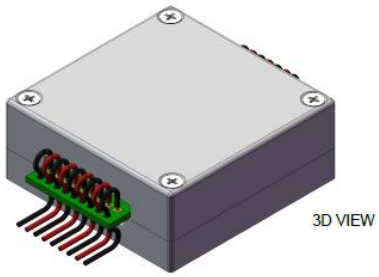
SGBC(-D) 19V-40V; 40V-60V; 90V-110V Input 15W (20W) output DC/DC converters Space application

Design

The Arc Power 15 W and 20W 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 300kHz-320khz, and take the advantages of 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 4 screws to achieve robustness against vibrations, and proper thermal conductivity.
The 15W DC/DC 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.
Customization of input and output voltages available.



Features

- Input voltage 19V-40V; 40V-60V; 90V-110V
- Input fault tolerance 80V (for the 20V-40V and 40V-60V); 120V (for the 90V-110V)
- Operating temperature range: -40°C ÷ +75°C (15W @75°C, within ECSS-Q.ST-30-11C derating rules); -40°C to +125°C without applying derating.
- ON/OFF capability
- Input under-voltage protection with activation hysteresis
- Output over-voltage latching protection
- Over voltage protection status monitor
- Overpower/output short circuit protection
- Radiation tolerance[1]:
  - TID: 25kard; 50krad or 100Krad
  - SEE LET 62 MeV-cm2/mg
- Magnetic coupled feedback
- Integrated Differential Mode Filter
- External frequency synchronization
- Export restriction free
- Trimming of the main output
- Test points to externally test the loop stability

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

Block diagram single output

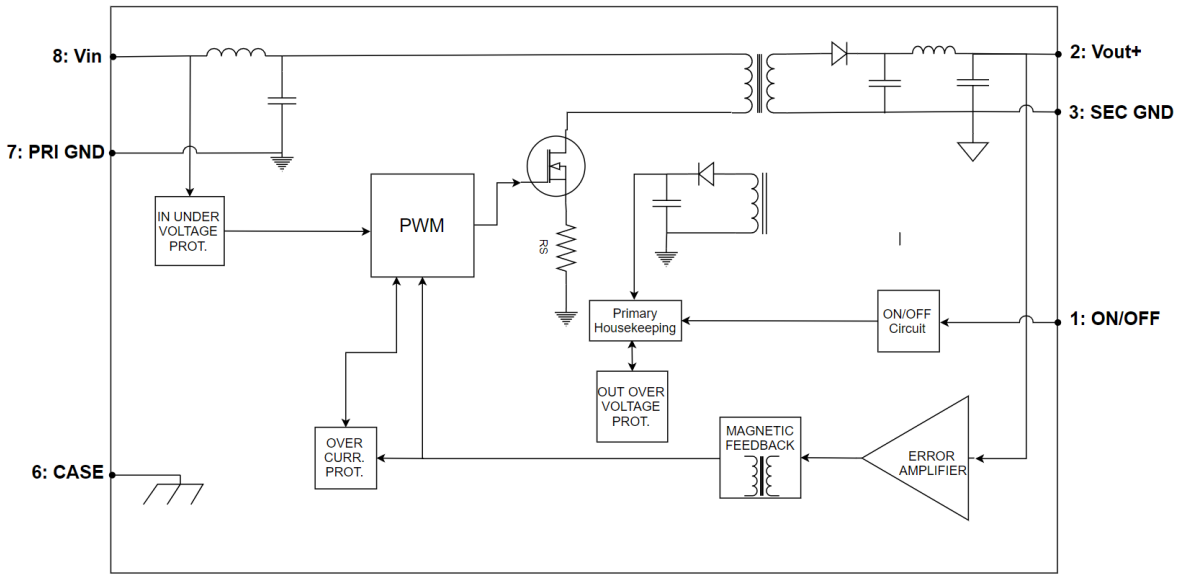


Figure 1: Block diagram

Electrical characteristics and performances Single Output

Performances in the range -40°C ÷ +75°C, input voltage 28V, full load; unless otherwise specified.

		SGBC2812S			SGBC2805S			SGBC2803S			
Parameter	**Description**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
Input Section											
Operating input voltage	ECSS-Q-ST-30-11C compliant	19	28	40	19	28	40	19	28	40	V
Fault input voltage tolerance	Continuous	-	-	70	-	-	70	-	-	70	V
Under voltage lockout	ON threshold	15.8	16.0	16.2	15.8	16.0	16.2	15.8	16.0	16.2	V
	OFF threshold	14.4	14.7	15.0	14.4	14.7	15.0	14.4	14.7	15.0	V
Ripple current	20Hz to 10Mhz	-	3	5	-	3	5	-	3	5	mApp
No load current	On condition no load connected @25°C	-	37	-	-	37	-	-	37	-	mA
OFF condition current		-	2	3	-	2	3	-	2	3	mA
Output Section											
Voltage positive output	-40°C ÷ +75°C	11.76	12.00	12.24	4.92	5.00	5.08	3.25	3.30	3.35	V
Power	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	0	-	15	0	-	15	0	-	13	W
Current positive output	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	0	-	1.25	0	-	3	0	-	4	A
Current negative output	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	N/A			N/A			N/A			A
Ripple voltage	Switching frequency	-	35	50	-	15	30	-	15	30	mVpp
Spikes	High frequency	-	-	100	-	-	100	-	-	100	mVpp
Line regulation	19V to 40V input	-	1	5	-	1	5	-	1	5	mV
Load regulation	0A to 3A load	-	5	15	-	10	20	-	10	20	mV
Load step positive output	Half to full load	-	50	70	-	75	100	-	75	100	mV
	Recovery time	-	300	400	-	300	400	-	300	400	µsec
Start-up overshot pos. out.	0V to 28V	-	-	0	-	-	0	-	-	0	mV
Startup rise time	0V to nominal output voltage	-	20	25	-	20	25	-	20	25	msec
Functions											
Inhibit	OFF	0	-	1.5	0	-	1.5	0	-	1.5	V

