

# 3.25-6.5 Watt Hybrid

## Features

- Specifically designed for redundant or individual military or aerospace applications
- Completely self contained Thick Film Hybrid DC-DC Converter
- No external filter caps required
- Fully isolated design
- "Inhibit-not" function
- Power on soft start
- 300 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  
 18 to 50 VDC full power  
 Survives 80 V transients/MIL-STD-704A

### 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  
 Grade M:

Full Power Output at  $T_{case} = +85^{\circ}C$   
 Linearly derates to zero at  $T_{case} = +115^{\circ}C$   
 Grade E:

Full Power Output at  $T_{case} = +125^{\circ}C$   
 Linearly derates to zero at  $T_{case} = +135^{\circ}C$

**WEIGHT:** 50 grams typical

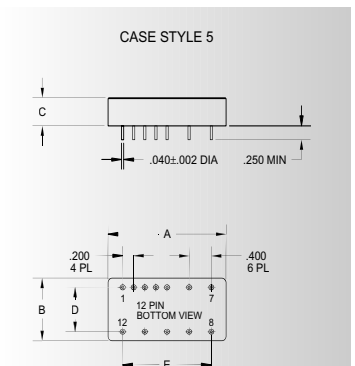
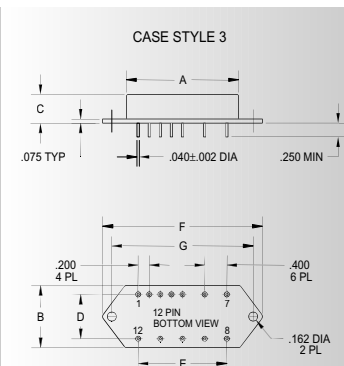
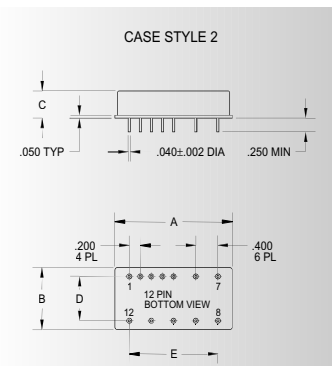
### Note

Series 6690 is recommended over 2690 for new designs ("Inhibit not" function yields a higher level of noise immunity).

SINGLE OUTPUT DEVICES		6690-S03.3 (6.5W)			6690-S05 (6.5W)			6690-S05.2 (6.5W)			6690-S12 (6.5W)		
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	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1
Output current	$V_{in\ min} - V_{in\ max}$	—	—	1.97A	—	—	1.3A	—	—	1.25A	—	—	541mA
Efficiency	$P_{out} = \text{max rated load}$	65%	68%	—	70%	73%	—	70%	73%	—	77%	81%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	10mV	30mV	—	10mV	50mV	—	10mV	50mV	—	20mV	100mV
Load regulation	$P_{out} = 10\%$ to F.L.	—	10mV	30mV	—	10mV	50mV	—	10mV	50mV	—	20mV	100mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	40	85	—	40	85	—	60	150

SINGLE OUTPUT DEVICES		6690-S15 (6.5W)			6690-S28 (6.5W)								
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX						
Output voltage	—	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2						
Output current	$V_{in\ min} - V_{in\ max}$	—	—	433mA	—	—	232mA						
Efficiency	$P_{out} = \text{max rated load}$	78%	82%	—	77%	81%	—						
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	25mV	125mV	—	50mV	250mV						
Load regulation	$P_{out} = 10\%$ to F.L.	—	25mV	125mV	—	50mV	250mV						
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	75	180	—	150	350						

Model No.	Case Style	Pin Count	Mounting
6690	2	12	Solder Sealed Flangeless PCB Mount
6690	F	3	Solder Sealed PCB Mount with Flange
6690	G	5	Seam Weld Flangeless PCB Mount
6690	GF	6	Seam Weld PCB Mount with Flange
6690	UF	8	Seam Weld Chassis Mount with Flange



TOLERANCES: ALL DIMENSIONS ±0.01 EXCEPT F = MAX, C = +0.01/-0.02; DRAWINGS 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	0.800	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

