

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 > 82MeV⁺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 16 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, R & S:

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

Grades RE & SE:

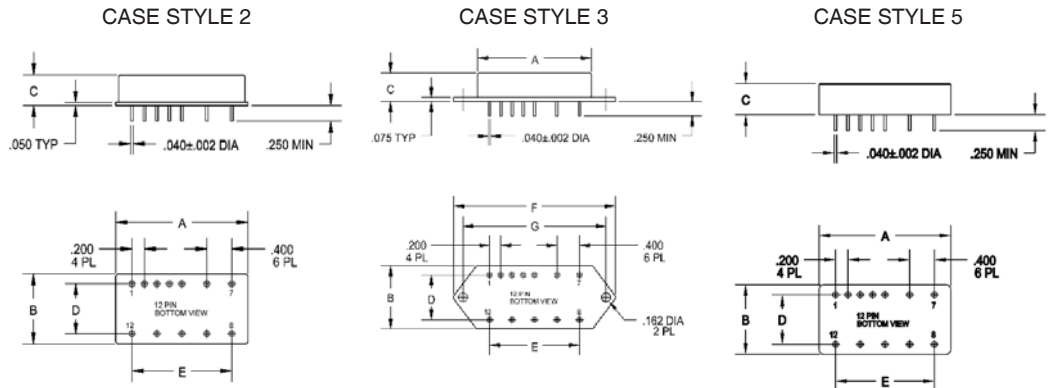
Full Power Output at T_{case} = +125°C
Linearly derates to zero at T_{case} = +135°C

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	$P_{out} = 10\%$ 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	$P_{out} = 10\%$ 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	12	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 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	IF	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	2.960 75.184	2.610 66.294
8	WF	2.225 56.515	1.350 34.290	— —	1.600 40.640	2.960 75.184	2.610 66.294
10	PB	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	— —	— —
12	PE	2.225 56.515	1.350 34.290	0.495 12.573	1.000 25.400	— —	— —



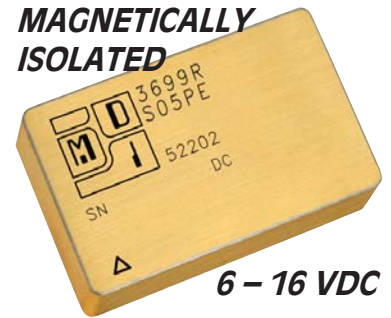
DC – DC Converters

PROTON RAD HARD 100K+™ SERIES 3699

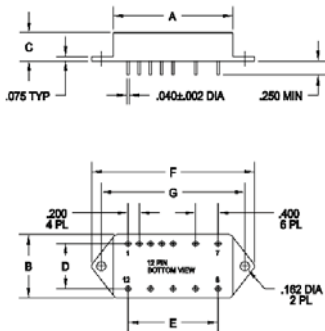
DUAL OUTPUT DEVICES		3699-D3.3/5 (11.6W)			3699-D05 (20W)			3699-D12 (20W)			3699-D15 (20W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1
		+4.9	+5.0	+5.1	-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current*	$V_{in\ min} - V_{in\ max}$	200mA	—	2A	±150mA	—	±2A	±125mA	—	±883mA	—	—	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.

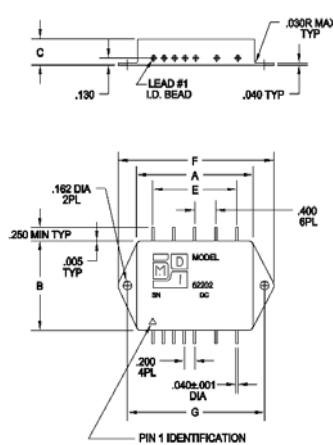
MAGNETICALLY ISOLATED



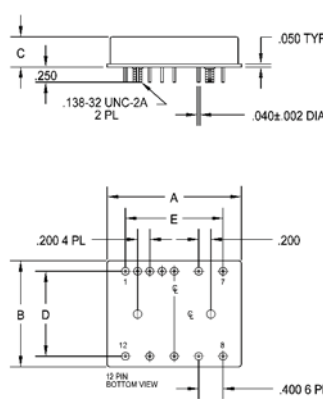
CASE STYLE 6



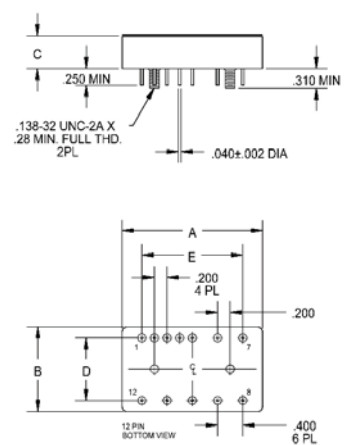
CASE STYLE 8



CASE STYLE 10



CASE STYLE 12



3699-SXX output < 24VDC

Pin 1	N/C	Pin 7	+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	Input Ret	Pin 12	-Remote Sense

3699-SXX output ≥ 24 VDC

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

3699-DXX

Pin1	N/C	Pin 7	+Input
Pin 2	Inhibit Not	Pin 8	+Remote Sense
Pin 3	Soft Start	Pin 9	-Remote Sense
Pin 4	Sync	Pin10	+Dual Output
Pin 5	Adjust	Pin 11	Dual Output Rtn
Pin 6	Input Ret	Pin 12	-Dual Output



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

EU Engineering Units

R 100 K+™, +85°C military/aerospace

RE 100 K+™, +125°C military/aerospace

S 100 K+™, +85°C space

SE 100 K+™, +125°C space