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AM20EWM-NZ



2 x 1"

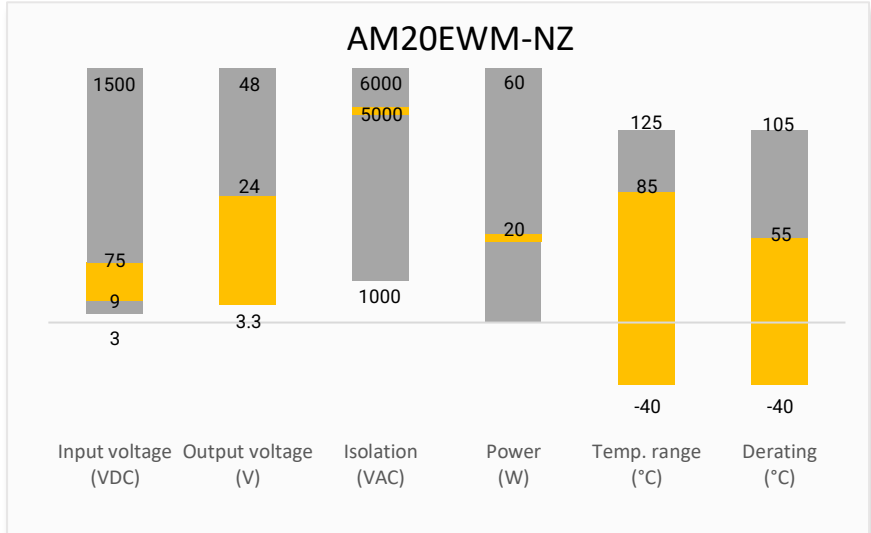
The AM20EWM-NZ is a brand-new 20W medical grade DC/DC converter that offers 4:1 ultra-wide input voltage range and meets the 2xMOPP EN60601-1 third edition medical grade standard. This series will offer many benefits to your new medical grade system design for high isolation requirement. This series offers great operating temperatures, from -40°C to +85°C with full power up to 55°C. It also features an isolation of 5000VAC for improved reliability and system safety. Furthermore, a higher MTBF of 1,000,000h, output short circuit protection (OSCP), output over-current protection (OCP), output over-voltage protection (OVP) and input under-voltage protection (UVLO) come standard with the series. The AM20EWM-NZ is perfect for high insulation required area such as medical applications.

Features

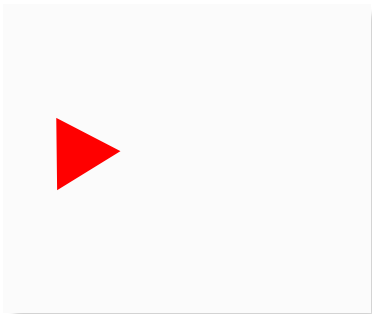


- Operating Temp: -40 °C to +85 °C
- High isolation voltage: 5000VAC
- Low ripple & noise, 200mV (p-p), max.
- Regulated Output
- Output short circuit, over-current, over-voltage, input under-voltage protection
- Design to meet 2xMOPP EN60601-1 medical standard

Summary



Training



Product Training Video
(click to open)



Application Notes

Applications



Medical

Industrial

Instrumentation

Models & Specifications

| Single Output | | | | | | | |
|--------------------|---------------------|----------------------|------------------------|-----------|-------------------------|------------------------------|-------------------------------|
| Model | Input Voltage (VDC) | Output Voltage (VDC) | Input Current Max (mA) | | Output Current Max (mA) | Maximum Capacitive Load (μF) | Efficiency (%) Full Load Typ. |
| | | | No Load | Full Load | | | |
| AM20EWM-2403SH50NZ | 24 (9-36) | 3.3 | 50 | 992 | 5000 | 10000 | 85 |
| AM20EWM-2405SH50NZ | 24 (9-36) | 5 | 50 | 992 | 4000 | 10000 | 85 |
| AM20EWM-2412SH50NZ | 24 (9-36) | 12 | 15 | 992 | 1666 | 4700 | 86 |
| AM20EWM-2415SH50NZ | 24 (9-36) | 15 | 15 | 992 | 1333 | 1600 | 87 |
| AM20EWM-2424SH50NZ | 24 (9-36) | 24 | 15 | 992 | 833 | 470 | 89 |
| AM20EWM-4803SH50NZ | 48 (18-75) | 3.3 | 30 | 491 | 5000 | 10000 | 86 |
| AM20EWM-4805SH50NZ | 48 (18-75) | 5 | 30 | 491 | 4000 | 10000 | 87 |
| AM20EWM-4812SH50NZ | 48 (18-75) | 12 | 10 | 491 | 1666 | 4700 | 87 |
| AM20EWM-4815SH50NZ | 48 (18-75) | 15 | 10 | 491 | 1333 | 1600 | 88 |
| AM20EWM-4824SH50NZ | 48 (18-75) | 24 | 10 | 491 | 833 | 470 | 89 |

