

# 19.5-40 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" 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  
 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  $T_{case} = +115^{\circ}C$

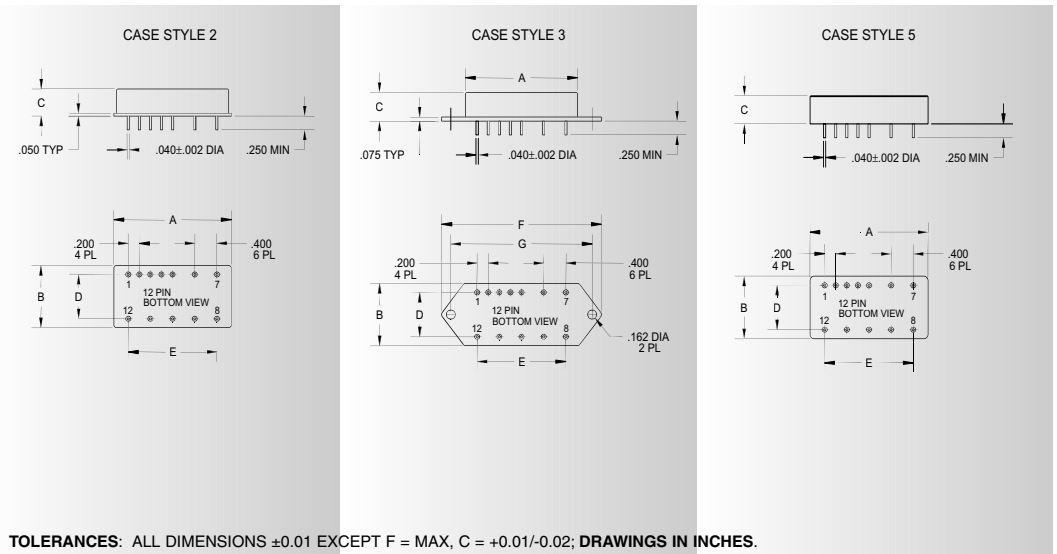
Grade E:  
 Full Power Output at  $T_{case} = +125^{\circ}C$   
 Linearly derates to zero at  $T_{case} = +135^{\circ}C$

**WEIGHT:** 90 grams typical

SINGLE OUTPUT DEVICES		3193-S03.3 (26.4W)			3193-S05 (40W)			3193-S05.2 (40W)			3193-S12 (40W)		
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	$V_{in\ min} - V_{in\ max}$	—	—	8A	—	—	8A	—	—	7.69A	—	—	3.33A
Efficiency	$P_{out} = \text{max rated load}$	67%	70%	—	72%	75%	—	72%	75%	—	79%	83%	—
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		3193-S15 (40W)			3193-S28 (40W)								
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX						
Output voltage	—	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2						
Output current	$V_{in\ min} - V_{in\ max}$	—	—	2.67A	—	—	1.43A						
Efficiency	$P_{out} = \text{max rated load}$	80%	84%	—	79%	83%	—						
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
3193	2	12	Solder Sealed Flangeless PCB Mount
3193	F	3	Solder Sealed PCB Mount with Flange
3193	J	5	Seam Weld Flangeless PCB Mount
3193	JF	6	Seam Weld PCB Mount with Flange
3193	XF	8	Seam Weld Chassis Mount with Flange
3193	PC	10	Solder Sealed Flangeless PCB Stud Mount



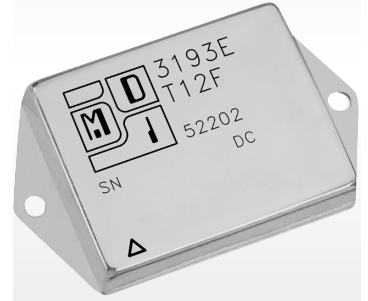
## Case Dimensions

Units: inches | millimeters

Case Style	A	B	C	D	E	F	G
2	2.200   55.880	1.750   44.450	0.495   12.573	1.400   35.560	1.600   40.640	—   —	—   —
3 F	2.200   55.880	1.750   44.450	0.495   12.573	1.400   35.560	1.600   40.640	2.960   75.184	2.610   66.294
5 J	2.225   56.515	1.750   44.450	0.495   12.573	1.400   35.560	1.600   40.640	—   —	—   —
6 JF	2.225   56.515	1.750   44.450	0.495   12.573	1.400   35.560	1.600   40.640	2.960   75.184	2.610   66.294
8 XF	2.225   56.515	2.100   53.340	0.495   12.573	—   —	1.600   40.640	2.960   75.184	2.610   66.294
10 PC	2.225   56.515	1.750   44.450	0.495   12.573	1.400   35.560	1.600   40.640	—   —	—   —

