P-DUKE®

# P-DUKE POWER

## UFED20 Series

Chassis-Mount DC-DC Converter
Up to 20 Watts

3 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT

Automation | Datacom | IPC

Industry | Measurement | Telecom

Automobile | Boat | Charger

Medical | PV | Railway

CB CE

1600 VDC Isolation Voltage | 2 : 1 Input Range | FUSE Installed | INRUSH CURRENT LIMIT | Internal EN55032 Class B Filter | NO Min. Load Required | REMOTE ON OFF | REVERSE POLARITY PROTECTION | OCP | OVP | SCP

## PART NUMBER STRUCTURE

UFED20 - 48 S 05 - N R EC

| Series Name | Input Voltage (VDC) | Output Quantity | Output Voltage (VDC) | Remote Control Option | Conformal Coating Option | Assembly Option |
|---|---|---|---|---|---|---|
| | **12:**9.5~18<br>**24:**18~36<br>**48:**36~75 | **S:**Single | **3P3:**3.3<br>**05:**5<br>**12:**12<br>**15:**15 | □:Positive logic<br>**N:**Negative logic | □: None<br>**R:** Conformal Coating | □: None<br>**EC:** Enclosed Mounting Type<br>**DR:** Din Rail Mounting Type<br>**ED:** Enclosed & Din Rail Mounting Type |
| | | **D:**Dual | **12:**±12<br>**15:**±15 | | | |



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**TECHNICAL SPECIFICATION** All specifications are typical at nominal input, full load and 25℃ unless otherwise noted

| Model Number | Input Range VDC | Output Voltage VDC | Output Current @Full Load mA | Input Current @ No Load mA | Efficiency % | Maximum Capacitor Load µF |
|---|---|---|---|---|---|---|
| UFED20-12S3P3 | 9.5 ~ 18 | 3.3 | 5000 | 117 | 84 | 13000 |
| UFED20-12S05 | 9.5 ~ 18 | 5 | 4000 | 78 | 86 | 6800 |
| UFED20-12S12 | 9.5 ~ 18 | 12 | 1670 | 96 | 85 | 2200 |
| UFED20-12S15 | 9.5 ~ 18 | 15 | 1330 | 43 | 85 | 755 |
| UFED20-12D12 | 9.5 ~ 18 | ±12 | ±833 | 51 | 85 | ±680 |
| UFED20-12D15 | 9.5 ~ 18 | ±15 | ±667 | 58 | 85 | ±450 |
| UFED20-24S3P3 | 18 ~ 36 | 3.3 | 5000 | 31 | 85 | 13000 |
| UFED20-24S05 | 18 ~ 36 | 5 | 4000 | 36 | 88 | 6800 |
| UFED20-24S12 | 18 ~ 36 | 12 | 1670 | 58 | 86 | 2200 |
| UFED20-24S15 | 18 ~ 36 | 15 | 1330 | 44 | 86 | 755 |
| UFED20-24D12 | 18 ~ 36 | ±12 | ±833 | 33 | 86 | ±680 |
| UFED20-24D15 | 18 ~ 36 | ±15 | ±667 | 34 | 87 | ±450 |
| UFED20-48S3P3 | 36 ~ 75 | 3.3 | 5000 | 16 | 86 | 13000 |
| UFED20-48S05 | 36 ~ 75 | 5 | 4000 | 21 | 88 | 6800 |
| UFED20-48S12 | 36 ~ 75 | 12 | 1670 | 37 | 87 | 2200 |
| UFED20-48S15 | 36 ~ 75 | 15 | 1330 | 52 | 86 | 755 |
| UFED20-48D12 | 36 ~ 75 | ±12 | ±833 | 22 | 87 | ±680 |
| UFED20-48D15 | 36 ~ 75 | ±15 | ±667 | 22 | 87 | ±450 |