| Input Specification | | | | |
|--------------------------------|---|---------|---------|-------|
| Parameters | Conditions | Typical | Maximum | Units |
| Input voltage | 24VDC | 9-36 | 40 | VDC |
| | 48VDC | 18-75 | 80 | |
| Input reflected ripple current | | 30 | | mA |
| Absolute maximum rating | 24VDC, 1s max. | ≥ -0.7 | 50 | VDC |
| | 48VDC, 1s max. | ≥ -0.7 | 100 | |
| Start-up voltage | 24VDC | | 9 | VDC |
| | 48VDC | | 18 | |
| Shut down voltage | 24VDC | 6.5 | | VDC |
| | 48VDC | 15.5 | | |
| On/Off Control | On - Ctrl pin open or apply 3.5-12V Off - Ctrl pin connect to GND or apply 0-1.2V; Idle current 8mA max. | | | |

| Isolation Specification | | | | |
|--------------------------|---------------------------------|---------|---------|-------|
| Parameters | Conditions | Typical | Maximum | Units |
| Tested isolation voltage | Input / output 60 sec, ≤ 1mA | 5000 | | VAC |
| Resistance | 500VDC | ≥10000 | | MΩ |
| Capacitance | 100KHz, 0.1V | 40 | | pF |
| Patient leakage current | 240VAC/60Hz | 3.6 | 5 | μA |
| Insulation | Transformer creepage, clearance | ≥8 | | mm |

| Output Specification | | | | | |
|-------------------------------|-------------------------------------|--------------------|---------|---------|----------|
| Parameters | Conditions | | Typical | Maximum | Units |
| Voltage accuracy | | | ±1 | ±2 | % |
| Line regulation | LL – HL 100% load | | ±0.2 | ±0.5 | % |
| Load regulation | 5% - 100% load | | ±0.5 | ±1 | % |
| | 0% - 5% load | | | ±5 | % |
| Short circuit protection | Continues, Auto recovery | | | | |
| Over current protection | | | 180 | 260 | % Io |
| Over voltage protection | | | ≥110 | 160 | % Vo |
| Transient Recovery Time | Nominal input, 25% load step change | | 300 | 500 | µs |
| Transient Response Deviation* | Nominal input, 25% load step change | 3.3V, 5V model | ±5 | ±8 | % |
| | | others | ±3 | ±5 | |
| Ripple & Noise** | 20MHz bandwidth | 3.3V, 5V model | 100 | 200 | mV pk-pk |
| | | AM20EWM-2415SH50NZ | 80 | 150 | |
| | | AM20EWM-2424SH50NZ | | | |
| | | AM20EWM-4824SH50NZ | | | |
| | | AM20EWM-2412SH50NZ | 50 | 100 | |
| | | AM20EWM-4812SH50NZ | | | |
| AM20EWM-4815SH50NZ | | | | | |

*An 270µF electrolytic capacitor is required for 3.3V model.
**Ripple & noise under 0-5% load is ±10% Vout max. for 3.3V, 5V models and 5% Vout max. for other models.

| General Specifications | | | | | |
|------------------------------|--|--|-------------|---------|-------|
| Parameters | Conditions | | Typical | Maximum | Units |
| Switching frequency* | 100% Load | | 280 | | KHz |
| Operating temperature | With derating | | -40 to +85 | | °C |
| Storage temperature | | | -55 to +125 | | °C |
| Manual soldering temperature | 1.5mm distance from case ≤ 10s | | | 300 | °C |
| Wave soldering temperature | 10s max. | | | 260 | °C |
| Temperature coefficient | 100% Load | | | ± 0.03 | %/°C |
| Cooling | Free air convection | | | | |
| Humidity | Non-condensing | | | 95 | % RH |
| Weight | | | 27.0 | | g |
| Case material | Plastic (flammability to UL 94V-0) | | | | |
| Dimensions (L x W x H) | 2.03 x 1.04 x 0.47 inches (51.50 x 26.50 x 12.00 mm) | | | | |
| Vibration | 10-150Hz, 5G, 0.75mm, along all axis | | | | |
| MTBF | > 1 000 000 hrs (MIL-HDBK -217F, t=+25°C) | | | | |

