

Series 3699 7.5 – 20 Watt Hybrid

For CUBESATS and MINIATURIZED SATELLITES

Features

- Rad Hard: TID > 100kRad(Si)
- 2:1 margin: Operates beyond 200kRad TID
- No SEE: LET > 82MeV²/cm²/mg
- Proton Resistant: No optocouplers used
- Single and dual outputs for 6 - 16V powerbus of cubesats and scalable miniaturized satellites
- Completely self contained Thick Film Hybrid DC-DC Converter
- No external filter caps required
- Fully isolated design
- "Inhibit-not" function
- Power on soft start
- 200 kHz operation for low ripple and fast response time
- Built-in EMI input filter
- Short circuit and overvoltage protection
- Capability of external sync for switching frequencies

Specifications

INPUT: 12 VDC nominal
Range: 6 to 17 VDC continuous

ISOLATION:

Input to case: 500 VDC
Input to output: 500 VDC
Output to case: 100 VDC

ENVIRONMENT:

Storage temperature: -55°C to +150°C
Shock: 50 G's
Acceleration: 500 G's
Vibration: 30 G's

Grades EU:

Full Power Output at T_{case} = +85°C
Linearly derates to zero at T_{case} = +115°C

Grades L, S:

Full Power Output at T_{case} = +85°C
Linearly derates to zero at T_{case} = +115°C

Grades LE, SE:

Full Power Output at T_{case} = +125°C
Linearly derates to zero at T_{case} = +135°C

WEIGHT: 60 grams typical

SINGLE OUTPUT DEVICES		3699-S02 (8W)			3699-S02.5 (10W)			3699-S03.3 (13.2W)			3699-S05 (20W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+1.9	+2.0	+2.1	+2.4	+2.5	+2.6	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1
Output current	$V_{in, min} - V_{in, max}$	—	—	4A	—	—	4A	—	—	4A	—	—	4A
Efficiency	$P_{out} = \text{max rated load}$	55%	58%	—	60%	63%	—	65%	68%	—	70%	73%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in, min} - V_{in, max}$	—	10mV	30mV	—	10mV	30mV	—	10mV	30mV	—	10mV	50mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	30mV	—	10mV	30mV	—	10mV	30mV	—	10mV	50mV
Output ripple	F.L. BW 2 MHz mV _{pp}	—	25	50	—	30	60	—	30	65	—	40	85

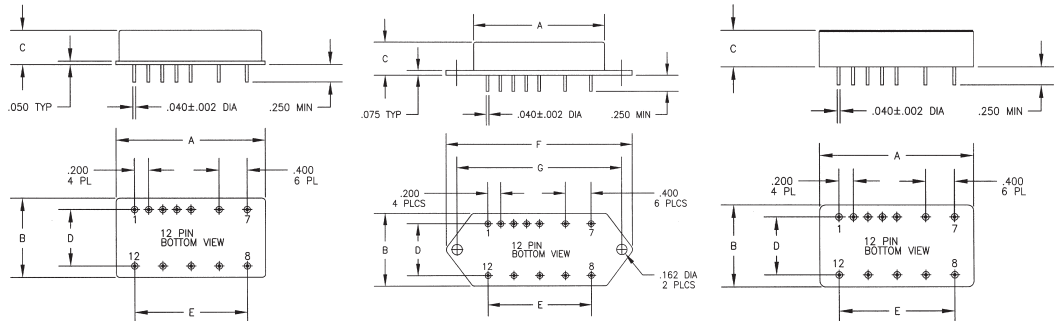
SINGLE OUTPUT DEVICES		3699-S05.2 (20W)			3699-S12 (20W)			3699-S15(20W)			3699-S28 (20W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2
Output current	$V_{in, min} - V_{in, max}$	—	—	3.85A	—	—	1.67A	—	—	1.33A	—	—	714mA
Efficiency	$P_{out} = \text{max rated load}$	70%	73%	—	76%	80%	—	77%	81%	—	76%	80%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in, min} - V_{in, max}$	—	10mV	50mV	—	20mV	100mV	—	25mV	125mV	—	50mV	250mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	50mV	—	20mV	100mV	—	25mV	125mV	—	50mV	250mV
Output ripple	F.L. BW 2 MHz mV _{pp}	—	40	85	—	60	150	—	75	180	—	150	350

Model No.	Case Style	Pin Count	Mounting
3699	2	12	Solder Sealed Flangeless PCB Mount
3699	F	12	Solder Sealed PCB Mount with Flange
3699	I	12	Seam Weld Flangeless PCB Mount
3699	IF	12	Seam Weld PCB Mount with Flange
3699	WF	8	Seam Weld Chassis Mount with Flange
3699	PB	10	Solder Sealed Flangeless PCB Stud Mount
3699	PE	12	Seam Weld Flangeless PCB Stud Mount

CASE STYLE 2

CASE STYLE 3

CASE STYLE 5



Case Dimensions

Units: inches | millimeters

TOLERANCES: ALL DIMENSIONS ±0.01 EXCEPT F= MAX. C = +0.01/-0.02; DRAWINGS IN INCHES.