		SGBC2812S			SGBC2805S			SGBC2803S			
Parameter	**Description**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
	(PIN 1 grounded to PRI_GND)										
	ON (high impedance on PIN1)	Open collector or unconnected			Open collector or unconnected			Open collector or unconnected			
Overvoltage Protection	Activation above nominal output voltage	110	120	125	110	120	125	110	120	125	%
Over voltage Error status	Normal operation: 0V (PRI_GND)	OV tripped: 9.5V to11V			OV tripped: 9.5V to11V			OV tripped: 9.5V to11V			
Other data											
Efficiency	@ 25°C	-	80	-	-	75	-	-	70	-	%
Capacitive load (per output)		-	-	250	-	-	300	-	-	300	µF
Switching frequency	Fix frequency	300	-	320	300	-	320	300	-	320	kHz
Storage temperature		-55	-	125	-55	-	125	-55	-	125	°C
Soldering temperature		-	-	300	-	-	300	-	-	300	°C

Table 1: SGBC2805S and SGBC2803S Electrical characteristics

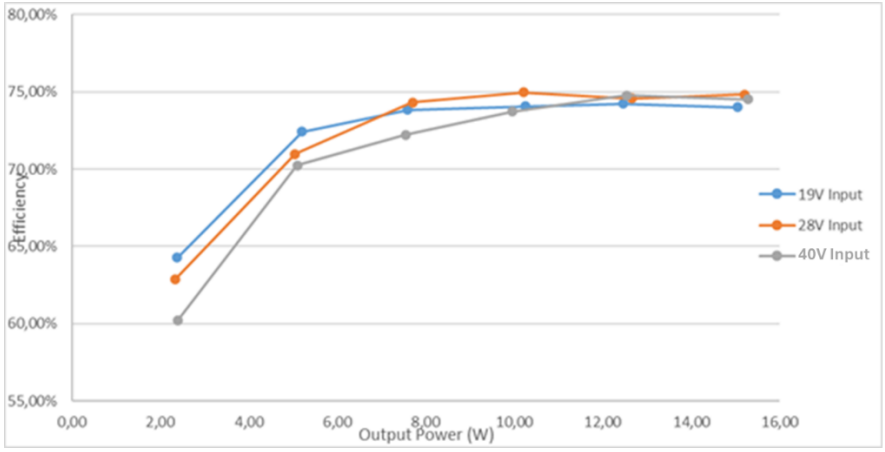


Figure 2: Efficiency SGBC2805S

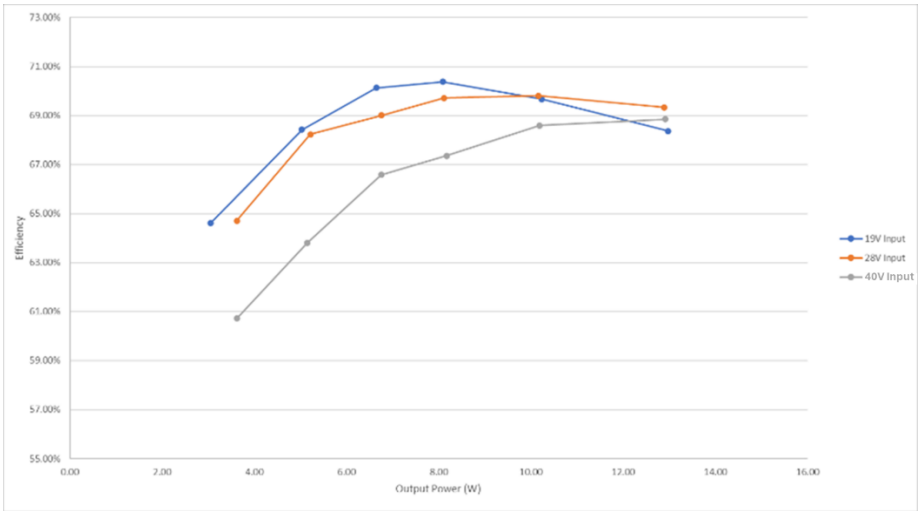


Figure 3: Efficiency SGBC2803S

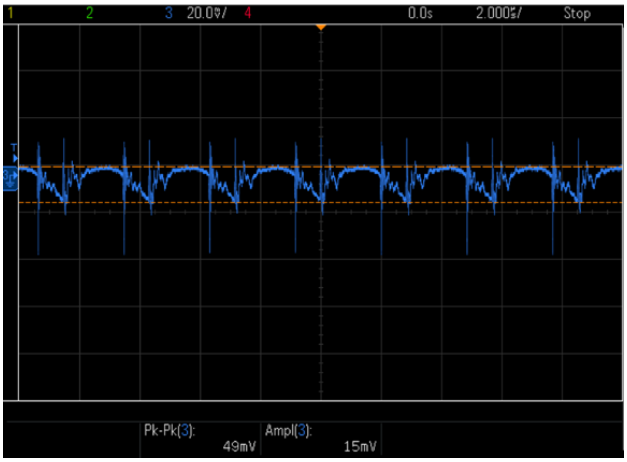
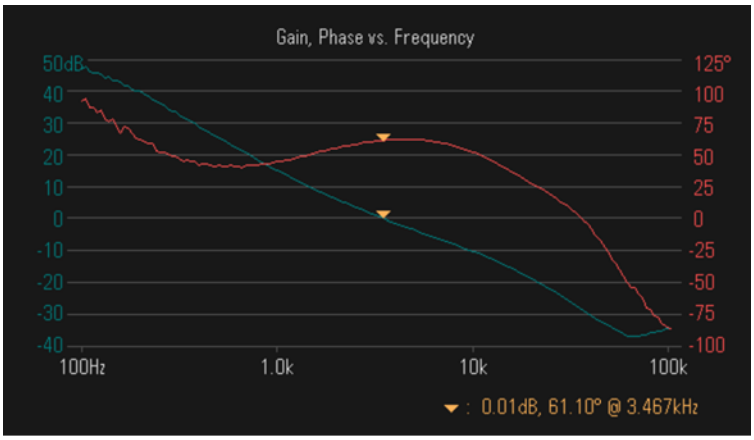
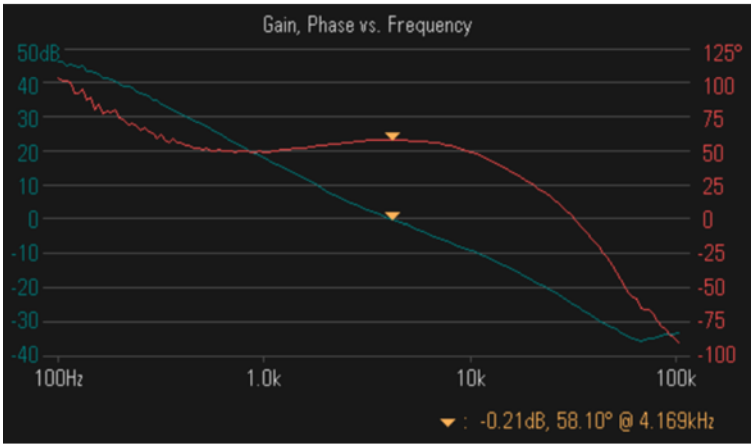


Figure 4: Output voltage ripple 3A load; SGBC2805S





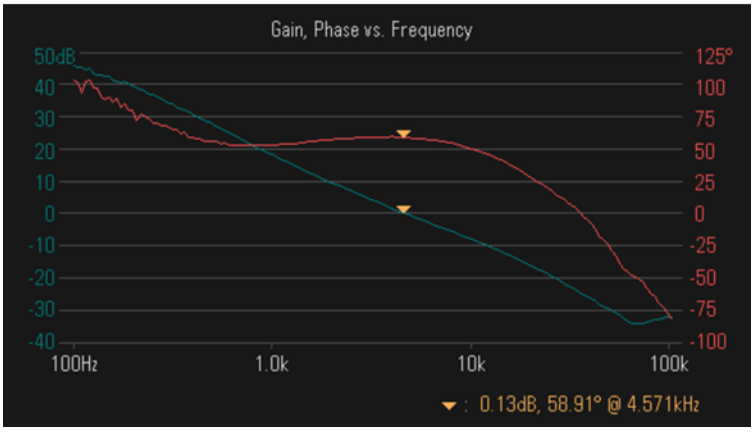


Figure 5: Stability 28V in 5W, 10W, 15W output Power - SGBC2005S

Electrical characteristics and performances Dual Output

Performances in the range -40°C ÷ +75°C, input voltage 28V, full load, unless otherwise specified.

		SGBC2805D			SGBC2812D			
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	-	3	7	-	3	7	mApp