# DC-DC CONVERTERS

## FULL FEATURE SERIES

# 6690



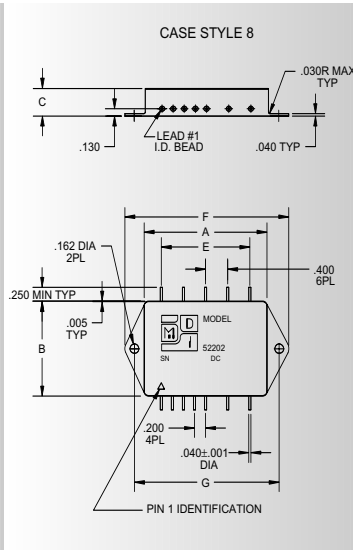
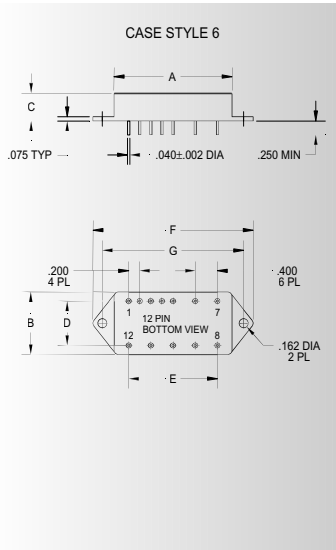
## 28 VDC

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DUAL OUTPUT DEVICES		6690-D05 (6.5W)			6690-D12 (6.5W)			6690-D15 (6.5W)		
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*	$V_{in min} - V_{in max}$	±35mA	—	±625mA	±35mA	—	±270mA	±32mA	—	±217mA
Efficiency	$P_{out} = \text{max rated load}$	72%	75%	—	77%	81%	—	78%	82%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in min} - V_{in max}$	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Load regulation†	$P_{out} = 10\%$ to F.L.	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	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.

TRIPLE OUTPUT DEVICES		6690-T3.3/5 (3.75W)			6690-T3.3/12 (5W)			6690-T3.3/15 (5W)			6690-T05 (3.75W)			6690-T12 (5W)			6690-T15 (5W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+3.2 +4.9 -4.9	+3.3 +5.0 -5.0	+3.4 +5.1 -5.1	+3.2 +11.9 -11.9	+3.3 +12.0 -12.0	+3.4 +12.1 -12.1	+3.2 +14.9 -14.9	+3.3 +15.0 -15.0	+3.4 +15.1 -15.1	+4.9 +4.9 -4.9	+5.0 +5.0 -5.0	+5.1 +5.1 -5.1	+11.9 +11.9 -11.9	+12.0 +12.0 -12.0	+12.1 +12.1 -12.1	+14.9 +14.9 -14.9	+15.0 +15.0 -15.0	+15.1 +15.1 -15.1
Output current	$V_{in min} - V_{in max}$	75mA ±20mA	—	750mA ±150mA	75mA ±20mA	—	750mA ±105mA	75mA ±20mA	—	750mA ±83mA	60mA ±20mA	—	500mA ±150mA	60mA ±20mA	—	500mA ±105mA	60mA ±20mA	—	500mA ±83mA
Efficiency	$P_{out} = \text{max rated load}$	65%	68%	—	65%	68%	—	65%	68%	—	65%	68%	—	70%	73%	—	70%	73%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in min} - V_{in max}$	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV
Load regulation	$P_{out} = 10\%$ to F.L.	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV	—	10mV 25mV	50mV 50mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	30	65	—	30	65	—	40	85	—	40	85	—	40	85



6690-SXX output <24 VDC				6690-SXX output ≥24 VDC				6690-DXX				6690-TXX			
Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function	Pin	Function
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	N/C	Pin 11	adjust	Pin 5	N/C	Pin 11	N/C	Pin 5	N/C	Pin 11	dual output ret	Pin 5	N/C	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. Industrial grade units will be shipped if no option is specified.

- M** +85°C military
- E** +125°C military