Case Style	A	B	C	D	E	F	G
2	2.200 55.880	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	— —	— —
3	2.200 55.880	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	2.960 75.184	2.610 66.294
5	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	— —	— —
6	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	2.960 75.184	2.610 66.294
8	2.225 56.515	1.350 34.290	0.495 12.573	— —	1.600 40.640	2.960 75.184	2.610 66.294
10	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	— —	— —
12	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	1.600 40.640	— —	— —



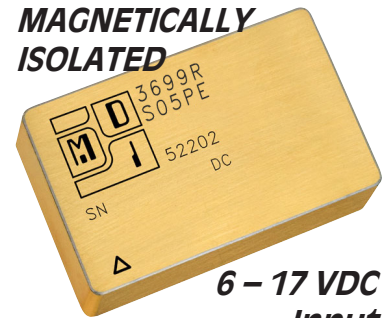
DC – DC Converters

PROTON RAD HARD 100K+™ SERIES 3699

DUAL OUTPUT DEVICES		3699-D3.3/5 (11.6W)			3699-D05 (20W)			3699-D12 (20W)			3699-D15 (20W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1
		+4.9	+5.0	+5.1	-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current*	$V_{in\ min} - V_{in\ max}$	200mA	—	2A	±150mA	—	±2A	±125mA	—	±833mA	—	—	4A
		100mA	—	1A									
Efficiency	$P_{out} = \text{max rated load}$	62%	65%	—	70%	74%	—	76%	80%	—	77%	81%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
		—	10mV	50mV									
Load regulation†	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
		—	10mV	50mV									
Output ripple	F.L. BW 2 MHz mV_{pp}	—	30	65	—	40	85	—	60	150	—	75	180
		—	25	50									

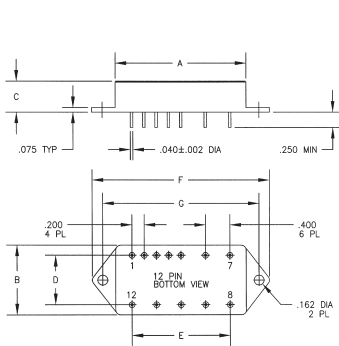
Notes: *Up to 90% full power available from either output if rated output power is not exceeded; †balanced load conditions.

MAGNETICALLY ISOLATED

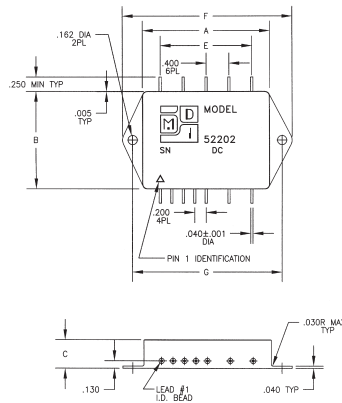


6 – 17 VDC Input

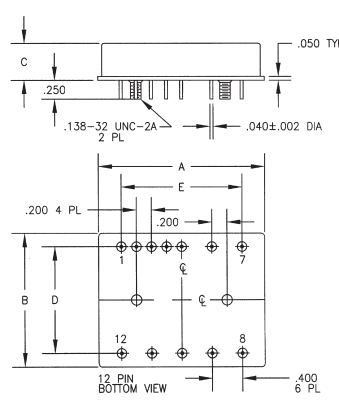
CASE STYLE 6



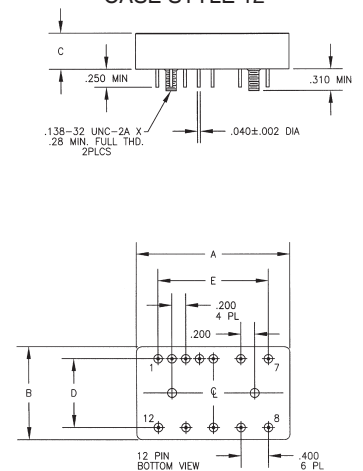
CASE STYLE 8



CASE STYLE 10



CASE STYLE 12



3699-SXX output < 24VDC

Pin 1	Case	Pin 7	+ 6 - 17 VDC Input
Pin 2	Inhibit Not	Pin 8	Main Output
Pin 3	Soft Start	Pin 9	Main Output Ret
Pin 4	Sync	Pin 10	+Remote Sense
Pin 5	N/C	Pin 11	Adjust
Pin 6	+6 - 17 VDC Input Ret	Pin 12	-Remote Sense

3699-SXX output ≥ 24 VDC

Pin 1	Case	Pin 7	+ 6 - 17 VDC Input
Pin 2	Inhibit Not	Pin 8	N/C
Pin 3	Soft Start	Pin 9	N/C
Pin 4	Sync	Pin 10	Main Output
Pin 5	N/C	Pin 11	N/C
Pin 6	+6 - 17VDC Input Ret	Pin 12	Main Output Ret

3699-DXX

Pin1	Case	Pin 7	+6 - 17 VDC Input
Pin 2	Inhibit Not	Pin 8	N/C
Pin 3	Soft Start	Pin 9	N/C
Pin 4	Sync	Pin10	+ Output
Pin 5	N/C	Pin 11	Output Common
Pin 6	+6 - 17 VDC Input Ret	Pin 12	-Output

3699-D3.3/5

Pin 1	Case	Pin 7	+6 - 17 VDC Input
Pin 2	Inhibit Not	Pin 8	N/C
Pin 3	Soft Start	Pin 9	N/C
Pin 4	Sync	Pin 10	+5 VDC Output
Pin 5	N/C	Pin 11	Output Common
Pin 6	+6 - 17 VDC Input Return	Pin 12	+3.3 VDC Output

Please specify **GRADE LEVEL** for your application. EU grade units will be shipped if no option is specified.



EU Engineering Units

L 45K+, +85°C space military/aerospace
LE 45K+, +125°C military/aerospace

S 100 K+™, +85°C space
SE 100 K+™, +125°C space