No load current	On condition no load connected @25°C	-	37	-	-	37	-	mA
OFF condition current		-	2	4	-	2	4	mA
Output Section								
Voltage positive output	-40°C ÷ +75°C	4.92	5.00	5.08	11.90	12.00	12.10	V
Power	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	0	-	15	0	-	15	W
Current positive output	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	0	-	3	0	-	1.25	A
Current negative output	-40°C ÷ +75°C (ECSS-Q-ST-30-11C compliant)	0	-	1.5	0	-	0.62	A
Ripple voltage	Switching frequency	-	70	90	-	60	80	mVpp
Spikes	High frequency	-	100	-	-	100	-	mVpp
Line regulation (pos. out)	19V to 39V input	-	1	5	-	1	5	mV
Load regulation (pos. out)	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	-	-	0	-	-	0	mV
Start-up rise time	0V to nominal output voltage	-	-	20	-	-	20	msec
Load fault power dissipation	Overload	-	-	8	-	-	8	W
Functions								
Inhibit	OFF (PIN 1 grounded to PRI_GND)	0	-	1.5	0	-	1.5	V
	ON (high impedance on PIN1)	Open collector or unconnected			Open collector or unconnected			-
Overvoltage Protection	Activation above nominal output voltage (load positive output from 1.5W to 15W)	110	-	125	110	-	125	%
Other data								

		SGBC2805D			SGBC2812D			
Parameter	**Description**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
Efficiency	@ 25°C	-	75	77	-	80	81	%
Capacitive load (per output)		-	-	300	-	-	100	µF
Switching frequency	Fix frequency	300	-	320	300	-	320	kHz
Isolation		100	-	-	100	-	-	MΩ
Storage temperature		-55	-	125	-45	-	125	°C
Soldering temperature		-	-	300	-	-	300	°C

