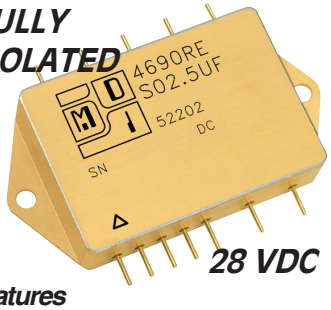
Series 4690

Proton Rad Hard 100K + ® DC – DC Converters

FULLY ISOLATED



28 VDC

Features

- Rad Hard: TID > 100 kRad (Si)
- 2:1 margin: Operates beyond 200 kRad TID
- No SEE: LET > 82MeV*cm²/mg
- Proton Resistant: No optocouplers used
- Efficiency optimized for low power applications
- Typical no load quiescent current <15 mA at 28 VDC
- Typical INH (OFF) quiescent current <275µA
- 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 meets MIL-STD-461C requirements CE01, CE03, CS01, CS02 and CS06
- Short circuit and overvoltage protection
- Capability of external sync for switching frequencies
- Built-in test capability

Specifications

INPUT: 28 VDC nominal
Range: 16 to 50 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, L & S:
Full Power Output at Tcase = +85°C
Linearly derates to zero at Tcase = +115°C
Grades LE & SE:
Full Power Output at Tcase= +125°C
Linearly derates to zero at Tcase= +135°C
Grades L & LE:
TID up to 45 kRad (Si)
No SEE up to 60Mev*cm²/mg

WEIGHT: 50 grams typical

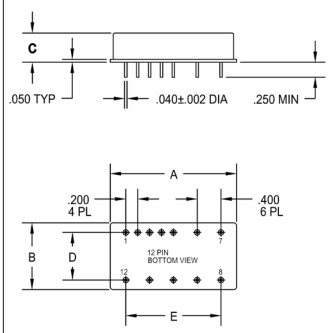
Note:
All units operate to no load. Minimum load is the measurement point for load regulation.

SINGLE OUTPUT DEVICES		4690-S02 (2.5W)			4690-S02.5 (2.5W)			4690-S03.3 (2.5W)			4690-S05 (2.5W)		
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	$V_{in\,min} - V_{in\,max}$	125mA	—	1.25A	0.1A	—	1A	75mA	—	0.75A	0.50mA	—	0.50A
Effciency	P_{out} = max rated load	59%	62%	—	62%	65%	—	67%	69%	—	73%	77%	—
Line regulation	P_{out} = 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.	—	50mV	100mV	—	62mV	125mV	—	75mV	250mV	—	0.1V	0.3V
Output Ripple	F.L BW 2 MHz mV_{pp}	—	30	65	—	30	65	—	3	100	—	40	125

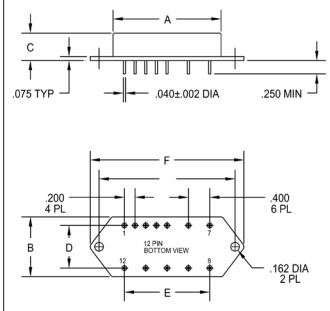
SINGLE OUTPUT DEVICES		4690-S05.2 (2.5W)			4690-S12 (2.5W)			4690-S15 (2.5W)			4690-S28 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2
Output current	$V_{in\,min} - V_{in\,max}$	48mA	—	480mA	20.8mA	—	0.208A	16.7mA	—	0.167A	9mA	—	90mA
Effciency	P_{out} = max rated load	77%	82%	—	81%	85%	—	81%	86%	—	81%	86%	—
Line regulation	P_{out} = max rated load $V_{in\,min} - V_{in\,max}$	—	10mV	50mV	—	20mV	100mV	—	25mV	125mV	—	50mV	250mV
Load regulation	Pout = 10% to F.L.	—	0.1V	0.2V	—	0.25V	0.5V	—	0.3V	0.6V	—	600mV	1.2V
Output Ripple	F.L BW 2 MHz mV_{pp}	—	40	85	—	60	150	—	75	180	—	150	350

Model No.		Case Style	Pin Count	Mounting
4690		2	12	Solder Sealed Flangless PCB Mount
4690	F	3	12	Solder Sealed PCB Mount with Flange
4690	G	5	12	Seam Weld Flangeless PCB Mount
4690	GF	6	12	Seam Weld PCB Mount with Flange
4690	UF	8	12	Seam Weld Chassis Mount with Flange

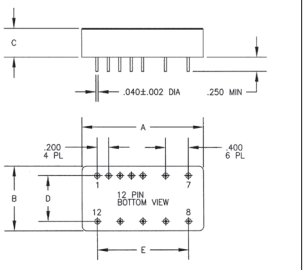
CASE STYLE 2



CASE STYLE 3



CASE STYLE 5



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

Case Dimensions

Units: inches | millimeters

Case Style		A	B	C	D	E	F	G
2		2.130 | 54.102	1.120 | 28.448	0.375 | 9.525	0.800 | 20.320	1.600 | 40.640	— | —	— | —
3	F	2.130 | 54.102	1.120 | 28.448	0.375 | 9.525	0.800 | 20.320	1.600 | 40.640	2.890 | 73.406	2.550 | 64.770
5	G	2.130 | 54.102	1.120 | 28448	0.375 | 9.525	0.800 | 20.320	1.600 | 40.640	— | —	— | —
6	GF	2.130 | 54.102	1.120 | 28.448	0.375 | 9.525	0.800 | 20.320	1600.| 40.640	2.890 | 73.406	2.550 | 64.770
8	UF	2.160 | 54.864	1.510 | 38.354	0.495 | 12.573	— | —	1.600 | 40.640	2.890 | 73.406	2.550 | 64.770

