

# Series 1680

## 12 – 30 Watt Hybrid

For demanding industrial applications not requiring military specifications

### Features

- Hermetic packaging protects against harsh environments
- Built-in EMI filter limits conducted emissions and reduces transient susceptibility
- Short circuit proof – inherent dual mode overcurrent protection
- Fixed frequency operation offers low ripple and fast load transient response
- User programmable soft start for Vout ramp
- Sync input
- Power on/off – ground INH to shut output: low quiescent current
- Precision RF feedback – no optical devices used
- Parallelable – for higher output prime or redundant power applications

### Specifications

**INPUT:** 24 VDC nominal  
Range: 18 to 50 VDC  
Operates through input transients of up to 80 V

### ISOLATION:

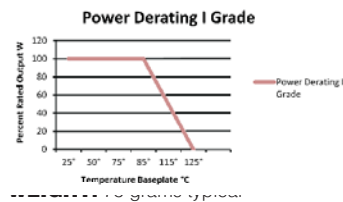
Input to case: 100 MOhms at 500 VDC  
Input to output: 100 MOhms at 500 VDC  
Output to case: 10 MOhms at 100 VDC

### ENVIRONMENT:

Storage temperature: -55°C to +150°C  
Mechanical Shock: 50 G's, 11 mSec 1/2 sine pulse, 3X each axis  
Random Vibration: 30 G's 50 – 2000Hz, 6dB/octave ramp, .6 PSD, 32g RMS overall

### DERATING:

Full Power Output at  $T_{case} = +85^{\circ}C$   
Linearly derates to 50% at  $T_{case} = +115^{\circ}C$

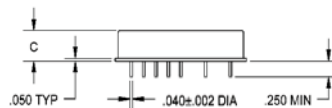


SINGLE OUTPUT DEVICES		1680-S02 (12W)			1680-S02.5 (15W)			1680-S03.3 (20W)			1680-S05 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+1.9	+2.0	+2.1	+2.4	+2.5	+2.6	+3.2	+3.3	+3.4	+4.9	+5.0	+5.1
Output current	$V_{in min} - V_{in max}$	—	—	6.06A	—	—	6.06A	—	—	6.06A	—	—	6A
Efficiency	$P_{out} = \text{max rated load}$	56%	59%	—	61%	64%	—	66%	69%	—	71%	74%	—
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 <sub>pp</sub>	—	25	50	—	30	60	—	30	65	—	40	85

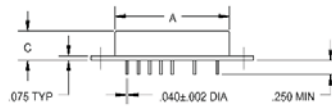
SINGLE OUTPUT DEVICES		1680-S05.2 (30W)			1680-S12 (30W)			1680-S15 (30W)			1680-S28 (30W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+5.1	+5.2	+5.3	+11.9	+12.0	+12.1	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2
Output current	$V_{in min} - V_{in max}$	—	—	5.76A	—	—	2.5A	—	—	2A	—	—	1.07A
Efficiency	$P_{out} = \text{max rated load}$	71%	74%	—	78%	82%	—	75%	80%	—	78%	82%	—
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 <sub>pp</sub>	—	40	85	—	60	150	—	75	180	—	150	350

Model No.	Case Style	Pin Count	Mounting
1680	2	12	Solder Sealed Flangeless PCB Mount
1680	F	12	Solder Sealed PCB Mount with Flange
1680	WF	12	Seam Weld Chassis Mount with Flange
1680	PB	10	Solder Sealed Flangeless PCB Stud Mount

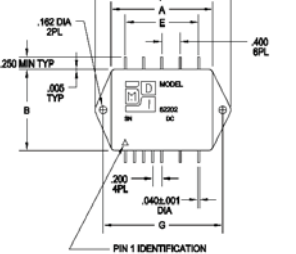
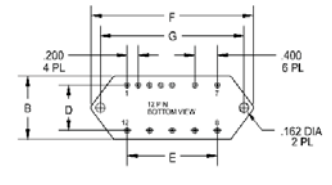
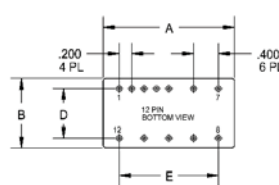
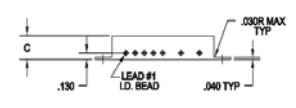
CASE STYLE 2  
Solder Sealed  
Flangeless PCB Mount



