

MAIN FEATURES

- 90 – 264 V_{AC} Universal input voltage range
- 200 W rated power (260 W peak)
- 2 x 4 x 1.48" compact form factor (> 16.9 W/in³)
- High efficiency (up to 93.5%)
- No-load low power consumption (<0.3 W)
- 12, 24, and 48V_{DC} standard output variants
- Active PFC, EN61000-3-2 compliant
- Low earth leakage current (<300 μA)
- Over temperature protection, auto-recovery
- Output over voltage latch off protection
- Over load and short circuit hiccup protections
- 12 V Auxiliary, 0.5 A output
- Metallic protecting cage available option
- IEC safety installation Class I and Class II variants
- Certified according to the IEC/EN/UL 60950-1
- RoHS-6 compliant (EU directive 2011/65/EU)
- 4000 m altitude operation
- 5 years warranty (*)



(*) Warranty period relevant the "-PC" variants when operated below 190 V_{AC}, at >75 % load natural convection, is Three (3) years

DESCRIPTION

The DDP200 is a series of IT/Industrial grade power supplies designed to offer the high-power density and high efficiency that space constrained and power demanding systems need. Available in 12, 24 and 48 V_{DC} outputs, this series of high performance AC-DC power supplies provides up to 200 W steady output power with moving air, or 160 W with convection cooling over the full 90 – 264 V_{AC} universal input voltage range, all in a compact 2.00 x 4.00 x 1.44" open frame form factor. It is also available in a 2.44 x 4.61 x 1.57" enclosed package which provides operator protection during system servicing and enhanced thermal performance.

With 93.5% efficiency and extremely low 0.3 W power consumption at no-load, the DDP200 facilitates thermal management and equipment design, including compatibility with the latest environmental legislations. The DDP200 series meets the latest IEC/EN/UL 60950-1 safety standards, including the internationally recognized EMC standard EN55032 Class B specifications for conducted noise emissions, and EN55024 / EN 61000-6-2 for EMC immunity, making the series suitable for use in a wide range of IT/Industrial applications worldwide.

The series comes configured in the IEC protective Class I or Class II variants as a standard.

MARKET SEGMENTS AND APPLICATIONS

- Integrated Wireless Backhaul Mobile LTE-A, 5G
- Desktop 3D Scanners / Printers
- LED Signage / Lighting Systems
- Voice and Data Center Solution
- Fiber Optics Telecommunication Systems
- Video/Imaging Systems

MODEL CODING AND OUTPUT RATINGS

| Model and Output Power | Output Nominal Voltage | Package Options |
|------------------------|----------------------------|----------------------|
| ITE 200W: DDP200- | 12 V _{DC} : -US12 | Open Frame: -OF |
| | 24 V _{DC} : -US24 | |
| | 48 V _{DC} : -US48 | Protective Cage: -PC |



MODEL CODING AND OUTPUT RATINGS

| Model Number | Output Voltage V1 [V] | V1 Output Voltage Accuracy [%] | I1 Output Current Forced air [A] | I1 Output Current ¹ Convection [A] | V1 ² Ripple [mV] | V1 Typical Efficiency [%] | Fan Voltage V2 [V] | I2 ¹ Output current forced air [A] | I2 ¹ Output current Convection [A] |
|----------------|--------------------------|-----------------------------------|-------------------------------------|--|--------------------------------|------------------------------|-----------------------|--|--|
| DDP200-US12-OF | 12 | ±2 | 16.67 | 15.00 | 150 | 92 | 12 | 0.5 | 0.3 |
| DDP200-US24-OF | 24 | ±2 | 8.33 | 7.50 | 240 | 93.5 | 12 | 0.5 | 0.3 |
| DDP200-US48-OF | 48 | ±2 | 4.17 | 3.75 | 480 | 93 | 12 | 0.5 | 0.3 |
| DDP200-US12-PC | 12 | ±2 | 16.67 | 16.67 | 150 | 92 | 12 | 0.5 | 0.3 |
| DDP200-US24-PC | 24 | ±2 | 8.33 | 8.33 | 240 | 93.5 | 12 | 0.5 | 0.3 |
| DDP200-US48-PC | 48 | ±2 | 4.17 | 4.17 | 480 | 93 | 12 | 0.5 | 0.3 |

¹ The combined output power of V1 and V2 for “-OF” and “-PC” packages, must not exceed 200 W when cooled by 10 CFM air flow, and 180 W when natural convection cooled, up to 40 °C. Above 40 °C output de-rating applies. See de-rating curves below. In any case, the heat sink temperature should not exceed +110 °C at 50 °C ambient temperature.