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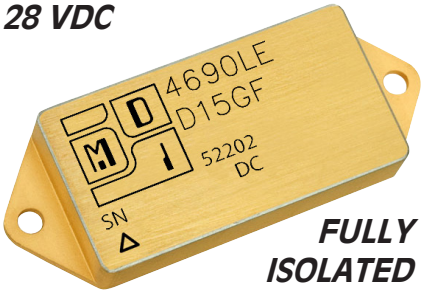
Series 4690

2.5 Watt Hybrid

DUAL OUTPUT DEVICES		4690-D05 (2.5W)			4690-D12 (2.5W)			4690-D15 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+4.9 -4.9	+5.0 -5.0	+5.1 -5.1	+11.9 -11.9	+12.0 -12.0	+12.1 -12.1	+14.9 -14.9	+15.0 -15.0	+15.1 -15.1
Output current*	$V_{in\,min} - V_{in\,max}$	±25mA	—	±250mA	±10.4mA	—	±104mA	±8.3mA	—	±83mA
Efficiency	P_{out} = max rated load	71%	77%	—	81%	85%	—	81%	86%	—
Line regulation	P_{out} = max rated load $V_{in\,min} - V_{in\,max}$	—	±10mV	±250mV	—	±20mV	±100mv	—	±25mV	±250mV
Load regulation†	P_{out} - 10% to F.L.	—	±50mV	±300mV	—	±250mV	±0.5V	—	±0.3V	±0.6V
Output ripple	F.L. BW 2 MHz mV_{pp}	—	40	85	—	60	150	—	75	180

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

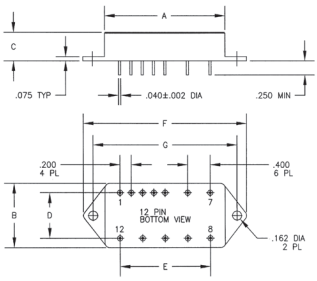
28 VDC



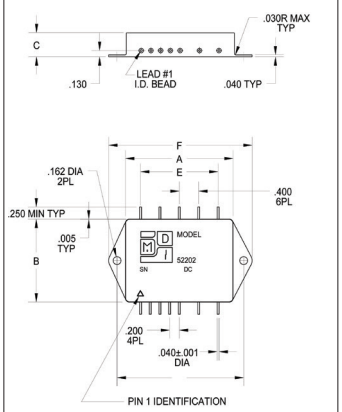
FULLY ISOLATED

TRIPPLE OUTPUT DEVICES		4690-T05 (2.5W)			4690-T12 (2.5W)			4690-T15 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+4.9 +4.9 -4.9	+5.0 +5.0 -5.0	+5.1 +5.1 -5.1	+4.9 +11.9 -11.9	+5.0 +12.0 -12.0	+5.1 +12.1 -12.1	+4.9 +14.9 -14.9	+5.0 +15.0 -15.0	+5.1 +15.1 -15.1
Output current	$V_{in\,min} - V_{in\,max}$	30ma ±20mA	— —	250mA ±125mA	30mA ±20mA	— —	250mA ±52mA	30mA ±20mA	— —	250mA ±42mA
Efficiency	P_{out} = max rated load	65%	70%	—	72%	77%	—	73%	78%	—
Line regulation	P_{out} = max rated load $V_{in\,min} - V_{in\,max}$	— —	10mV 100mV	50mV 200mV	— —	10mV 100mV	50mV 200mV	— —	10mV 100mV	50mV 200mV
Load regulation	P_{out} = 10% to F.L.	— —	10mV 100mV	50mV 200mV	— —	10mV 100mV	50mV 200mV	— —	10mV 100mV	50mV 200mV
Output ripple	F.L. BW 2 MHz mV_{pp}	— —	40 —	85 50	— —	40 —	85 50	— —	40 —	85 50

CASE STYLE 6



CASE STYLE 8



4690-SXX output<24 VDC				4690-SXX output ≥ 24 VDC				4690-DXX				4690-TXX			
Pin 1	bit	Pin 7	+input	Pin 1	bit	Pin 7	+input	Pin 1	bit	Pin 7	+input	Pin 1	bit	Pin 7	+input
Pin 2	inhibit not	Pin 8	main output	Pin 2	inhibit not	Pin 8	N/C	Pin 2	inhibit not	Pin 8	N/C	Pin 2	inhibit not	Pin 8	main output
Pin 3	soft start	Pin 9	main output ret	Pin 3	soft start	Pin 9	N/C	Pin 3	soft start	Pin 9	N/C	Pin 3	soft start	Pin 9	main output ret
Pin 4	sync	Pin 10	N/C	Pin 4	sync	Pin 10	main output	Pin 4	sync	Pin 10	+dual output	Pin 4	sync	Pin 10	+dual output
Pin 5	case	Pin 11	N/C	Pin 5	case	Pin 11	N/C	Pin 5	case	Pin 11	dual output ret	Pin 5	case	Pin 11	dual output ret
Pin 6	input ret	Pin 12	N/C	Pin 6	input ret	Pin 12	main output ret	Pin 6	input ret	Pin 12	-dual output	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

L 45 KRAD, +85°C military/aerospace

S 100 KRAD, +85°C space

LE 45 KRAD, +125°C Military/aerospace

SE 100 KRAD, +125°C space

Revised 2023-06-06