## INPUT SPECIFICATIONS

| Parameter | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Operating input voltage range | | 12Vin(nom) | 9.5 | 12 | 18 | VDC |
| | | 24Vin(nom) | 18 | 24 | 36 | |
| | | 48Vin(nom) | 36 | 48 | 75 | |
| Input fuse | slow blow | 12Vin(nom) | | 6 | | A |
| | | 24Vin(nom) | | 6 | | |
| | | 48Vin(nom) | | 4 | | |
| In-rush current | | | | 15 | | A |
| Start up time | Constant resistive load | Power up | | 100 | | ms |
| | | Remote ON/OFF | | 10 | | |
| Input surge voltage | 100ms, max. | 12Vin(nom) | | | 36 | VDC |
| | | 24Vin(nom) | | | 50 | |
| | | 48Vin(nom) | | | 100 | |
| Remote ON/OFF | Referred to –Vin pin | Positive logic (Standard) DC-DC ON | Open or 3 ~ 12VDC | | | |
| | | Positive logic (Standard) DC-DC OFF | Short or 0 ~ 1.2VDC | | | |
| | | Negative logic (Option) DC-DC ON | Short or 0 ~ 1.2VDC | | | |
| | | Negative logic (Option) DC-DC OFF | Open or 3 ~ 12VDC | | | |
| | | Input current of Ctrl pin | -0.5 | | 0.5 | mA |
| | | Remote off input current | | 2.5 | | mA |



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## OUTPUT SPECIFICATIONS

| Parameter | Conditions | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Voltage accuracy | | | 3.3Vout<br>Others | -1.5<br>-1.0 | | +1.5<br>+1.0 | % |
| Line regulation | Low Line to High Line at Full Load | | Single<br>Dual | -0.2<br>-0.5 | | +0.2<br>+0.5 | % |
| Load regulation | No Load to Full Load | | 3.3Vout<br>Others | -1.5<br>-1.0 | | +1.5<br>+1.0 | % |
| Cross regulation | Asymmetrical load 25%/100% FL | | Dual | -5.0 | | +5.0 | % |
| Voltage adjustability | Single output | | | -10 | | +10 | % |
| Ripple and noise | Measured by 20MHz bandwidth | Single<br><br>Dual | 3.3Vout<br>5Vout, 12Vout, 15Vout<br>All | | 60<br>75<br>100 | | mVp-p |
| Temperature coefficient | | | | -0.02 | | +0.02 | %/℃ |
| Transient response recovery time | 25% load step change | | | | 250 | | μs |
| Over voltage protection | Zener diode clamp | | 3.3Vout<br>5Vout<br>12Vout<br>15Vout | | 3.9<br>6.2<br>15<br>18 | | VDC |
| Output indicator | | | | | Green LED | | |
| Over load protection | % of Iout rated | | | | | 150 | % |
| Short circuit protection | | | | | Continuous, automatics recovery | | |

## GENERAL SPECIFICATIONS

| Parameter | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Isolation voltage | 1 minute | Input to Output<br>Input (Output) to Chassis | 1600<br>1600 | | | VDC |
| Isolation resistance | 500VDC | | 1 | | | GΩ |
| Isolation capacitance | | | | | 4000 | pF |
| Switching frequency | | | 450 | 500 | 550 | kHz |
| Safety approvals | IEC/ UL/ EN60950-1 | | | | UL:E193009<br>CB:UL(Demko) | |
| Chassis material | | | | | | Aluminum |
| Conformal coating | | | | | | Impregnating varnish |
| Weight | | | | | | 89g (3.13oz) |
| MTBF | MIL-HDBK-217F, Full load | | | | | 2.073 x $10^6$ hrs |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Operating ambient temperature | | Without derating<br>With derating | -40<br>+70 | | +70<br>+89 | ℃ |
| Storage temperature range | | | -40 | | +105 | ℃ |
| Thermal shock | | | | | | MIL-STD-810F |
| Vibration | | □□S□□ -□□<br>□□S□□ -□□EC<br>□□S□□ -□□DR<br>□□S□□ -□□ED | | | | MIL-STD-810F<br>MIL-STD-810F<br>IEC60068-2-6<br>IEC60068-2-6 |
| Relative humidity | | | | | | 5% to 95% RH |



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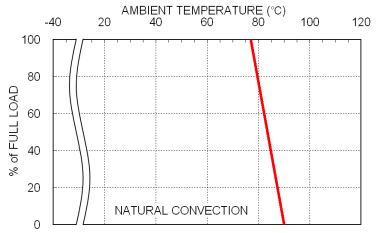
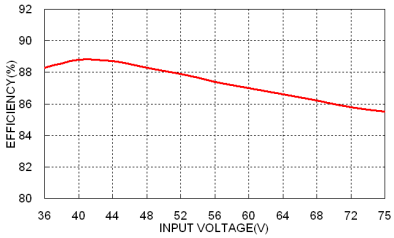
## EMC SPECIFICATIONS

| Parameter | Conditions | Level |
|---|---|---|
| EMI | EN55032 | Class B |
| ESD | EN61000-4-2 | Air ± 8kV and Contact ± 6kV | Perf. Criteria A |
| Radiated immunity | EN61000-4-3 | 10V/m | Perf. Criteria A |
| Fast transient | EN61000-4-4 | ± 2kV | Perf. Criteria A |
| Surge | EN61000-4-5 | ± 0.5kV | Perf. Criteria A |
| Conducted immunity | EN61000-4-6 | 10Vr.m.s | Perf. Criteria A |
| Power frequency magnetic field | EN61000-4-8 | 100A/m continuous; 1000A/m 1 second | Perf. Criteria A |