² Peak-to-Peak measured at 20 MHz Bandwidth.

INPUT SPECIFICATIONS

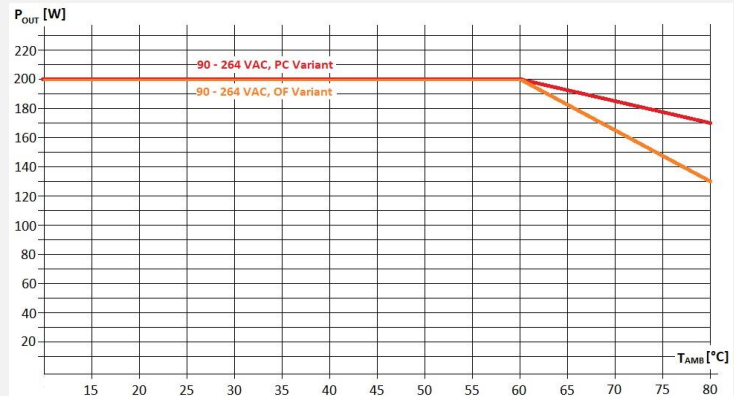
| Specification | Test Conditions / Notes | Min. | Nominal | Max. | Units |
|--|---|------|---------|------|-----------------|
| AC Input Voltage | | 90 | 100-240 | 264 | V _{AC} |
| Input Frequency | | 47 | 50/60 | 63 | Hz |
| Input Current | RMS at 100 V _{AC} , maximum load | - | - | 2.5 | A |
| Inrush Current | 240 V _{AC} , 25 °C ambient, cold start. 12, 24, 48V, variants | - | - | 100 | A |
| Fusing | 2X Time Lag 2.5 A, 250 V on both L and N | - | 2.5 | - | A |
| Efficiency | At 230 V _{AC} , 100 % rated load | | | | |
| | 12V | - | 92 | - | % |
| | 24V | - | 93.5 | - | % |
| | 48V | - | 93 | - | % |
| No-load Power Consumption | At 115-230 V _{RMS} , no load | - | - | 0.3 | W |
| Power Factor | At full rated load, 115 V _{AC} , 60 Hz and 230 V _{AC} , 50 Hz input voltages | 0.90 | - | - | - |
| Harmonic Current Fluctuations and Flicker | Complies with EN-61000-3-2, Classes A, D Complies with EN-61000-3-3 at nominal voltages and full load. | | | | |
| Earth Leakage Current | Normal conditions, 264 V _{AC} , 60 Hz. | - | - | 300 | μA |
| | Normal conditions, nominal input voltages and frequencies | - | 260 | - | μA |
| Touch Leakage Current “PC” variant | Normal conditions | - | 75 | 100 | μA |


