Advance Info: SGBF5000D 20V-40V; 40V-60V; 90V-110V Input 50W output DC/DC converters Space application

Design

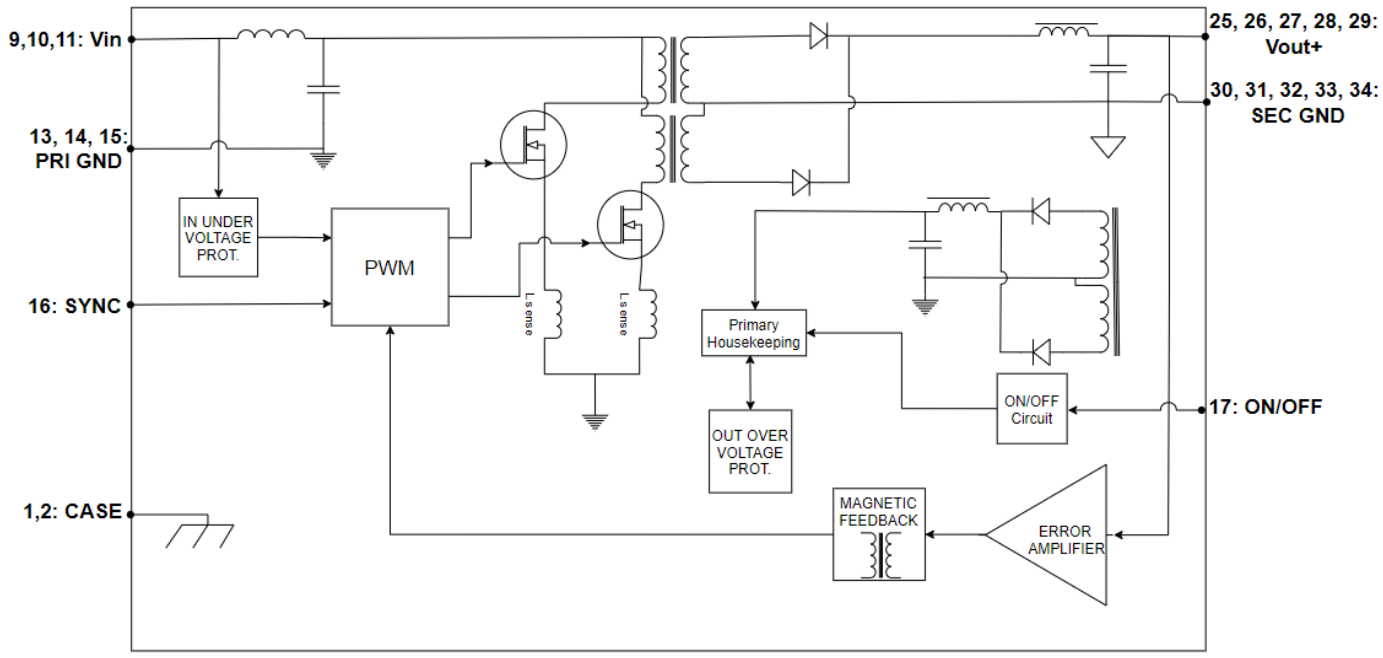
ARC-SGBF isolated DC/DC converter series is a design, based on European components, made to keep robust performance in the harsh space environment.
The design complies with the derating rules specified in ECSS-Q-ST-30-11C, up to 75°C.
The converter is switching at a fix frequency, in the range 380kHz-420khz, and take the advantages of a magnetic feedback (no optocoupler used) resulting in high radiation tolerance levels.
The metal baseplate is designed to dissipate the power reducing the temperature stress on junctions of silicon devices. The case can be fixed to the structure by means of 6 screws to achieve robustness against vibrations, and proper thermal conductivity.
The SGBF series is equipped with a differential mode filter and doesn't need an additional differential mode filter cell outside the module.
The design documentation includes worst case, part stress analysis, FMEA and reliability prediction. Full manufacturing data package can be delivered together with the hardware.

Features

- Input voltage options:20V-40V; 40V-60V; 90V-110V.
- Input fault tolerance 80V
- Operating temperature range: -40°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
- Over-voltage protection status
- Radiation tolerance[1]:
  - TID: 100Krad
  - SEE 62 MeV-cm2/mg
- Magnetic coupled feedback
- Integrated Differential Mode Filter
- External frequency synchronization
- Export restriction free

[1] Radiation tolerance based on components screening and unit level analysis.

