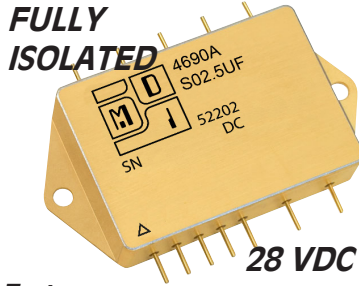


# Series 4690A

## Proton Rad Hard 100K + <sup>®</sup> DC – DC Converters



### Features

- Rad Hard: TID > 100 kRad (Si)
- No SEE: LET > 82MeV\*cm<sup>2</sup>/mg
- GaN FET for higher efficiency
- 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 <800µA
- 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

### Specifications

**INPUT:** 28 VDC nominal  
**Range:** 16 to 40 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\*cm<sup>2</sup>/mg

**WEIGHT:** 50 grams typical

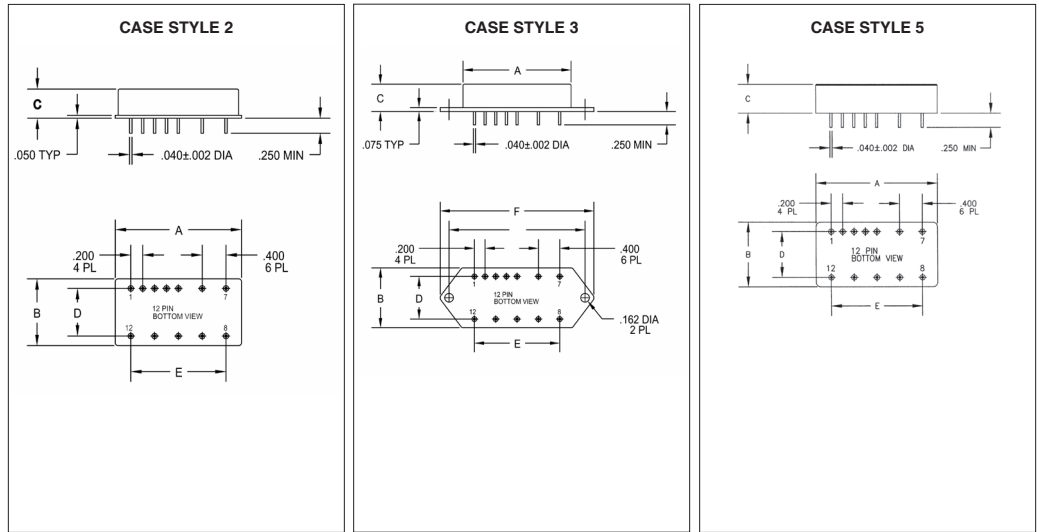
### Note:

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

SINGLE OUTPUT DEVICES		4690A-S02 (2.5W)			4690A-S02.5 (2.5W)			4690A-S03.3 (2.5W)			4690A-S05 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	F.L.	+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	100mA	—	1A	75mA	—	0.75A	50mA	—	0.50A
Efficiency	$P_{out} = \text{max rated load}$	60%	66%	—	62%	68%	—	67%	69%	—	73%	77%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	50mV	100mV	—	62mV	125mV	—	75mV	250mV	—	0.1V	0.2V
Output Ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	30	65	—	30	100	—	40	125

SINGLE OUTPUT DEVICES		4690A-S05.2 (2.5W)			4690A-S12 (2.5W)			4690A-S15 (2.5W)			4690A-S28 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	F.L.	+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
Efficiency	$P_{out} = \text{max rated load}$	73%	77%	—	80%	85%	—	80%	86%	—	80%	86%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	50mV	100mV	—	50mV	200mV	—	50mV	200mV	—	100mV	400mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	0.1V	0.2V	—	0.25V	0.5V	—	0.3V	0.6V	—	600mV	1.2V
Output Ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	40	85	—	60	150	—	75	180	—	150	350

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



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

### Case Dimensions

Units: inches | millimeters

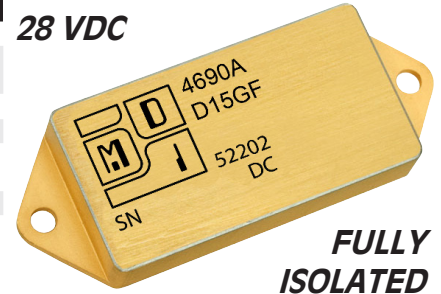
Case Style	A	B	C	D	E	F	G
2	2.130   54.102	1.120   28.448	0.375   9.525	0.800   20.320	1.600   40.640	—   —	—   —
3 F	2.130   54.102	1.120   28.448	0.375   9.525	0.800   20.320	1.600   40.640	2.890   73.406	2.550   64.770
5 G	2.130   54.102	1.120   28.448	0.375   9.525	0.800   20.320	1.600   40.640	—   —	—   —
6 GF	2.130   54.102	1.120   28.448	0.375   9.525	0.900   20.320	1.600   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