OUTPUT SPECIFICATIONS

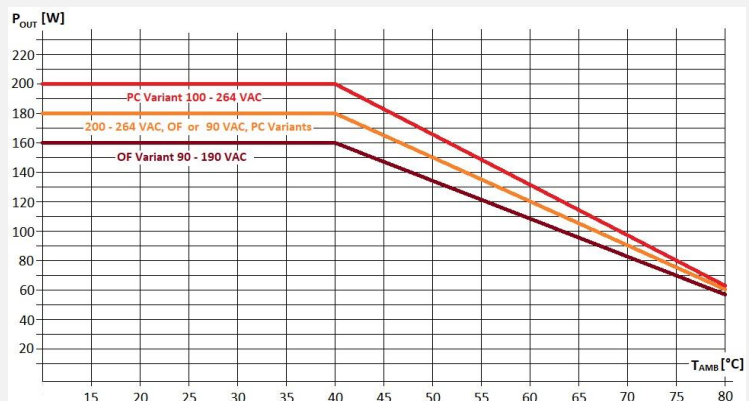
| Specification | Test Conditions / Notes | Min. | Nom. | Max. | Units |
|---|--|-------|----------------|-----------------------|--------|
| V1 Output Voltage | ±2% set point accuracy for all voltage variants At 60% load, 25 °C ambient temperature. Output voltage can be manually adjusted through potentiometer in a ±2% of nominal value maximum range. | - | 12 24 48 | - | V |
| V1 Rated Currents | 12V, 10 CFM forced air cooling 24V, 10 CFM forced air cooling 48V, 10 CFM forced air cooling See output power de-rating curves below | - | - | 16.67 8.33 4.17 | W |
| V2 Output Voltage | All models. ±10% accuracy at 10-100% full load | - | 12 | - | V |
| V2 Output Current (I2) | Convection / 10 CFM forced air cooling Natural convection cooling | - | - | 0.5 0.3 | A |
| V1 Load Regulation | V _{AC} : 90 – 264 V _{RMS} 20-100% full load | - | - | ±1 | %V1 |
| V1 Line Regulation | V _{AC} : 90 – 264 V _{RMS} | - | - | ±0.5 | %V1 |
| Transient Response (V1 Voltage Deviation) | 25% load changes at 1 A/μs 12V at 2200 μF Load / I _{OUT} > 0.5 A 24 V at 1000 μF Load / I _{OUT} > 0.5 A 48V at 560 μF Load / I _{OUT} > 0.5 A | - | - | ±5 | %V1 |
| V1 Ripple and Noise | 12V 24V 48V Peak-to-peak, 20 MHz BW. 100 nF ceramic and 47 μF aluminium electrolytic caps at the load. | - | - | 150 240 480 | mV |
| Turn-on Overshoot | | - | 10 | - | %V1 |
| Hold-up Time | At nominal V _{IN} , full load, for all models | 10 | - | - | ms |
| Minimum Load | All models; V1, V2 and 5V _{SB} | 0 | - | - | A |
| Maximum Load Capacitance | At nominal V _{IN} , 25 °C ambient, max load 12 V 24 V 48 V | - | - | 16400 8570 1270 | μF |
| Temperature Drift | | -0.05 | - | +0.05 | %V1/°C |

Output Power De-ratings

Output Power to Ambient
Temperature at 10 CFM Forced Air
Cooling



Output Power to Ambient
Temperature at Natural Convection



PROTECTION FEATURES

| Specification | Test Conditions / Notes | Min. | Nominal | Max. | Units |
|---------------------------------|---|------|----------------|------|-------------------|
| Input Fuse | 2X Time Lag 2.5 A, 250 V on L1 and L2 | - | - | 2.5 | A |
| Over Current | At nominal input voltages. V1: Hiccup mode, auto-recovering. V2: PTC limiting, auto-recovering. | 130 | 150 | 180 | %I _{MAX} |
| Short Circuit | At nominal input voltages. V1: Hiccup mode, auto-recovering. V2: PTC limiting, auto-recovering | - | - | - | |
| Over Voltage | 12 V 24 V 48 V Unit shut down and latch off | - | 16 31 56 | - | V |
| Over Temperature | Hiccup mode, auto-recovering. | - | - | - | |
| Isolation Primary-to- Secondary | Reinforced | 4000 | - | - | V _{AC} |
| Isolation Input-to-PE | Basic | 1500 | - | - | V _{AC} |
| Isolation V1-to-V2 | | 100 | - | - | V _{DC} |
| Isolation Output-to-PE | Basic | 1500 | - | - | V _{AC} |

ENVIRONMENTAL SPECIFICATIONS

| Specification | Test Conditions / Notes | Min | Nominal | Max | Units |
|-----------------------------|--|-----|---------|----------|--------|
| Operating Temperature Range | See output power de-rating curves PS starts up at -20 °C | -20 | - | 70 | °C |
| Storage Temperature Range | | -40 | - | 85 | °C |
| Humidity | RH, Non-condensing Operating Non-operating | - | - | 93 95 | % % |
| Operating Altitude | | - | - | 3000 | m |
| Shock | EN 60068-2-27 | | | | |
| Vibration | Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). | | | | |
| | Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative). | | | | |
| Vibration | Operating: Sine, 10 – 500 Hz, 1 g, 3 axes, 1 oct/min., 60 min. Random, 5 – 500 Hz, 0.02 g ² /Hz, 1 g _{RMS} , 3 axes, 30 min. | | | | |
| | Non-Operating: 5 – 500 Hz, 2.46 g _{RMS} (0.0122 g ² /Hz), 3 axes, 30 min. | | | | |
| MTBF | Full Load, 115 V _{AC} , 25 °C ambient GB, MIL-HDBK-217F | - | 279000 | - | Hours |
| Useful Life (*) | Low line range, 75% rated load, 40 °C ambient, natural convection. | - | 4 | - | Years |
| Thermal Considerations | The output power de-rating curves are herein provided. These curves can be used as a guideline to assess the limit in performance of a power supply once installed in a system providing controlled air flow at a certain input voltage and ambient temperature. | | | | |