Block diagram (single output)



Electrical characteristics and performances SGBF5012S

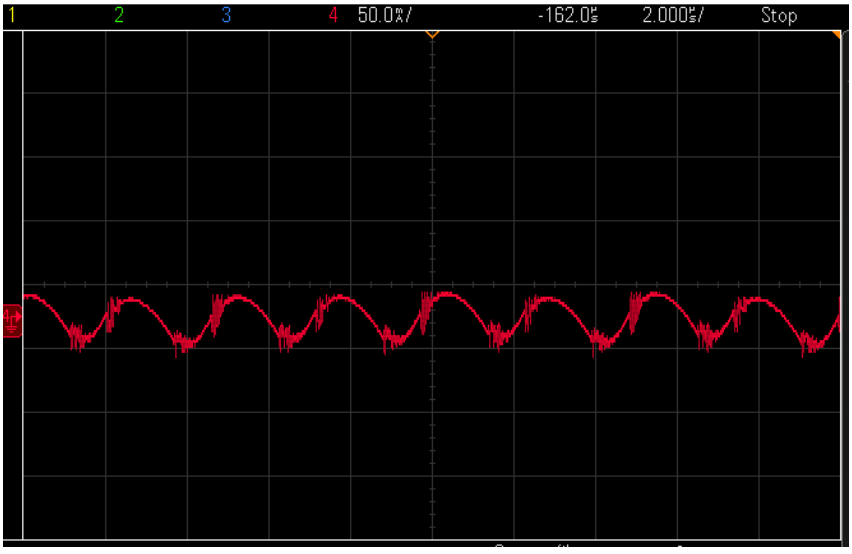
Performances in the range [-40°C; +80°C], input voltage 50V, full load (unless otherwise specified).

Parameter	Description	Min	Typ	Max	Unit
Input Section					
Operating input voltage	Continuous	40	50	60	V
Fault input voltage tolerance	Continuous	-	-	80	V
Under voltage lockout	Turn ON	-	-	36	V
	Turn OFF	-	-	35	V
Current Consumption	Inhibited	-	3	7	mA
	No Load	-	40	50	mA

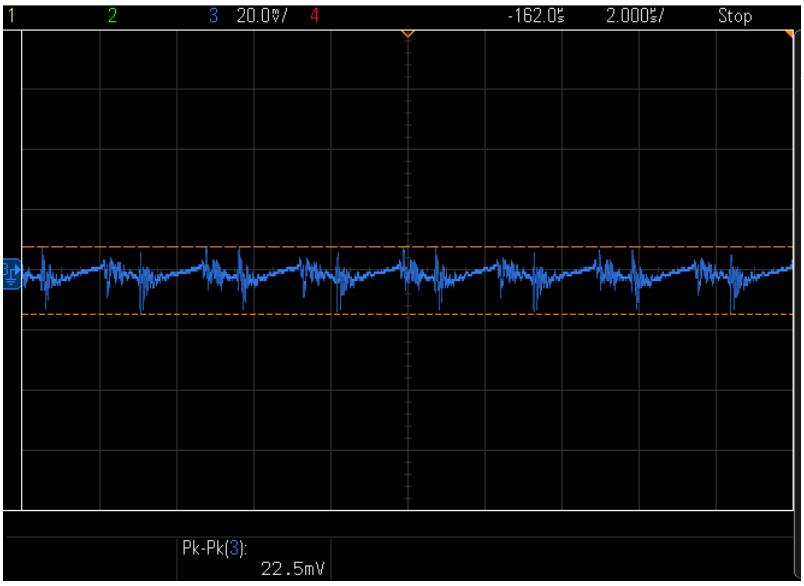
Parameter	Description	Min	Typ	Max	Unit
Ripple current	Full load, 20Hz to 10Mhz	-	45	60	mApp
Output Section					
Output Voltage	T_{CASE} = 25°C	11.95	12.00	12.05	V
	T_{CASE} = -40°C ÷ +80°C	11.90	-	12.10	V
Power		-	-	50	W
Current	Output	0	-	4.17	A
Ripple voltage	Switching frequency	-	10	20	mVpp
Spikes	High frequency		25		mVpp
Line regulation	V_{IN} = 40V to 60V input	-	2	5	mV
Load regulation	No Load to Full Load	-	2	5	mV
Load step output transient	Half Load to Full Load	-	-	300	mV_{PK}
Load step recovery		-	0.5	-	msec
Start up output overshoot	0V to 50V	-	-	0	mV_{PK}
Start up delay	0V to 50V	-	20	25	msec
Functions					
Inhibit	OFF PIN 17 grounded to PRI_GND) (I_sink <0.5mA)			1	V
	ON PIN 17 high impedance or > 9V		Left open (or >9V)		-