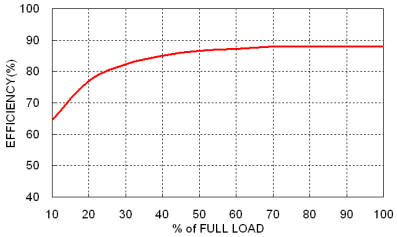
## CHARACTERISTIC CURVE




UFED20-48S05 Derating Curve



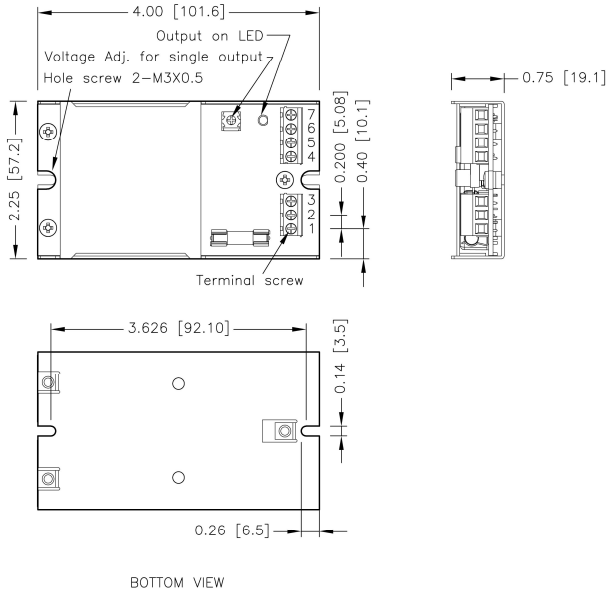

UFED20-48S05 Efficiency vs. Input Voltage




UFED20-48S05 Efficiency vs. Output Load

## MECHANICAL DRAWING

### CHASSIS MOUNTING TYPE




### TERMINAL CONNECTION

| NO. | SINGLE | DUAL |
|---|---|---|
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | Ctrl | Ctrl |
| 4 | NC | NC |
| 5 | -Vout | -Vout |
| 6 | +Vout | Common |
| 7 | NC | +Vout |

※ NC：No Connection

※ Screw terminals – wire range from 14 to 18 AWG



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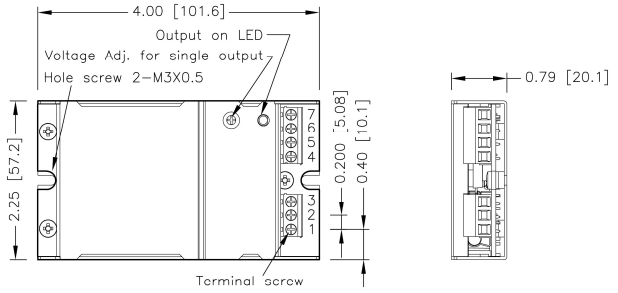
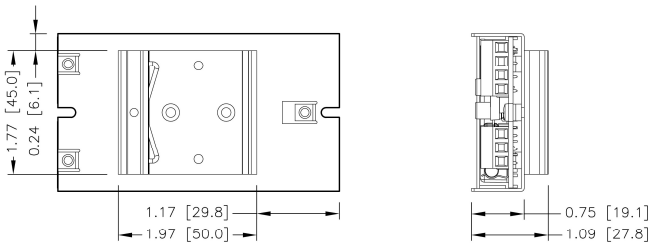
## MECHANICAL DRAWING(CONTINUED)

### ENCLOSED MOUNTING TYPE




TOP VIEW

### DIN RAIL MOUNTING TYPE




BOTTOM VIEW

1. All dimensions in Inch [mm]
2. Tolerance : X.XX±0.02 [X.X±0.5]
   X.XXX±0.01 [X.XX±0.25]
3. Hole screw locked torque :
   MAX 5.0kgf-cm/0.49N-m
4. Terminal screw locked torque :
   MAX 2.5kgf-cm/0.25N-m

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