CASE STYLE 3  
Solder Sealed  
PCB Mount with Flange



CASE STYLE 8  
Seam Welded  
Chassis Mount with Flange



### 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	F	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
8	WF	2.225   56.515	1.710   43.434	0.495   12.573	—   —	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	1.600   40.640	—   —	—   —



# Series 1680

## INDUSTRIAL GRADE

## DC – DC Converters

24 Volts DC Input



DUAL OUTPUT DEVICES		1680-D3.3/5 (14.9W)			1680-D05 (30W)			1680-D12 (30W)			1680-D15 (30W)		
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*	$V_{in\ min} - V_{in\ max}$	300mA	—	3A	±150mA	—	±3A	±95mA	—	±1.25A	±76mA	—	±1A
Efficiency	$P_{out} = \text{max rated load}$	63%	66%	—	72%	76%	—	78%	82%	—	79%	83%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
		—	10mV	50mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Load regulation <sup>1</sup>	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	30mV	—	±10mV	±50mV	—	±20mV	±100mV	—	±25mV	±125mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	40	85	—	60	150	—	75	180
		—	25	50	—	—	—	—	—	—	—	—	—

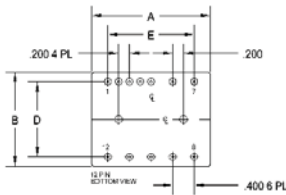
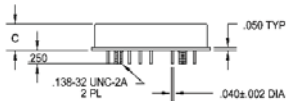
Notes: \*Up to 90% full power available from either output if rated output power is not exceeded; <sup>1</sup>balanced load conditions.

TRIPLE OUTPUT DEVICES		1680-T3.3/5 (12.5W)			1680-T3.3/12 (17.5W)			1680-T3.3/15 (17.5W)			1680-T05 (12.5W)			1680-T12 (17.5W)			1680-T15 (17.5W)		
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	+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	+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
Output current	$V_{in\ min} - V_{in\ max}$	300mA	—	3A	300mA	—	3A	300mA	—	3A	90mA	—	2A	90mA	—	2A	90mA	—	2A
		±40mA	—	±250mA	±40mA	—	±312mA	±32mA	—	±250mA	±40mA	—	±250mA	±40mA	—	±312mA	±32mA	—	±250mA
Efficiency	$P_{out} = \text{max rated load}$	66%	69%	—	66%	69%	—	66%	69%	—	66%	69%	—	71%	74%	—	71%	74%	—
Line regulation	$P_{out} = \text{max rated load}$ $V_{in\ min} - V_{in\ max}$	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV
		—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV
Load regulation	$P_{out} = 10\% \text{ to F.L.}$	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV
Output ripple	F.L. BW 2 MHz mV <sub>pp</sub>	—	30	65	—	30	65	—	30	65	—	40	85	—	40	85	—	40	85
		—	—	50	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50

### CASE STYLE 10

Solder Sealed

Flangeless PCB Stud Mount



1680-SXX output < 24 VDC		1680-SXX output ≥ 24 VDC		1680-DXX		1680-TXX	
Pin 1 N/C	Pin 7 + Input	Pin 1 N/C	Pin 7 + Input	Pin 1 N/C	Pin 7 + Input	Pin 1 N/C	Pin 7 + Input
Pin 2 Inhibit Not	Pin 8 Main Output	Pin 2 Inhibit Not	Pin 8 + Remote Sense	Pin 2 Inhibit Not	Pin 8 + Remote Sense	Pin 2 Inhibit Not	Pin 8 Main Output
Pin 3 Soft Start	Pin 9 Main Output Ret	Pin 3 Soft Start	Pin 9 - Remote Sense	Pin 3 Soft Start	Pin 9 - Remote Sense	Pin 3 Soft Start	Pin 9 Main Output Ret
Pin 4 Sync	Pin 10 + Remote Sense	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 Adjust	Pin 11 N/C	Pin 5 Adjust	Pin 11 Dual Output Ret	Pin 5 N/C	Pin 11 Dual Output Ret
Pin 6 Input Ret	Pin 12 - Remote Sense	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



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