

19.5-40 Watt Hybrid

Features

- Rad Hard: TID > 100kRad(Si)
- 2:1 margin: Operates beyond 200kRad TID
- No SEE: LET > 82MeV*cm²/mg
- Proton Resistant: No optocouplers used
- Specifically designed for redundant or individual space 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
- 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

Grades EU, L, R & S:

Full Power Output at T_{case} = +85°C
 Linearly derates to zero at T_{case} = +115°C
 Grades LE, RE & SE:

Full Power Output at T_{case} = +125°C
 Linearly derates to zero at T_{case} = +135°C

Grades L & LE:

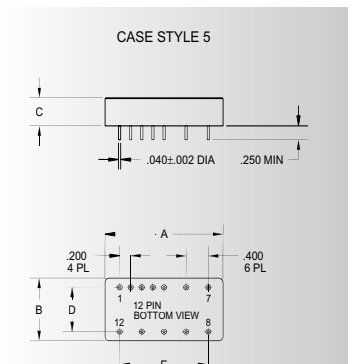
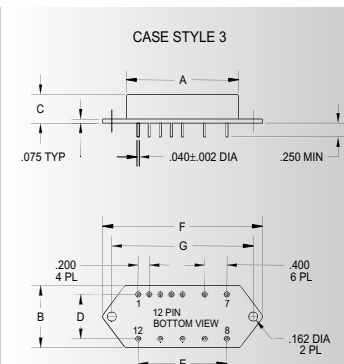
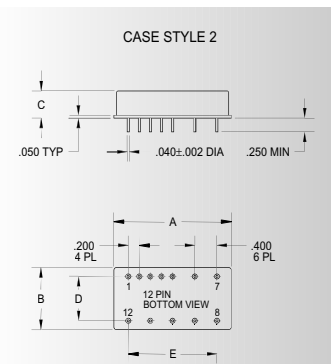
TID up to 45kRad(Si)
 No SEE up to 60MeV*cm²/mg

WEIGHT: 90 grams typical

SINGLE OUTPUT DEVICES		5193-S03.3 (26.4W)			5193-S05 (40W)			5193-S05.2 (40W)			5193-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} = max rated load	66%	69%	—	69%	73%	—	71%	74%	—	78%	82%	—
Line regulation	P _{out} = 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 _{pp}	—	30	65	—	40	85	—	40	85	—	60	150

SINGLE OUTPUT DEVICES		5193-S15 (40W)			5193-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} = max rated load	79%	83%	—	78%	82%	—						
Line regulation	P _{out} = 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 _{pp}	—	75	180	—	150	350						

Model No.	Case Style	Pin Count	Mounting
5193	2	12	Solder Sealed Flangeless PCB Mount
5193	F	12	Solder Sealed PCB Mount with Flange
5193	J	12	Seam Weld Flangeless PCB Mount
5193	JF	12	Seam Weld PCB Mount with Flange
5193	XF	12	Seam Weld Chassis Mount with Flange
5193	PC	10	Solder Sealed Flangeless PCB Stud Mount



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

Case Dimensions

Units: inches | millimeters

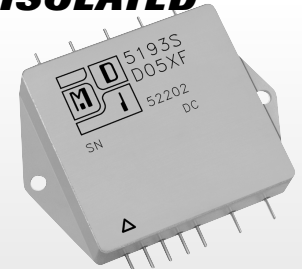
Case Style	A	B	C	D	E	F	G
2	2.205 56.007	1.755 44.577	0.495 12.573	1.400 35.560	1.600 40.640	— —	— —
3 F	2.205 56.007	1.755 44.577	0.495 12.573	1.400 35.560	1.600 40.640	2.960 75.184	2.610 66.294
5 J	2.205 56.007	1.755 44.577	0.495 12.573	1.400 35.560	1.600 40.640	— —	— —
6 JF	2.220 56.388	1.760 44.704	0.495 12.573	1.400 35.560	1.600 40.640	2.960 75.184	2.610 66.294
8 XF	2.220 56.388	2.110 53.594	0.495 12.573	— —	1.600 40.640	2.960 75.184	2.610 66.294
10 PC	2.220 56.388	1.760 44.704	0.495 12.573	1.400 35.560	1.600 40.640	— —	— —