*Switching frequency reduces when load under 50%.
NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

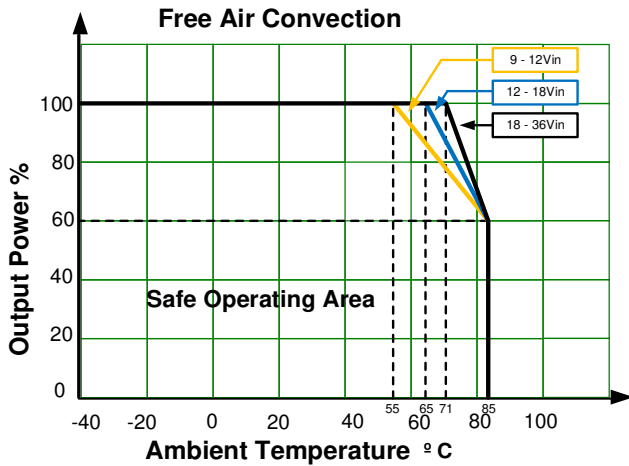
Safety Specifications

Parameters

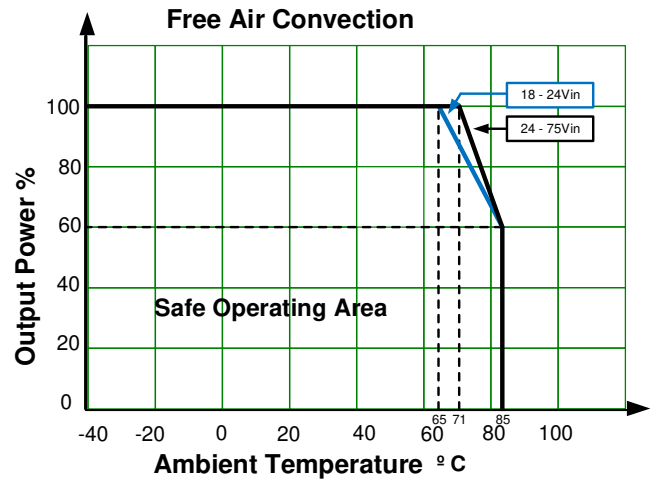
| | | |
|-----------|--|---|
| Standards | Design to meet 2xMOPP EN60601-1 3rd, EN62368 | |
| | EMI - Conducted and radiated emission | CISPR32/EN55032 Class A without additional components Class B with recommended EMC circuit 2-B (For AM20EWM-2412SH50NZ use recommended EMC circuit 1) |
| | Electrostatic Discharge Immunity | IEC/EN 61000-4-2, Contact $\pm 8\text{KV}$, Air $\pm 15\text{KV}$, Criteria B |
| | RF, Electromagnetic Field Immunity | IEC/EN 61000-4-3, 10V/m, Criteria A |
| | Electrical Fast Transient/Burst Immunity | IEC/EN 61000-4-4, 100KHz, $\pm 2\text{KV}$, with recommended EMC circuit 2-A, Criteria B |
| | Surge Immunity | IEC/EN 61000-4-5, L-L $\pm 2\text{KV}$ with recommended EMC circuit 2-A, Criteria B |
| | RF, Conducted Disturbance Immunity | IEC/EN 61000-4-6, 10Vr.m.s, Criteria A |
| | Power frequency Magnetic Field Immunity | IEC 61000-4-8: 30A/m, Continuous, Criteria A |