Parameter	Description	Min	Typ	Max	Unit
Overvoltage Protection	Activation above nominal output voltage (load output from 15W to 50W)			25	%
Other data					
Efficiency		-	85	87	%
Capacitive load		-	-	300	µF
Switching frequency	Without external synchronization	190	200	210	kHz
Clock frequency	Without external synchronization	380	400	420	kHz
Isolation (input to output)	500 V_{DC}	10	-	-	MΩ
Storage temperature		-55°C	-	125°C	°C
Soldering temperature		-	-	300	°C

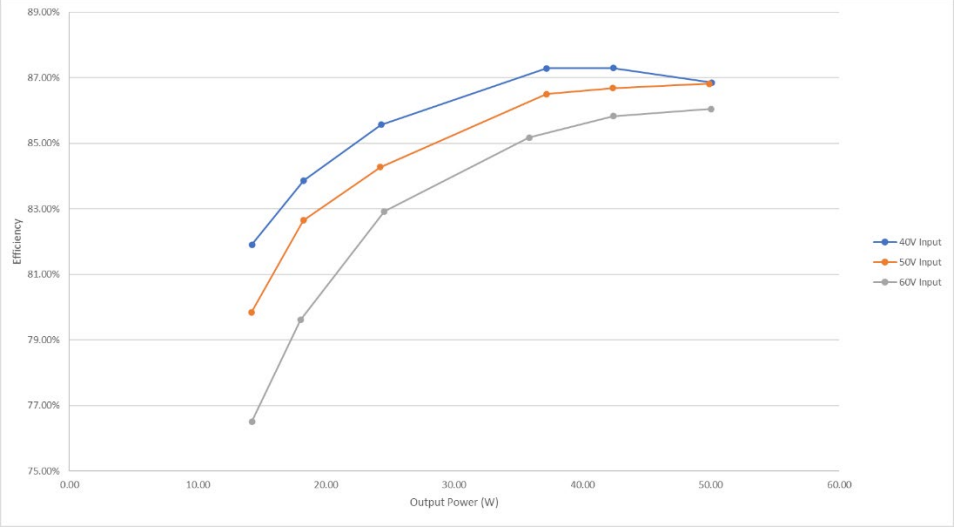
Stability



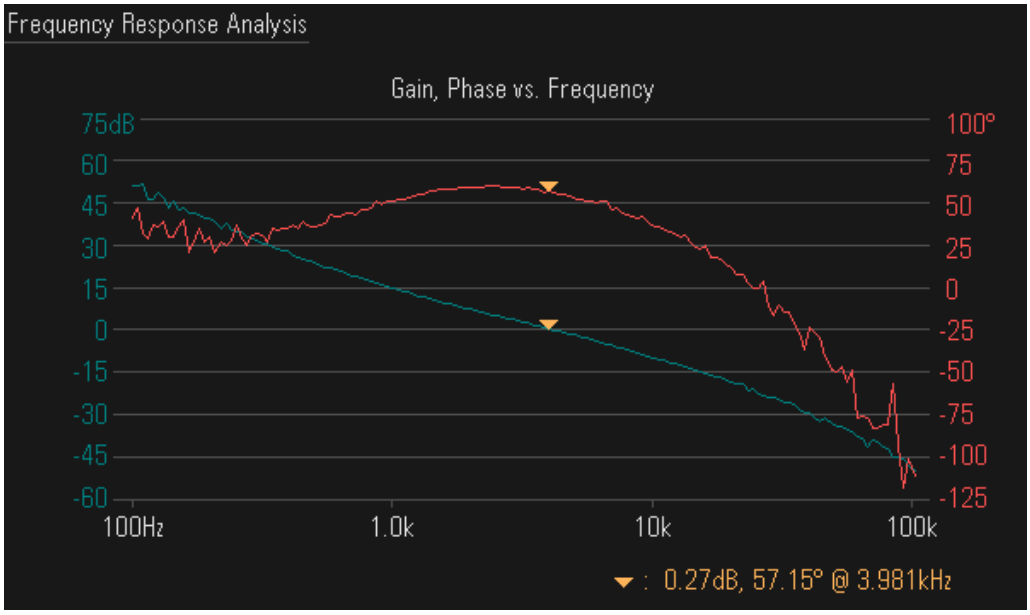
Typical input current ripple: 50V In; 50W Out



