19.5–40 Watt Hybrid

Features

- Rad Hard: TID > 100kRad(Si)
- 2:1 margin: Operates beyond 200kRad TID
- No SEE: LET > 82MeV*cm^2/mg
- Proton Resistant: No optocouplers used
- Specifically engineered for 50 VDC satellite bus
- 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

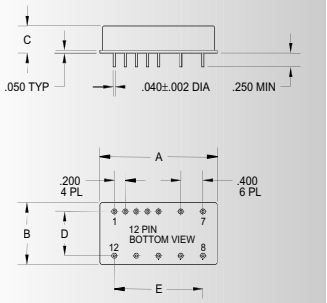
INPUT: 50 VDC nominal
Range: 30 to 75 VDC continuous
ISOLATION:
Input to case: 500 VDC
Input to output: 500 VDC
Output to case: 100 VDC
ENVIRONMENT:
Storage temperature: -55°C to +150°C
Shock: 50 G's
Acceleration: 500 G's
Vibration: 30 G's
Grades EU, L, & S:
Full Power Output at T_{case} = +85°C
Linearly derates to zero at T_{case} = +115°C
Grades LE, & 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		7193-S03.3 (26.4W)			7193-S05 (40W)			7193-S05.2 (40W)			7193-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%	—	71%	74%	—	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

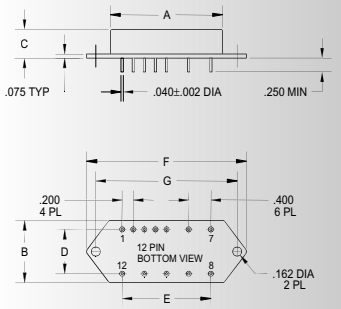
SINGLE OUTPUT DEVICES		7193-S15 (40W)			7193-S28 (40W)		
PARAMETER	CONDITION	MIN	TYP	MAX	MIN	TYP	MAX
Output voltage	—	+14.9	+15.0	+15.1	+27.8	+28.0	+28.2
Output current	$V_{in\ min}$ — $V_{in\ max}$	—	—	2.67A	—	—	1.43A
Efficiency	P_{out} = max rated load	79%	83%	—	78%	82%	—
Line regulation	P_{out} = 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
7193	2	12	Solder Sealed Flangeless PCB Mount
7193 F	3	12	Solder Sealed PCB Mount with Flange
7193 J	5	12	Seam Weld Flangeless PCB Mount
7193 JF	6	12	Seam Weld PCB Mount with Flange
7193 XF	8	12	Seam Weld Chassis Mount with Flange
7193 PC	10	12	Solder Sealed Flangeless PCB Stud Mount

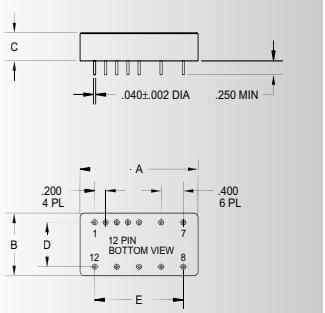
CASE STYLE 2



CASE STYLE 3



CASE STYLE 5



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	— | —	— | —

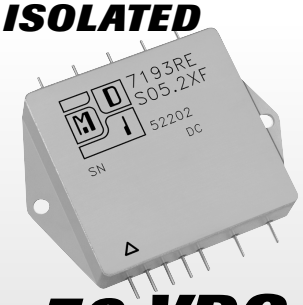
9006

DC-DC CONVERTERS
PROTON RAD HARD 100K+™ SERIES 7193

DUAL OUTPUT DEVICES		7193-D05 (40W)			7193-D12 (40W)			7193-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} = max rated load	73%	76%	—	78%	82%	—	79%	83%	—
Line regulation	P_{out} = 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.*

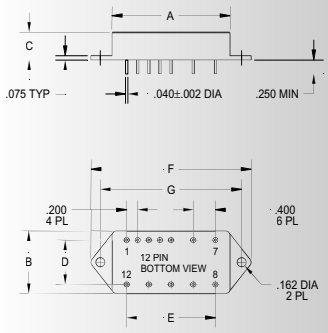
MAGNETICALLY ISOLATED



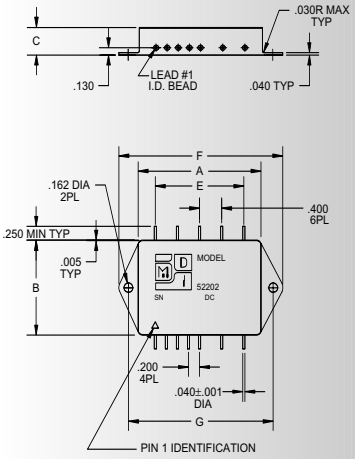
50 VDC

TRIPLE OUTPUT DEVICES		7193-T3.3/5 (17.5W)			7193-T3.3/12 (24W)			7193-T3.3/15 (25.2W)			7193-T05 (19.5W)			7193-T12 (25.8W)			7193-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 -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	+4.9 +11.9 -11.9	+5.0 +12.0 -12.0	+5.1 +12.1 -12.1	+4.9 +14.9 -14.9	+5.0 +15.0 -15.0	+5.1 +15.1 -15.1
Output current	$V_{in\ min}$ — $V_{in\ max}$	400mA ±40mA	— —	4A ±450mA	400mA ±40mA	— —	4A ±450mA	400mA ±32mA	— —	4A ±400mA	300mA ±40mA	— —	3A ±450mA	300mA ±40mA	— —	3A ±450mA	300mA ±32mA	— —	3A ±400mA
Efficiency	P_{out} = max rated load	66%	69%	—	66%	69%	—	66%	69%	—	66%	69%	—	71%	74%	—	71%	74%	—
Line regulation	P_{out} = 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_{pp}	— —	30 —	65 50	— —	30 —	65 50	— —	30 —	65 50	— —	40 —	85 50	— —	40 —	85 50	— —	40 —	85 50

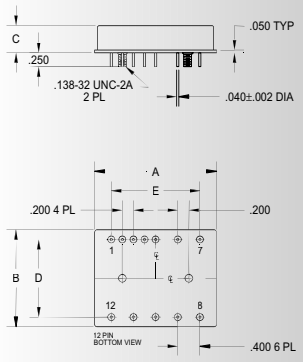
CASE STYLE 6



CASE STYLE 8



CASE STYLE 10



7193-SXX output <24 VDC				7193-SXX output ≥24 VDC				7193-DXX				7193-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	+ 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

Please specify **GRADE LEVEL** for your application. EU grade units will be shipped if no option is specified.

EU Engineering Units
L 45 K+™, +85°C military/aerospace
LE 45 K+™, +125°C military/aerospace
S 100 K+™, +85°C space
SE 100 K+™, +125°C space

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