(*) Calculated life time for the PC variants at natural convection, 115 V_{AC} input, 40 °C and 75% rated load is 3 years

ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

| Phenomenon | Conditions / Notes | Standard | Equipment Performance Class |
|--------------------------------------|---|----------------------------------|-----------------------------|
| Conducted (*) | 115 V _{RMS} , 230 V _{RMS} . Maximum load. | EN 55032 (ITE) EN 55011 (IMS) | B |
| Radiated (*) | | EN 55032 (ITE) EN 55011 (IMS) | B |
| Line Voltage Fluctuation and Flicker | At 20%, 50% and 100% maximum load. Nominal input voltages. | EN 61000-3-3 | |
| Harmonic Current Emission | At nominal input voltages | EN 61000-3-2 | A, D |

(*) Need an external 1mH choke at input for Class II type to pass EN55011 and EN55032 Class B

ELECTROMAGNETIC COMPATIBILITY EMC) – IMMUNITY

| Phenomenon | Conditions / Notes | Standard | Test Level | Performance criteria |
|---|--|--|------------|----------------------|
| Reference standard for IT equipment: EN 55024, EN 61000-6-2 | | | | |
| ESD | 15 kV air discharge, 8 kV contact, at any point of the system. | EN 61000-4-2 | 4 | A |
| Radiated Field | 10 V/m, 80-1000 MHz, 1 KHz 80% AM | EN 61000-4-3 | 3 | A |
| Electric Fast Transient | ±2 kV on AC power port for 1 minute; ±1 kV on signal/control lines | EN 61000-4-4 | 3 | A |
| Surge | ± 2 kV line to line; ± 4 kV line to earth; on AC power port. | EN 61000-4-5 | 3 | A B |
| Conducted RF Immunity | 10 V _{RMS} , 0,15-80 MHz, 1 KHz, 80% AM 100 - 240V _{AC} | EN 61000-4-6 | 3 | A |
| Dips and Interruptions | Drop-out to 5% for 0.5 cycles (10 ms) Dip to 70% for 25 cycles (500 ms) Interrupts > 95% for 5 s | EN61000-4-11 EN61000-4-11 EN61000-4-11 | | A B B |