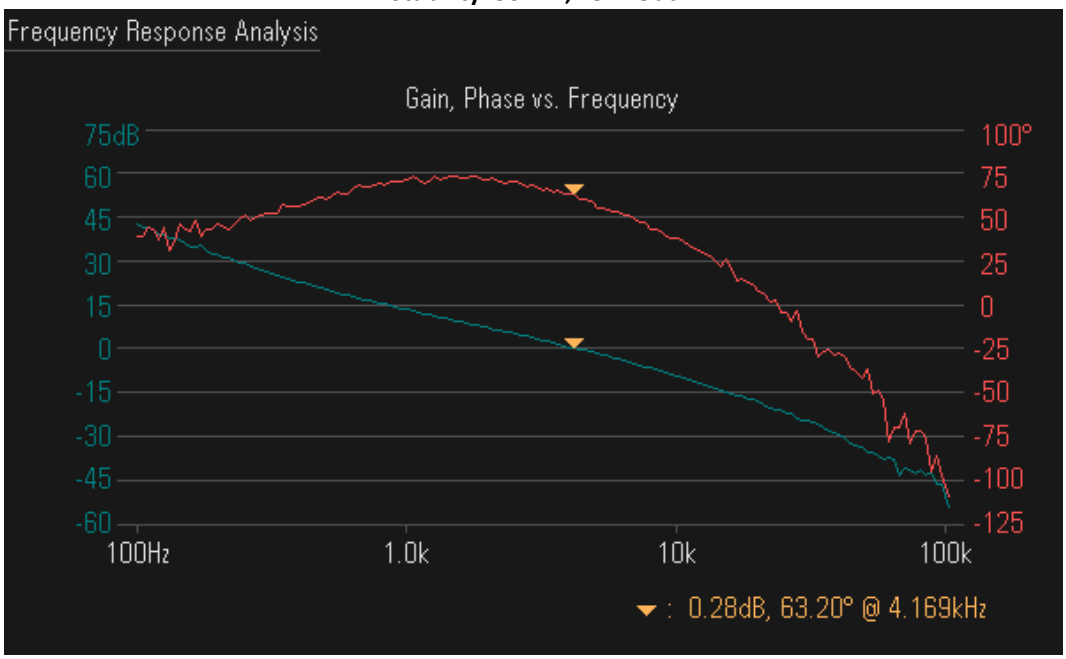
Typical output voltage ripple: 50V In; 50W Out