DC-DC CONVERTERS

PROTON RAD HARD 100K+™ SERIES

5193

MAGNETICALLY ISOLATED



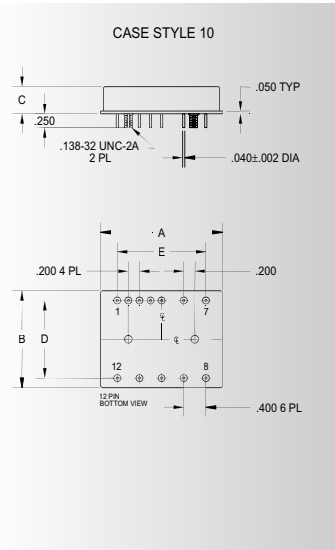
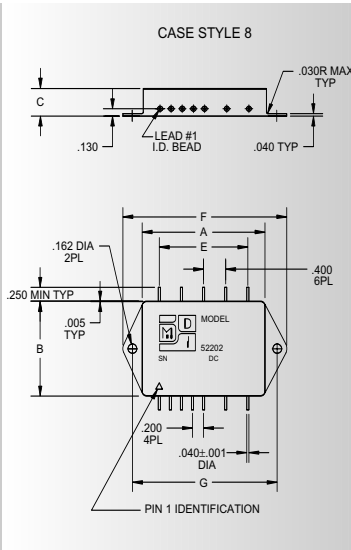
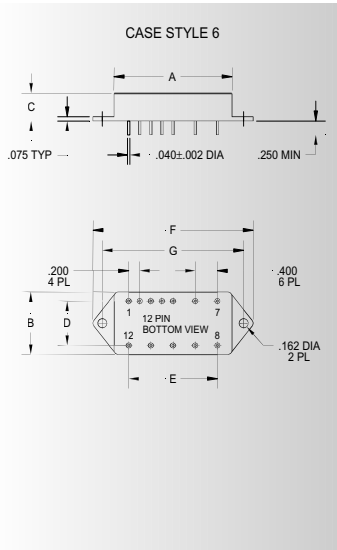
28 VDC

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DUAL OUTPUT DEVICES		5193-D05 (40W)			5193-D12 (40W)			5193-D15 (40W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	$+I_{out} = -I_{out}$	+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*	$V_{in min} - V_{in max}$	±150mA	—	±4A	±95mA	—	±1.67A	±76mA	—	±1.33A
Efficiency	$P_{out} = \text{max rated load}$	73%	76%	—	78%	82%	—	79%	83%	—
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 _{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.

TRIPLE OUTPUT DEVICES		5193-T3.3/5 (17.7W)			5193-T3.3/12 (24W)			5193-T3.3/15 (25.2W)			5193-T05 (19.5W)			5193-T12 (25.8W)			5193-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	+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	$V_{in min} - V_{in max}$	400mA	—	4A	400mA	—	4A	400mA	—	4A	90mA	—	3A	90mA	—	3A	90mA	—	3A
		±40mA	—	±450mA	±40mA	—	±450mA	±32mA	—	±400mA	±40mA	—	±450mA	±40mA	—	±450mA	±32mA	—	±400mA
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	$P_{out} = 10\%$ to F.L.	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV	—	10mV	50mV
		—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV	—	25mV	50mV
Output ripple	F.L. BW 2 MHz mV _{pp}	—	30	65	—	30	65	—	30	65	—	40	85	—	40	85	—	40	85
		—	—	50	—	—	50	—	—	50	—	—	50	—	—	50	—	—	50



5193-SXX output <24 VDC

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	main output
Pin 3	soft start	Pin 9	main output ret
Pin 4	sync	Pin 10	+ remote sense
Pin 5	N/C	Pin 11	adjust
Pin 6	input ret	Pin 12	- remote sense

5193-SXX output ≥24 VDC

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	+ remote sense
Pin 3	soft start	Pin 9	- remote sense
Pin 4	sync	Pin 10	main output
Pin 5	adjust	Pin 11	N/C
Pin 6	input ret	Pin 12	main output ret

5193-DXX

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	+ remote sense
Pin 3	soft start	Pin 9	- remote sense
Pin 4	sync	Pin 10	+ dual output
Pin 5	adjust	Pin 11	dual output ret
Pin 6	input ret	Pin 12	- dual output

5193-TXX

Pin 1	bit	Pin 7	+ input
Pin 2	inhibit not	Pin 8	main output
Pin 3	soft start	Pin 9	main output ret
Pin 4	sync	Pin 10	+ dual output
Pin 5	N/C	Pin 11	dual output ret
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
R 100 K+™, +85°C military/aerospace

RE 100 K+™, +125°C military/aerospace
S 100 K+™, +85°C space

SE 100 K+™, +125°C space

L 45 K, +85°C military/aerospace

LE 45 K, +125°C military/aerospace