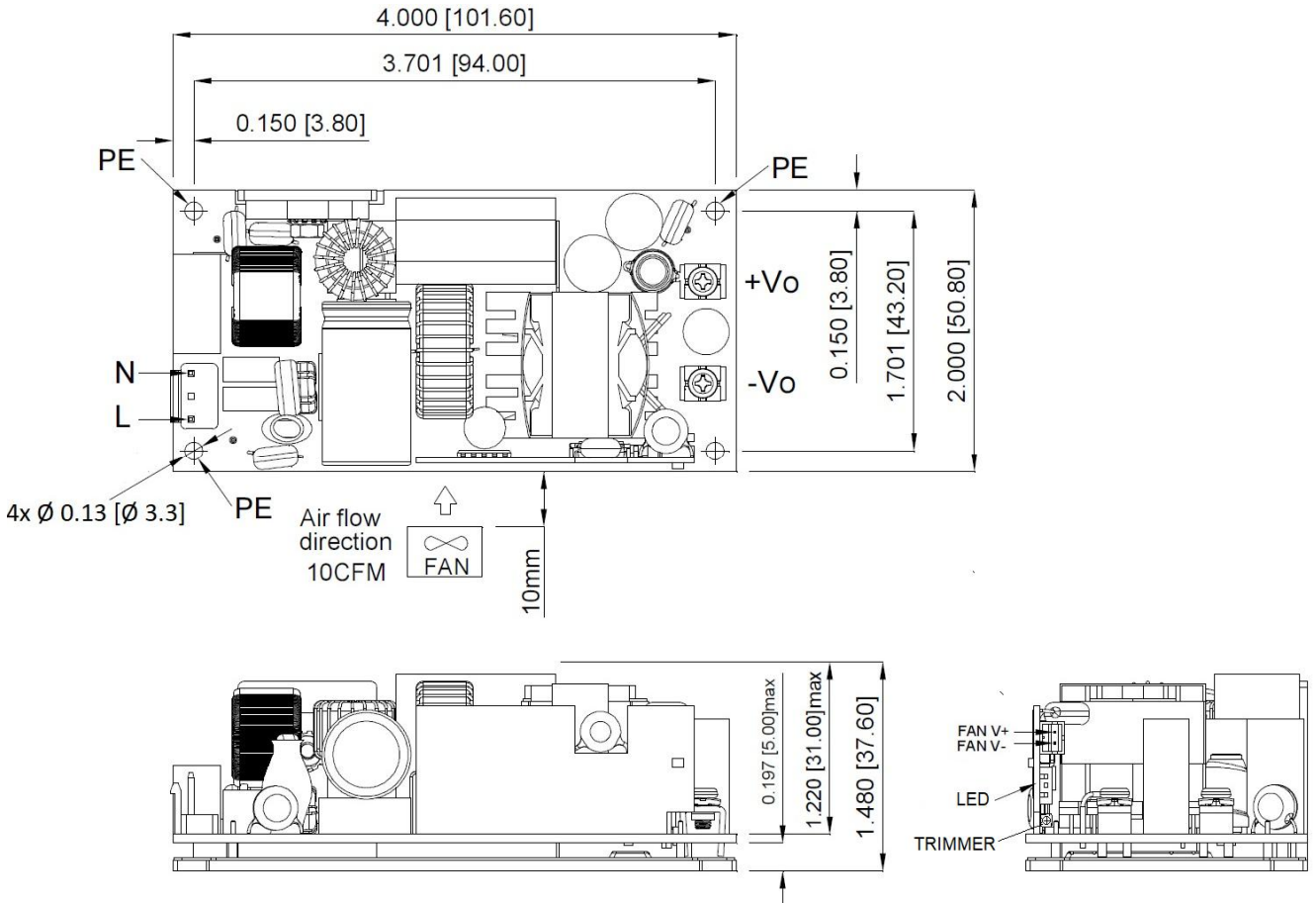
SAFETY AGENCIES APPROVALS

| Certification Body | Safety Standards and file numbers | Category |
|-------------------------------|--|----------------------------------|
| CSA/UL | CSA C22.2 No. 60950-1, UL 60950-1; 2007, 2 nd edition +A1 + A2 | Information Technology Equipment |
| IEC IECEE CB Certification | IEC/EN 60950-1 2 nd edition + A1 + A2 | Information Technology Equipment |
| CE | Directive 2014/35/EU: Electrical Safety: Low Voltage electrical equipment (LVD) Directive 2014/30/EU: Electromagnetic Compatibility (EMC) Directive 2011/65/EU: RoHS 2 | Information Technology Equipment |

OUTLINE DRAWING AND CONNECTIONS – OPEN FRAME (-OF)

Overall dimensions: (50.8 X 101.6 X 37.6) mm; (2.00 X 4.00 X 1.48) in

Weight: 253 g; 0.56 lb



Input connector: TAIWAN KING PIN TERMINAL PVHI series. Mate connector: JST Housing VHR series or equivalent.