Table 2: SGBC2805D and SGBC2812D Electrical characteristics

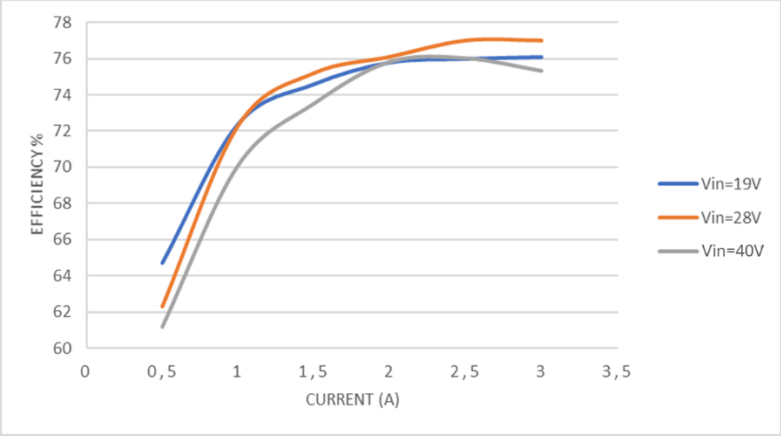


Figure 6: Efficiency SGBC2812D

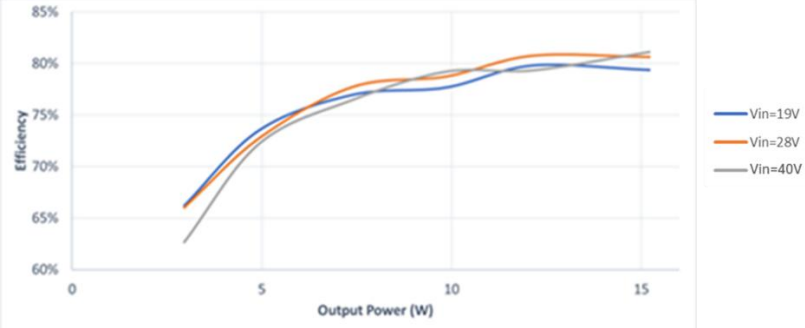


Figure 7: Efficiency SGBC2812D

Mechanical and Electrical Interface:

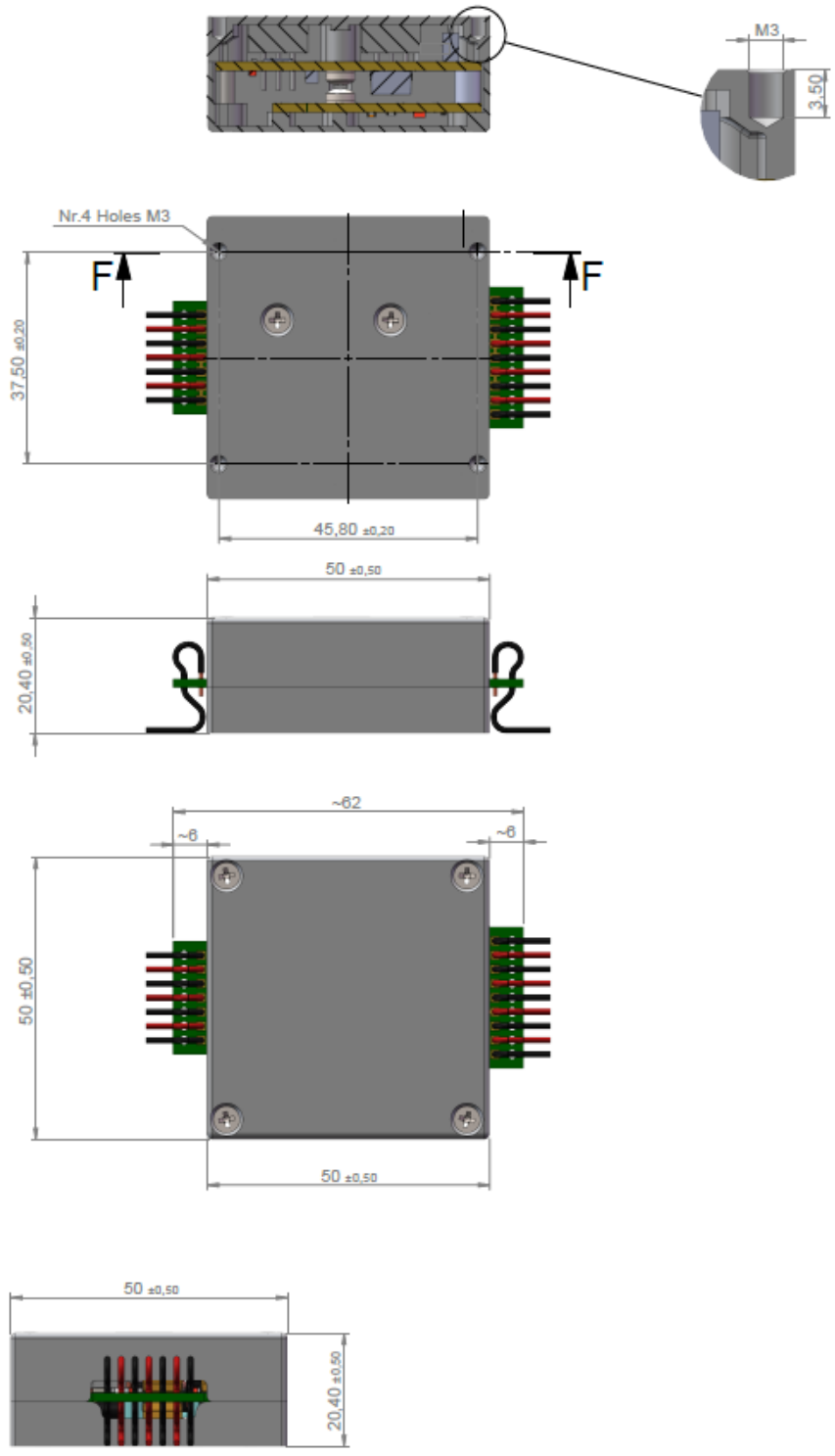
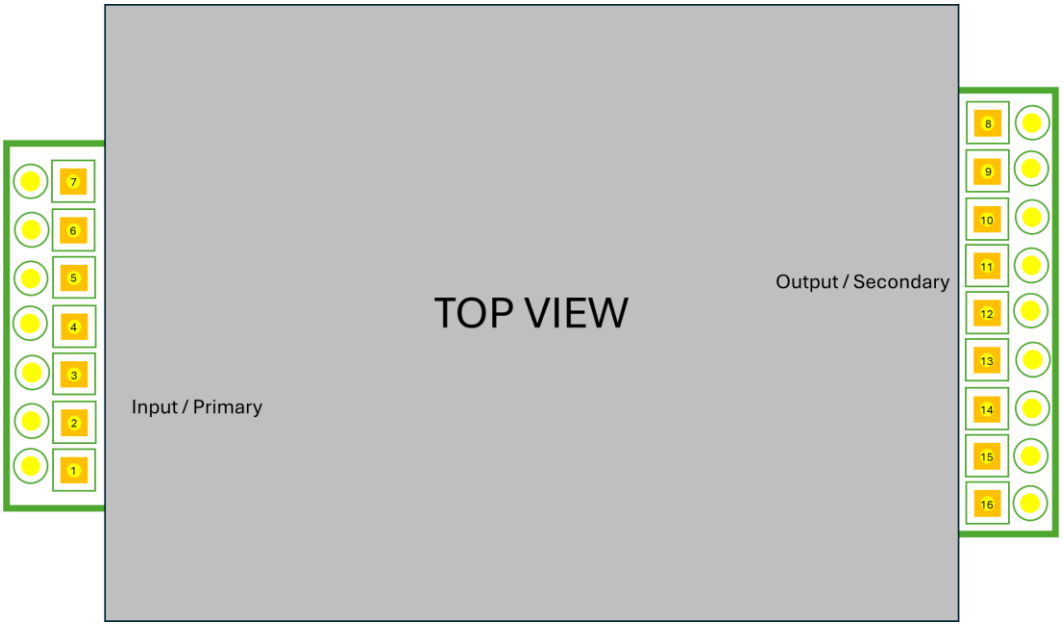