# Series 4690A

## 2.5 Watt Hybrid

DUAL OUTPUT DEVICES		4690A-D05 (2.5W)			4690A-D12 (2.5W)			4690A-D15 (2.5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$V_{out} = -I_{out}$ F.L.	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1
		-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1
Output current*	$V_{in, min} - V_{in, max}$	±25mA			±10.4mA			±8.3mA		
Efficiency	$P_{out} = \text{max rated load}$	73%	77%	—	80%	85%	—	80%	86%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in, min} - V_{in, max}$	±50mV ±100mV			±100mV ±200mV			±50mV ±200mV		
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 <sub>pp</sub>	—	40	125	—	60	150	—	75	180

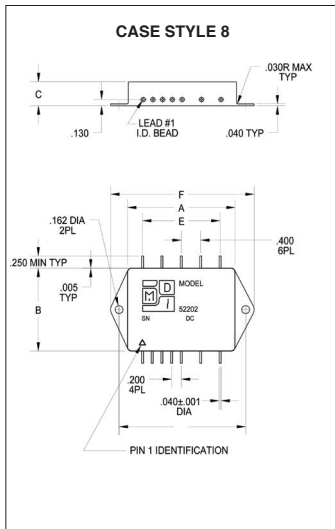
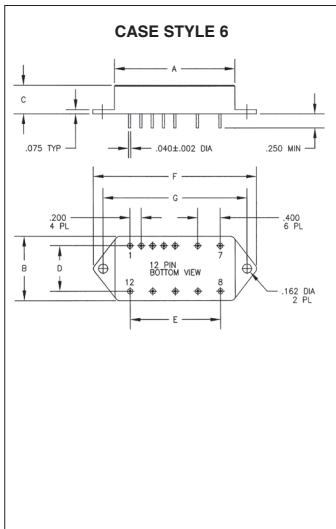
28 VDC



**FULLY ISOLATED**

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

TRIPLE OUTPUT DEVICES		4690A-3.3/5 (2.5W)			4690A-3.3/12 (2.5W)			4690A-3.3/15 (2.5W)			4690A-T05 (2.5W)			4690A-T12 (2.5W)			4690A-T15 (2.5W)						
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX				
Output voltage	$V_{out} = -I_{out}$ F.L.	+3.2	+3.3	+3.4	+3.2	+3.3	+3.4	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1	+4.9	+5.0	+5.1	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1	
		-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1	-4.9	-5.0	-5.1	-11.9	-12.0	-12.1	-14.9	-15.0	-15.1				
Output current	$V_{in, min} - V_{in, max}$	40mA	—	380mA	40mA	—	380mA	40mA	—	380mA	30mA	—	250mA	30mA	—	250mA	30mA	—	250mA	30mA	—	250mA	
Efficiency	$P_{out} = \text{max rated load}$	60%	63%	—	61%	64%	—	61%	64%	—	61%	64%	—	65%	70%	—	65%	70%	—	65%	70%	—	
Line regulation	$P_{out} = \text{max rated load}$ $V_{in, min} - V_{in, max}$	Main	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV	—	50mV	100mV
		Aux	—	25mV	50mV	—	25mV	250mV	—	25mV	250mV	—	100mV	200mV	—	100mV	200mV	—	100mV	200mV	—	100mV	200mV
Load regulation	$P_{out} = 10\%$ to F.L.	Main	—	25mV	250mV	—	50mV	100mV	—	50mV	100mV	—	100mV	200mV	—	100mV	200mV	—	100mV	200mV	—	100mV	200mV
		Aux	—	50mV	100mV	—	75mV	150mV	—	80mV	160mV	—	50mV	100mV	—	75mV	150mV	—	80mV	160mV	—	80mV	160mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	Main	—	30	100	—	30	100	—	30	100	—	40	125	—	40	125	—	40	125	—	40	125
		Aux	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50



4690A-SXX output < 24 VDC			4690A-SXX output ≥ 24 VDC			4690A-DXX			4690A-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      **LE** 45 KRAD, +125°C Military/aerospace  
**S** 100 KRAD, +85°C space      **SE** 100 KRAD, +125°C space