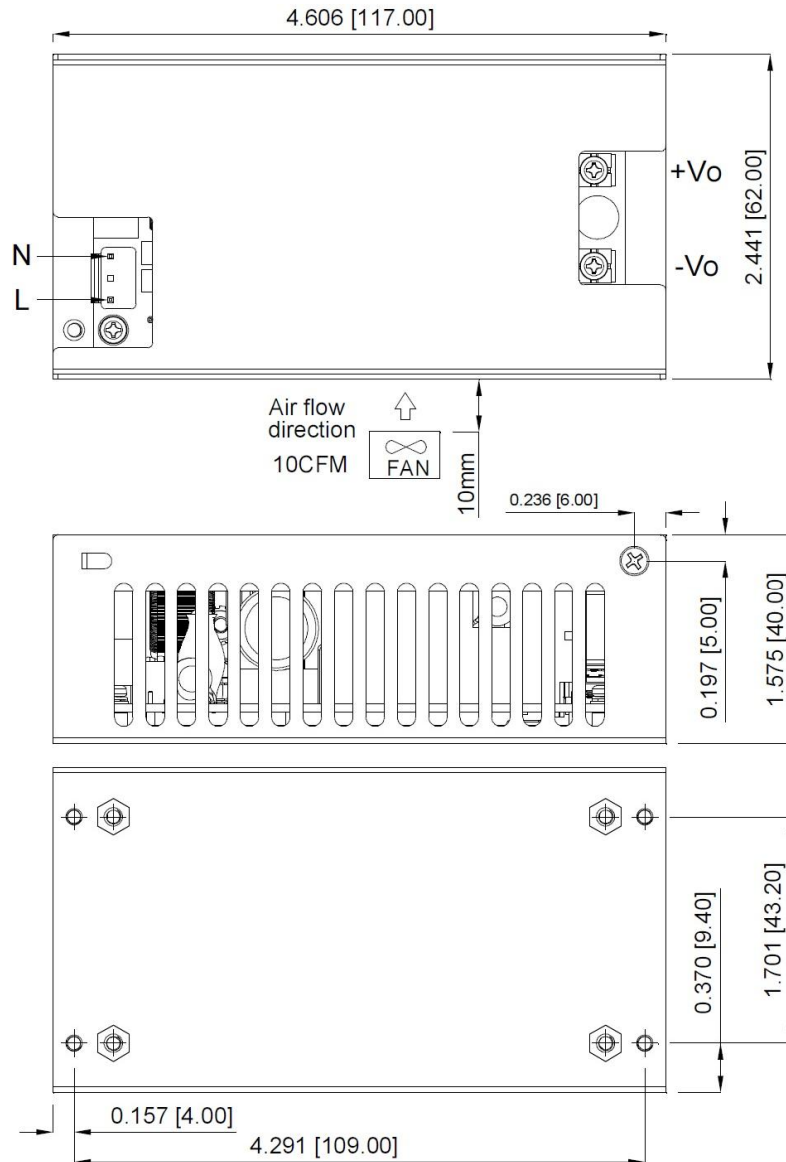
Fan output connector: TOWNES ENTERPRISE 2001BW series. Mate connector: JST Housing PHR-R5500 series and JST R5503-PT series crimp terminal or equivalent.

Output connectors (+Vo, -Vo): M3 screw block, mate with round terminal (outer diameter < 6.75 mm, inner diameter < 3.9 mm).

OUTLINE DRAWING AND CONNECTIONS – PROTECTIVE COVER (-PC)

Overall dimensions: (62.0 X 117.0 X 40) mm; (2.44 X 4.61 X 1.57) in

Weight: 314 g; 0.69 lb



Input connector: TAIWAN KING PIN TERMINAL PVHI series. Mate connector: JST Housing VHR series or equivalent.

Fan output connector: TOWNES ENTERPRISE 2001BW series. Mate connector: JST Housing PHR-R5500 series and JST R5503-PT series crimp terminal or equivalent.

Output connectors (+Vo, -Vo): M3 screw block, mate with round terminal (outer diameter < 6.75 mm, inner diameter < 3.9 mm).

Specifications appearing in EFORE's catalogues and brochures as well as any oral statements are not binding. All descriptions, drawings and other particulars (including dimensions, materials and performance data) given by EFORE are as accurate as possible but, being given for general information, and are not binding on EFORE. EFORE makes thus no representation or warranty as to the accuracy of such material. We assume no liability other than as agreed in the terms of the individual contracts and we reserve the right to make technical modifications in the course of our product development. Our product information solely describes our goods and services and is in no way to be construed or interpreted as a quality or condition guarantee. The aforesaid shall not relieve the customer of its obligation to verify the suitability of our Products for the use or application intended by the purchaser. Customers are responsible for their products and applications. EFORE assumes no liability from the use of its products outside of specifications. No license is granted to any intellectual property rights by this document.