Figure 8: Mechanical Interface

Pin function:



Input/Primary side connections:

Function	Connection number	Interface	Description
ON/OFF	1	1 x AWG22	Connect to primary ground=DC/DC OFF; Floating Connection=DC/DC ON
OV Status Signal	2	1 x AWG22	<1V OV protection Not Tripped; 9V to 12V in case the out OV protection has tripped. Leave it floating or acquire with high impedance receiver.
SYNC	3	1 x AWG22	High impedance synchronization signal
Power IN RTN	4,5	2 x AWG22	Bus Voltage Return
Power IN	6,7	2 x AWG22	Positive Bus Voltage

Table 3: Input/Primary side electrical interfaces

Output/Secondary side connections:

Function	Connection number	Interface	Description
Trimm	8	1 x AWG22	Fine trimming point for POUT1: connect a resistor to POUT1 to decrease the POUT1; connect a resistor to SEC_GND to increase POUT1
Loop test	9	1 x AWG22	Test point to measure gain and phase margin
POUT2	10,11	2 x AWG22	Positive cross-regulated output POUT2
SEC GND	12,13,14	3 x AWG22	Secondary Ground – return path for the output currents
POUT1	15,16	2 x AWG22	Main output POIUT1

Table 4: Output/Secondary side electrical interfaces

Ordering information:

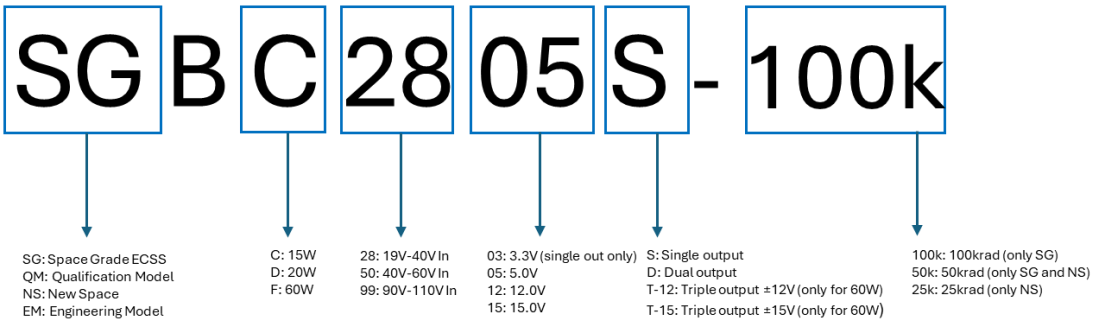


Figure 9: Part Number Definition

NOTE: Customized output configurations are possible (i.e. single: +10V; +6V etc. and dual +5V, +12 ; 3.3V, +15V, etc.). For **customization of the product** (input voltage range, output voltages, etc.), or additional information please contact info@arc-power.com.

Code Quality Level	Quality Level	Description
SG	Space Grade	Assembly processes ECSS compliant; PCB ESCC level; components ESCC grade 1, JANS, JANTXV; TID test at component level on batch used for the production.
QM	Qualification Model	Assembly processes ECSS compliant; PCB ESCC level, components electrical and mechanical the same as the SG but may have lower level of screening and belongs not to radiation tested batches.
NS	New Space	IPC Class 3 assembly processes; PCB IPC Class 3; Components not individually screened or procured according to automotive specification. The full assembly is screened by means of thermal cycling: • Number of cycles:10 • Temperature: -35°C / +80°C • Ramp up & down: 4°C/min. • Dwell time: 20 minutes Components batches not TID tested if the technology has proven TID performances with at least 100% margin on the program TID requirements. Available NS 25krad and 50krad options.
EM	Engineering Model	Mechanical and electrical equivalent to the other quality levels but not screened at component or DC/DC module level. Not suitable for vacuum test. Assembled with industrial standard. Recommended for early prototyping.