Efficiency single out 12V @ 25°C



Stability: 50V In; 15W Out



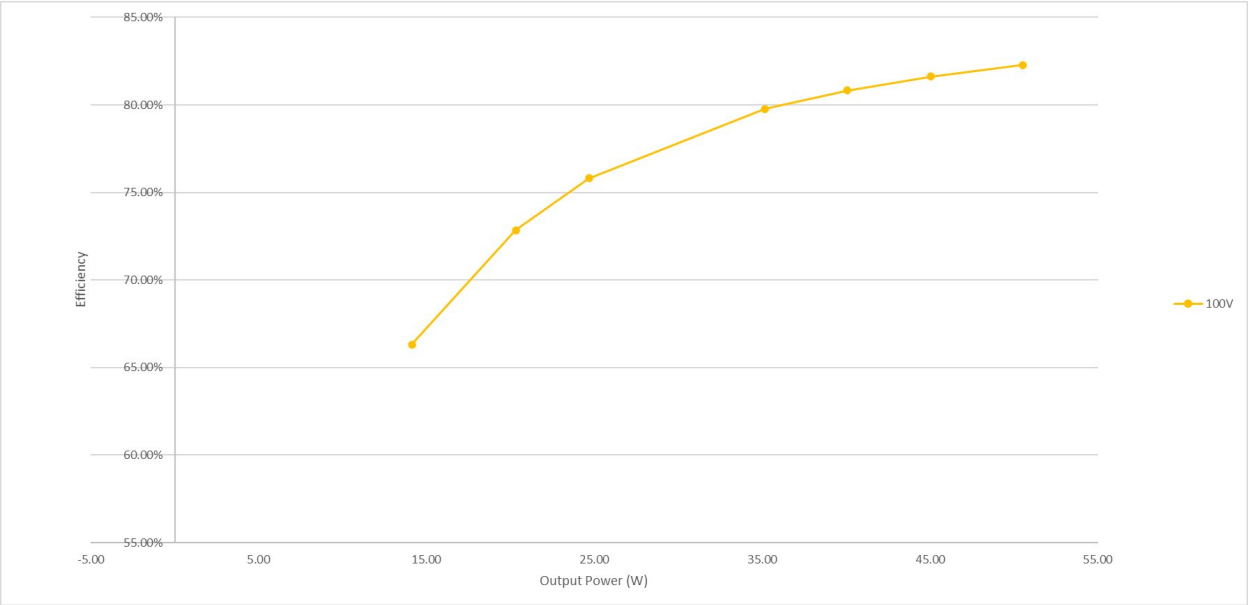
Stability: 50V In; 50W Out

Electrical characteristics and performances SGBF9912S

Performances in the range [-40°C; +85°C], input voltage 100V, full load (unless otherwise specified).

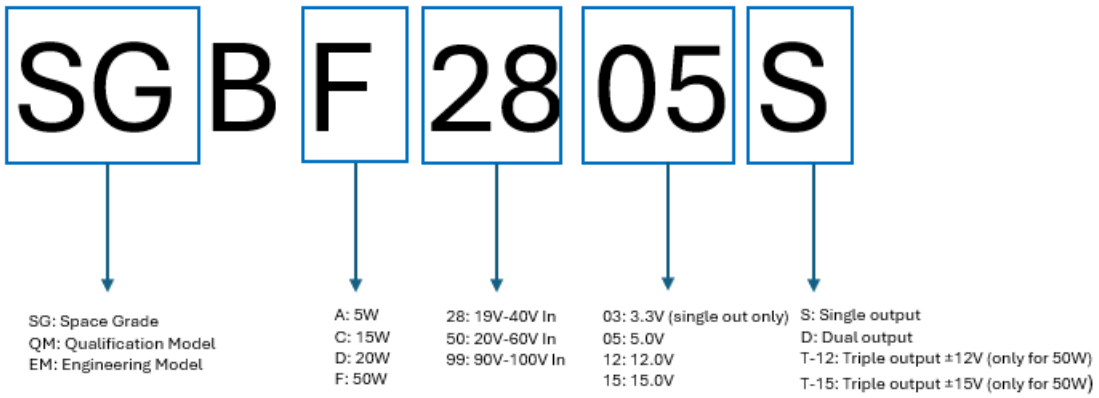
Parameter	Description	Min	Typ	Max	Unit
Input Section					
Operating input voltage	Continuous	90	100	110	V
Fault input voltage tolerance	Continuous	-	-	160	V
Under voltage lockout	Turn ON	-	-	88	V
	Turn OFF	-	-	86	V
Current Consumption	Inhibited	-	1	3	mA
	No Load	-	20	30	mA
Ripple current	Full load, 20Hz to 10Mhz	-	4	10	mApp
Output Section					
Output Voltage	T_{CASE} = 25°C	11.95	12.00	12.05	V
	T_{CASE} = -40°C ÷ +80°C	11.90	-	12.10	V
Power		-	-	50	W
Current	Output	0	-	4.17	A
Ripple voltage	Switching frequency	-	10	20	mVpp
Spikes	High frequency		25		mVpp
Line regulation	V_{IN} = 40V to 60V input	-	2	5	mV
Load regulation	No Load to Full Load	-	2	5	mV

Parameter	Description	Min	Typ	Max	Unit
Load step output transient	Half Load to Full Load	-	-	300	mV_{PK}
Load step recovery		-	0.5	-	msec
Start up output overshoot	0V to 100V	-	-	0	mV_{PK}
Start up delay	0V to 100V	-	20	25	msec
Functions					
Inhibit	OFF PIN 17 grounded to PRI_GND) (I_sink <0.5mA)			1	V
	ON PIN 17 high impedance or > 9V		Left open (or >9V)		-
Overvoltage Protection	Activation above nominal output voltage (load output from 15W to 50W)			25	%
Other data					
Efficiency		-	80	82	%
Capacitive load		-	-	300	µF
Switching frequency	Without external synchronization	380	400	420	kHz
Clock frequency	Without external synchronization	380	400	420	kHz
Isolation (input to output)	500 V_{DC}	10	-	-	MΩ
Storage temperature		-55°C	-	125°C	°C
Soldering temperature		-	-	300	°C



Efficiency single out 12V @ 25°C

Ordering information:



For customization of the product (input voltage range, output voltages, etc.), or additional information please contact info@arc-power.com.