### 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 L, R, & S:
  - Full Power Output at Tcase = +85°C
  - Linearity derates to zero at Tcase = +115°C
- Grades LE, RE & SE:
  - Full Power Output at Tcase = +125°C
  - Linearity derates to zero at Tcase = +135°C
- Grades L & LE:
  - TID up to 45kRad(Si)
- No SEE up to 60MeV·cm²/mg

**WEIGHT:**
- 90 grams typical

#### Table

**Model No.** | **Case Style** | **Pin Count** | **Mounting**
--- | --- | --- | ---
5193 | 2 | 12 | Solder Sealed Flangeless PCB Mount
5193 F | 3 | 12 | Solder Sealed PCB Mount with Flange
5193 J | 5 | 12 | Seam Weld Flangeless PCB Mount
5193 JF | 6 | 12 | Seam Weld PCB Mount with Flange
5193 XF | 8 | 12 | Seam Weld Chassis Mount with Flange
5193 PC | 10 | 12 | Solder Sealed Flangeless PCB Stud Mount

**TOLERANCES:**
- All dimensions ±0.01 except F = MAX, C = ±0.01/0.02; DRAWINGS IN INCHES.

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## DC-DC CONVERTERS

### PROTON RAD HARD 100K+™ SERIES

#### 5193

### MAGNETICALLY ISOLATED

#### 28 VDC

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### DUAL OUTPUT DEVICES

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CONDITION</th>
<th>5193-D05 (40W)</th>
<th>5193-D12 (40W)</th>
<th>5193-D15 (40W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>( V_{\text{OUT}} )</td>
<td>( +14.9 )</td>
<td>( +15.0 )</td>
<td>( +15.1 )</td>
</tr>
<tr>
<td>Output current</td>
<td>( I_{\text{OUT}} )</td>
<td>( +4.9 )</td>
<td>( -5.0 )</td>
<td>( -5.1 )</td>
</tr>
<tr>
<td>Efficiency</td>
<td>( \eta )</td>
<td>( 72% )</td>
<td>( 76% )</td>
<td>( 82% )</td>
</tr>
<tr>
<td>Load regulation</td>
<td>( P_{\text{out}} )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
<td>( +5.1 )</td>
</tr>
<tr>
<td>Output ripple</td>
<td>( \Delta V_{\text{out}} )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
<td>( +5.1 )</td>
</tr>
</tbody>
</table>

Notes: *Up to 90% full power available from either output if rated output power is not exceeded; †balanced load conditions.

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### TRIPLE OUTPUT DEVICES

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CONDITION</th>
<th>5193-T3.3/12 (24W)</th>
<th>5193-T3.3/15 (25.2W)</th>
<th>5193-T05 (19.5W)</th>
<th>5193-T12 (25.8W)</th>
<th>5193-T15 (27W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>( V_{\text{OUT}} )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
<td>( +5.1 )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
</tr>
<tr>
<td>Output current</td>
<td>( I_{\text{OUT}} )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
<td>( +5.1 )</td>
<td>( +4.9 )</td>
<td>( +5.0 )</td>
</tr>
<tr>
<td>Efficiency</td>
<td>( \eta )</td>
<td>( 66% )</td>
<td>( 69% )</td>
<td>( 69% )</td>
<td>( 66% )</td>
<td>( 69% )</td>
</tr>
</tbody>
</table>

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### Notes

- Please specify GRADE LEVEL for your application. EU grade units will be shipped if no option is specified.
- 5193-SXX output <24 VDC
- 5193-SXX output ≥24 VDC
- 5193-DXX
- 5193-TXX

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### Diagrams

- CASE STYLE 6
- CASE STYLE 8
- CASE STYLE 10

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### Pin Identification

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

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### Engineering Units

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

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