Table 5: Quality level codes

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
SGBC2803S-50k	19V-40V	3.3V	12W	50	Space Grade
SGBC2805S-50k	19V-40V	5V	15W	50	Space Grade
SGBC2812S-50k	19V-40V	12V	15W	50	Space Grade
SGBC2815S-50k	19V-40V	15V	15W	50	Space Grade
SGBC2805D-50k	19V-40V	5V; -5V	15W	50	Space Grade
SGBC2812S-50k	19V-40V	12V; -12V	15W	50	Space Grade
SGBC2815S-50k	19V-40V	15V; -15V	15W	50	Space Grade
SGBC2803T-12-50k	19V-40V	3.3V; 12V; -12V	15W	50	Space Grade
SGBC2803T-15-50k	19V-40V	3.3V; 15V; -15V	15W	50	Space Grade
SGBC2805T-12-50k	19V-40V	5V; 12V; -12V	15W	50	Space Grade
SGBC2805T-15-50k	19V-40V	5V; 15V; -15V	15W	50	Space Grade
SGBC5003S-50k	40V-60V	3.3V	12W	50	Space Grade
SGBC5005S-50k	40V-60V	5V	15W	50	Space Grade
SGBC5012S-50k	40V-60V	12V	15W	50	Space Grade
SGBC5015S-50k	40V-60V	15V	15W	50	Space Grade
SGBC5005D-50k	40V-60V	5V; -5V	15W	50	Space Grade
SGBC5012S-50k	40V-60V	12V; -12V	15W	50	Space Grade
SGBC5015S-50k	40V-60V	15V; -15V	15W	50	Space Grade
SGBC5003T-12-50k	40V-60V	3.3V; 12V; -12V	15W	50	Space Grade
SGBC5003T-15-50k	40V-60V	3.3V; 15V; -15V	15W	50	Space Grade
SGBC5005T-12-50k	40V-60V	5V; 12V; -12V	15W	50	Space Grade
SGBC5005T-15-50k	40V-60V	5V; 15V; -15V	15W	50	Space Grade
SGBC9903S-50k	90V-110V	3.3V	15W	50	Space Grade
SGBC9905S-50k	90V-110V	5V	15W	50	Space Grade
SGBC9912S-50k	90V-110V	12V	15W	50	Space Grade
SGBC9915S-50k	90V-110V	15V	15W	50	Space Grade
SGBC9905D-50k	90V-110V	5V; -5V	15W	50	Space Grade
SGBC9912S-50k	90V-110V	12V; -12V	15W	50	Space Grade
SGBC9915S-50k	90V-110V	15V; -15V	15W	50	Space Grade
SGBC9903T-12-50k	90V-110V	3.3V; 12V; -12V	15W	50	Space Grade
SGBC9903T-15-50k	90V-110V	3.3V; 15V; -15V	15W	50	Space Grade
SGBC9905T-12-50k	90V-110V	5V; 12V; -12V	15W	50	Space Grade
SGBC9905T-15-50k	90V-110V	5V; 15V; -15V	15W	50	Space Grade
SGBC2803S-100k	19V-40V	3.3V	12W	100	Space Grade
SGBC2805S-100k	19V-40V	5V	15W	100	Space Grade
SGBC2812S-100k	19V-40V	12V	15W	100	Space Grade
SGBC2815S-100k	19V-40V	15V	15W	100	Space Grade

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
SGBC2805D-100k	19V-40V	5V; -5V	15W	100	Space Grade
SGBC2812S-100k	19V-40V	12V; -12V	15W	100	Space Grade
SGBC2815S-100k	19V-40V	15V; -15V	15W	100	Space Grade
SGBC2803T-12-100k	19V-40V	3.3V; 12V; -12V	15W	100	Space Grade
SGBC2803T-15-100k	19V-40V	3.3V; 15V; -15V	15W	100	Space Grade
SGBC2805T-12-100k	19V-40V	5V; 12V; -12V	15W	100	Space Grade
SGBC2805T-15-100k	19V-40V	5V; 15V; -15V	15W	100	Space Grade
SGBC5003S-100k	40V-60V	3.3V	12W	100	Space Grade
SGBC5005S-100k	40V-60V	5V	15W	100	Space Grade
SGBC5012S-100k	40V-60V	12V	15W	100	Space Grade
SGBC5015S-100k	40V-60V	15V	15W	100	Space Grade
SGBC5005D-100k	40V-60V	5V; -5V	15W	100	Space Grade
SGBC5012S-100k	40V-60V	12V; -12V	15W	100	Space Grade
SGBC5015S-100k	40V-60V	15V; -15V	15W	100	Space Grade
SGBC5003T-12-100k	40V-60V	3.3V; 12V; -12V	15W	100	Space Grade
SGBC5003T-15-100k	40V-60V	3.3V; 15V; -15V	15W	100	Space Grade
SGBC5005T-12-100k	40V-60V	5V; 12V; -12V	15W	100	Space Grade
SGBC5005T-15-100k	40V-60V	5V; 15V; -15V	15W	100	Space Grade
SGBC9903S-100k	90V-110V	3.3V	12W	100	Space Grade
SGBC9905S-100k	90V-110V	5V	15W	100	Space Grade
SGBC9912S-100k	90V-110V	12V	15W	100	Space Grade
SGBC9915S-100k	90V-110V	15V	15W	100	Space Grade
SGBC9905D-100k	90V-110V	5V; -5V	15W	100	Space Grade
SGBC9912S-100k	90V-110V	12V; -12V	15W	100	Space Grade
SGBC9915S-100k	90V-110V	15V; -15V	15W	100	Space Grade
SGBC9903T-12-100k	90V-110V	3.3V; 12V; -12V	15W	100	Space Grade
SGBC9903T-15-100k	90V-110V	3.3V; 15V; -15V	15W	100	Space Grade
SGBC9905T-12-100k	90V-110V	5V; 12V; -12V	15W	100	Space Grade
SGBC9905T-15-100k	90V-110V	5V; 15V; -15V	15W	100	Space Grade
QMBC2803S	19V-40V	3.3V	12W	-	Qualification Model
QMBC2805S	19V-40V	5V	15W	-	Qualification Model
QMBC2812S	19V-40V	12V	15W	-	Qualification Model
QMBC2815S	19V-40V	15V	15W	-	Qualification Model

