developing the DC/DC converter controller ARC-SGHFC100 which simplifies the design of isolated and non-isolated DC/DC converters which are based on a primary low-side power transistor. The ARC-SGHFC100 can directly interface the input power bus in a wide voltage range (18V-105V) without need of additional components. The design effort of single and multi-output DC/DC converters will be reduced to designing the main transformer, the output rectifier stage and input and output filters while all the other functionalities, including over-current, under-voltage, over-voltage and over-temperature protection are implemented within the DC/DC converter controller.

All the Arc Power products are intended for space application.