Derating

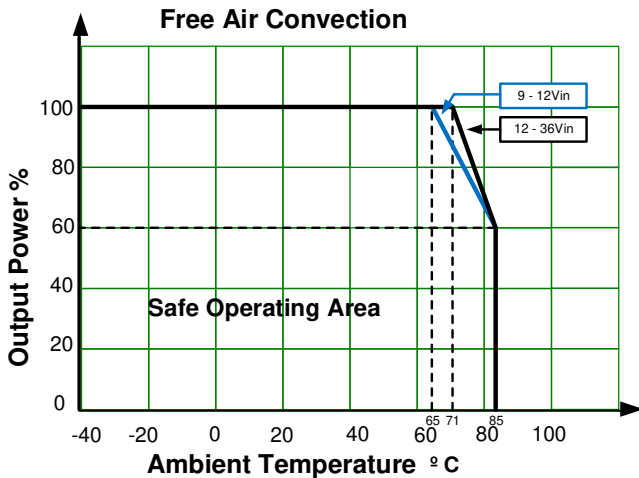
AM20EWM-2403SH50NZ, AM20EWM-2405SH50NZ



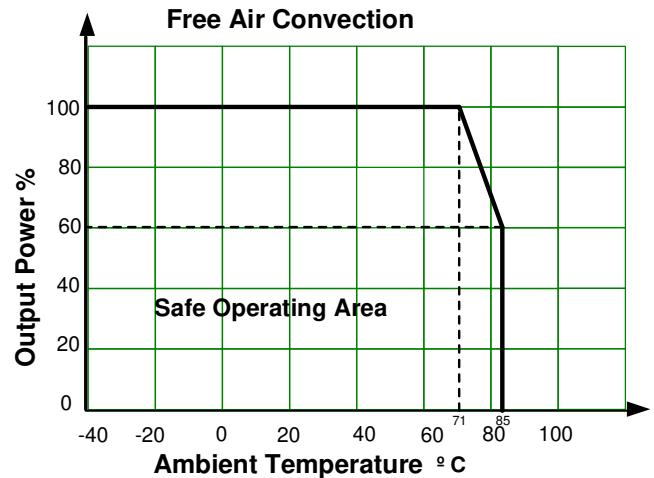
AM20EWM-4803SH50NZ, AM20EWM-4805SH50NZ



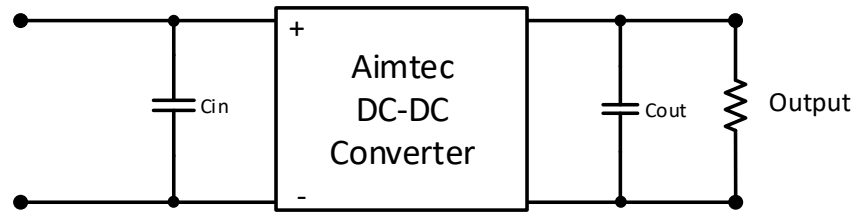
AM20EWM-2412SH50NZ, AM20EWM-2415SH50NZ



Other models

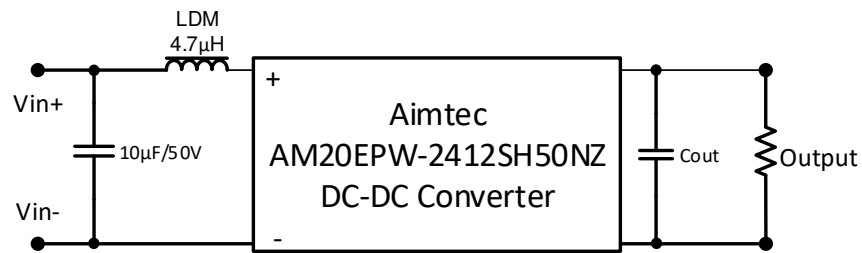


Typical Application Circuit

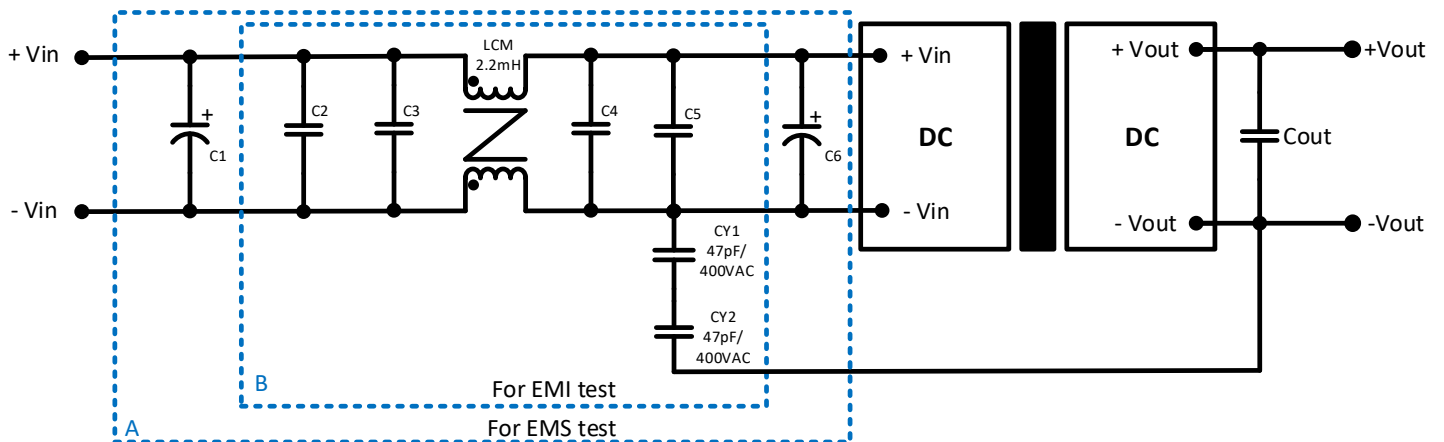


| Vin | Cin | Cout | |
|-----|-----------|---------|--------|
| | | 3.3Vout | Others |
| 24V | 100μF | 270μF | 10μF |
| 48V | 10 - 47μF | 270μF | 10μF |

Recommended EMC Circuit 1



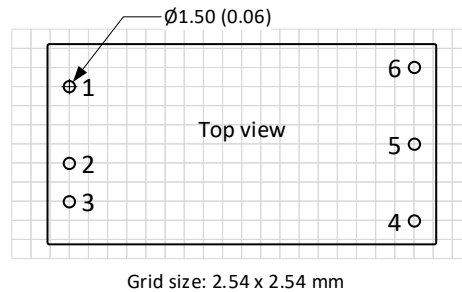
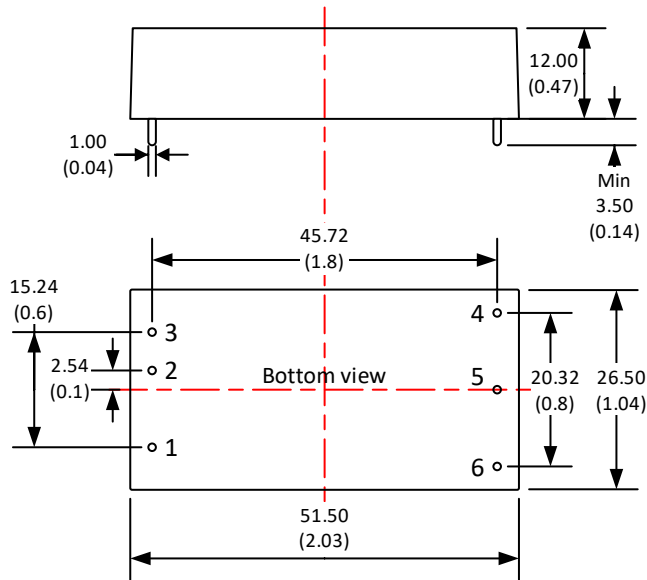
Recommended EMC Circuit 2



Notes: Part A for EMS filtering and Part B for EMI filtering.

| | 24Vin | 48Vin |
|-------------------|---------------------------------|--------------|