# DC-DC CONVERTERS

# FULL FEATURE SERIES 3193



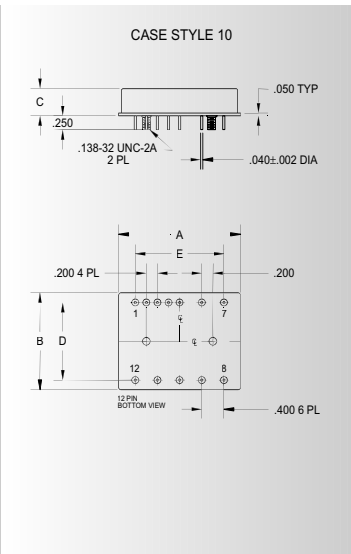
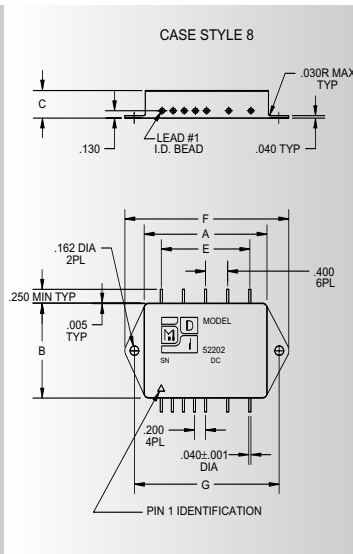
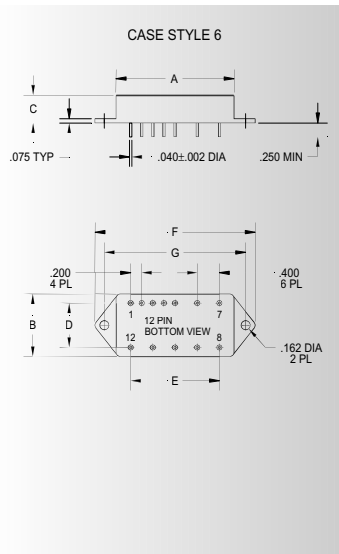
**28 VDC**

DUAL OUTPUT DEVICES		3193-D05 (40W)			3193-D12 (40W)			3193-D15 (40W)		
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*	$V_{in min} - V_{in max}$	±150mA	—	±4A	±95mA	—	±1.67A	±76mA	—	±1.33A
Efficiency	$P_{out} = \text{max rated load}$	73%	77%	—	79%	83%	—	80%	84%	—
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		3193-T3.3/5 (17.7W)			3193-T3.3/12 (24W)			3193-T3.3/15 (25.2W)			3193-T05 (19.5W)			3193-T12 (25.8W)			3193-T15 (27W)		
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	+3.3 -5.0	+3.4 -5.1	+3.2 -11.9	+3.3 -12.0	+3.4 -12.1	+3.2 -14.9	+3.3 -15.0	+3.4 -15.1	+4.9 -4.9	+5.0 -5.0	+5.1 -5.1	+4.9 -11.9	+5.0 -12.0	+5.1 -12.1	+4.9 -14.9	+5.0 -15.0	+5.1 -15.1
Output current	$V_{in min} - V_{in max}$	400mA ±40mA	—	4A ±450mA	400mA ±40mA	—	4A ±450mA	400mA ±32mA	—	4A ±400mA	90mA ±40mA	—	3A ±450mA	90mA ±40mA	—	3A ±450mA	90mA ±32mA	—	3A ±400mA
Efficiency	$P_{out} = \text{max rated load}$	67%	70%	—	67%	70%	—	67%	70%	—	67%	70%	—	72%	75%	—	72%	75%	—
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
Load regulation	$P_{out} = 10\%$ 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

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3193-SXX output <24 VDC			3193-SXX output ≥24 VDC			3193-DXX			3193-TXX		
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 2	inhibit	Pin 8	main output	Pin 2	inhibit	Pin 8	N/C	Pin 2	inhibit	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	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 5	N/C	Pin 11	adjust	Pin 5	N/C	Pin 11	N/C	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

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