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
QMBC2805D	19V-40V	5V; -5V	15W	-	Qualification Model
QMBC2812S	19V-40V	12V; -12V	15W	-	Qualification Model
QMBC2815S	19V-40V	15V; -15V	15W	-	Qualification Model
QMBC2803T-12	19V-40V	3.3V; 12V; -12V	15W	-	Qualification Model
QMBC2803T-15	19V-40V	3.3V; 15V; -15V	15W	-	Qualification Model
QMBC2805T-12	19V-40V	5V; 12V; -12V	15W	-	Qualification Model
QMBC2805T-15	19V-40V	5V; 15V; -15V	15W	-	Qualification Model
QMBC5003S	40V-60V	3.3V	12W	-	Qualification Model
QMBC5005S	40V-60V	5V	15W	-	Qualification Model
QMBC5012S	40V-60V	12V	15W	-	Qualification Model
QMBC5015S	40V-60V	15V	15W	-	Qualification Model
QMBC5005D	40V-60V	5V; -5V	15W	-	Qualification Model
QMBC5012S	40V-60V	12V; -12V	15W	-	Qualification Model
QMBC5015S	40V-60V	15V; -15V	15W	-	Qualification Model
QMBC5003T-12	40V-60V	3.3V; 12V; -12V	15W	-	Qualification Model
QMBC5003T-15	40V-60V	3.3V; 15V; -15V	15W	-	Qualification Model
QMBC5005T-12	40V-60V	5V; 12V; -12V	15W	-	Qualification Model
QMBC5005T-15	40V-60V	5V; 15V; -15V	15W	-	Qualification Model
QMBC9903S	90V-110V	3.3V	12W	-	Qualification Model
QMBC9905S	90V-110V	5V	15W	-	Qualification Model
QMBC9912S	90V-110V	12V	15W	-	Qualification Model
QMBC9915S	90V-110V	15V	15W	-	Qualification Model

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
QMBC9905D	90V-110V	5V; -5V	15W	-	Qualification Model
QMBC9912S	90V-110V	12V; -12V	15W	-	Qualification Model
QMBC9915S	90V-110V	15V; -15V	15W	-	Qualification Model
QMBC9903T-12	90V-110V	3.3V; 12V; -12V	15W	-	Qualification Model
QMBC9903T-15	90V-110V	3.3V; 15V; -15V	15W	-	Qualification Model
QMBC9905T-12	90V-110V	5V; 12V; -12V	15W	-	Qualification Model
QMBC9905T-15	90V-110V	5V; 15V; -15V	15W	-	Qualification Model
EMBC2803S	19V-40V	3.3V	12W	-	Engineering Model
EMBC2805S	19V-40V	5V	15W	-	Engineering Model
EMBC2812S	19V-40V	12V	15W	-	Engineering Model
EMBC2815S	19V-40V	15V	15W	-	Engineering Model
EMBC2805D	19V-40V	5V; -5V	15W	-	Engineering Model
EMBFC2812S	19V-40V	12V; -12V	15W	-	Engineering Model
EMBC2815S	19V-40V	15V; -15V	15W	-	Engineering Model
EMBC2803T-12	19V-40V	3.3V; 12V; -12V	15W	-	Engineering Model
EMBC2803T-15	19V-40V	3.3V; 15V; -15V	15W	-	Engineering Model
EMBC2805T-12	19V-40V	5V; 12V; -12V	15W	-	Engineering Model
EMBC2805T-15	19V-40V	5V; 15V; -15V	15W	-	Engineering Model
EMBC5003S	40V-60V	3.3V	12W	-	Engineering Model
EMBC5005S	40V-60V	5V	15W	-	Engineering Model
EMBC5012S	40V-60V	12V	15W	-	Engineering Model
EMBC5015S	40V-60V	15V	15W	-	Engineering Model
EMBC5005D	40V-60V	5V; -5V	15W	-	Engineering Model
EMBC5012S	40V-60V	12V; -12V	15W	-	Engineering Model
EMBC5015S	40V-60V	15V; -15V	15W	-	Engineering Model
EMBC5003T-12	40V-60V	3.3V; 12V; -12V	15W	-	Engineering Model
EMBC5003T-15	40V-60V	3.3V; 15V; -15V	15W	-	Engineering Model
EMBC5005T-12	40V-60V	5V; 12V; -12V	15W	-	Engineering Model
EMBC5005T-15	40V-60V	5V; 15V; -15V	15W	-	Engineering Model
EMBC9903S	90V-110V	3.3V	12W	-	Engineering Model
EMBC9905S	90V-110V	5V	15W	-	Engineering Model
EMBC9912S	90V-110V	12V	15W	-	Engineering Model
EMBC9915S	90V-110V	15V	15W	-	Engineering Model

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
EMBC9905D	90V-110V	5V; -5V	15W	-	Engineering Model
EMBC9912S	90V-110V	12V; -12V	15W	-	Engineering Model
EMBC9915S	90V-110V	15V; -15V	15W	-	Engineering Model
EMBC9903T-12	90V-110V	3.3V; 12V; -12V	15W	-	Engineering Model
EMBC9903T-15	90V-110V	3.3V; 15V; -15V	15W	-	Engineering Model
EMBC9905T-12	90V-110V	5V; 12V; -12V	15W	-	Engineering Model
EMBC9905T-15	90V-110V	5V; 15V; -15V	15W	-	Engineering Model
NSBC2803S-50k	19V-40V	3.3V	12W	50	New Space
NSBC2805S-50k	19V-40V	5V	15W	50	New Space
NSBC2812S-50k	19V-40V	12V	15W	50	New Space
NSBC2815S-50k	19V-40V	15V	15W	50	New Space
NSBC2805D-50k	19V-40V	5V; -5V	15W	50	New Space
NSBC2812S-50k	19V-40V	12V; -12V	15W	50	New Space
NSBC2815S-50k	19V-40V	15V; -15V	15W	50	New Space
NSBC2803T-12-50k	19V-40V	3.3V; 12V; -12V	15W	50	New Space
NSBC2803T-15-50k	19V-40V	3.3V; 15V; -15V	15W	50	New Space
NSBC2805T-12-50k	19V-40V	5V; 12V; -12V	15W	50	New Space
NSBC2805T-15-50k	19V-40V	5V; 15V; -15V	15W	50	New Space
NSBC5003S-50k	40V-60V	3.3V	12W	50	New Space
NSBC5005S-50k	40V-60V	5V	15W	50	New Space
NSBC5012S-50k	40V-60V	12V	15W	50	New Space
NSBC5015S-50k	40V-60V	15V	15W	50	New Space
NSBC5005D-50k	40V-60V	5V; -5V	15W	50	New Space
NSBC5012S-50k	40V-60V	12V; -12V	15W	50	New Space
NSBC5015S-50k	40V-60V	15V; -15V	15W	50	New Space
NSBC5003T-12-50k	40V-60V	3.3V; 12V; -12V	15W	50	New Space
NSBC5003T-15-50k	40V-60V	3.3V; 15V; -15V	15W	50	New Space
NSBC5005T-12-50k	40V-60V	5V; 12V; -12V	15W	50	New Space
NSBC5005T-15-50k	40V-60V	5V; 15V; -15V	15W	50	New Space
NSBC9903S-50k	90V-110V	3.3V	12W	50	New Space
NSBC9905S-50k	90V-110V	5V	15W	50	New Space
NSBC9912S-50k	90V-110V	12V	15W	50	New Space
NSBC9915S-50k	90V-110V	15V	15W	50	New Space
NSBC9905D-50k	90V-110V	5V; -5V	15W	50	New Space
NSBCC9912S-50k	90V-110V	12V; -12V	15W	50	New Space
NSBC9915S-50k	90V-110V	15V; -15V	15W	50	New Space
NSBC9903T-12-50k	90V-110V	3.3V; 12V; -12V	15W	50	New Space

Commercial Part Number	Input Bus	Output Voltages	Maximum Output Power	TID (Krad)	Level
NSBC9903T-15-50k	90V-110V	3.3V; 15V; -15V	15W	50	New Space
NSBC9905T-12-50k	90V-110V	5V; 12V; -12V	15W	50	New Space
NSBC9905T-15-50k	90V-110V	5V; 15V; -15V	15W	50	New Space
NSBC2803S-25k	19V-40V	3.3V	12W	25	New Space
NSBC2805S-25k	19V-40V	5V	15W	25	New Space
NSBC2812S-25k	19V-40V	12V	15W	25	New Space
NSBC2815S-25k	19V-40V	15V	15W	25	New Space
NSBC2805D-25k	19V-40V	5V; -5V	15W	25	New Space
NSBC2812S-25k	19V-40V	12V; -12V	15W	25	New Space
NSBC2815S-25k	19V-40V	15V; -15V	15W	25	New Space
NSBC2803T-12-25k	19V-40V	3.3V; 12V; -12V	15W	25	New Space
NSBC2803T-15-25k	19V-40V	3.3V; 15V; -15V	15W	25	New Space
NSBC2805T-12-25k	19V-40V	5V; 12V; -12V	15W	25	New Space
NSBC2805T-15-25k	19V-40V	5V; 15V; -15V	15W	25	New Space
NSBC5003S-25k	40V-60V	3.3V	12W	25	New Space
NSBC5005S-25k	40V-60V	5V	15W	25	New Space
NSBC5012S-25k	40V-60V	12V	15W	25	New Space
NSBC5015S-25k	40V-60V	15V	15W	25	New Space
NSBC5005D-25k	40V-60V	5V; -5V	15W	25	New Space
NSBC5012S-25k	40V-60V	12V; -12V	15W	25	New Space
NSBC5015S-25k	40V-60V	15V; -15V	15W	25	New Space
NSBC5003T-12-25k	40V-60V	3.3V; 12V; -12V	15W	25	New Space
NSBC5003T-15-25k	40V-60V	3.3V; 15V; -15V	15W	25	New Space
NSBC5005T-12-25k	40V-60V	5V; 12V; -12V	15W	25	New Space
NSBC5005T-15-25k	40V-60V	5V; 15V; -15V	15W	25	New Space
NSBC9903S-25k	90V-110V	3.3V	12W	25	New Space
NSBC9905S-25k	90V-110V	5V	15W	25	New Space
NSBC9912S-25k	90V-110V	12V	15W	25	New Space
NSBC9915S-25k	90V-110V	15V	15W	25	New Space
NSBC9905D-25k	90V-110V	5V; -5V	15W	25	New Space
NSBC9912S-25k	90V-110V	12V; -12V	15W	25	New Space
NSBC9915S-25k	90V-110V	15V; -15V	15W	25	New Space
NSBC9903T-12-25k	90V-110V	3.3V; 12V; -12V	15W	25	New Space
NSBC9903T-15-25k	90V-110V	3.3V; 15V; -15V	15W	25	New Space
NSBC9905T-12-25k	90V-110V	5V; 12V; -12V	15W	25	New Space
NSBC9905T-15-25k	90V-110V	5V; 15V; -15V	15W	25	New Space

Table 6: Available 15W DC/DC converters Modules

NOTE: The converter listed in the table above are also available in the extended power level D, 20W output capability. The mechanical and electrical interfaces are identical to the DC/DC Power level C, 15W.