| C1 / C6 | 680μF / 50V | 330μF / 100V |
| C2 / C3 / C4 / C5 | 10μF / 50V | 10μF / 100V |
| CY1 / CY2 | 3.3V / 5V output model required | |

Dimensions



Note:
Unit: mm (inch)
Pin tolerance: ± 0.1 (0.004)
General tolerance: ± 0.5 (0.02)

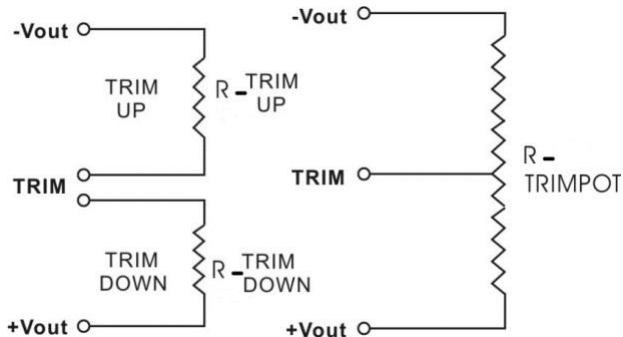
| Pin Out Specifications | |
|------------------------|-----------|
| Pin | Function |
| 1 | Ctrl |
| 2 | -V Input |
| 3 | +V Input |
| 4 | +V Output |
| 5 | -V Output |
| 6 | Trim |

Trimming

Output voltage can be externally trimmed by utilizing the methods as shown below

Fixed Resistor

Variable Potentiometer



3.3V output models

| | | | | | | | | | | |
|-----------------------|----------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| Trim down % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 3.267 | 3.234 | 3.201 | 3.168 | 3.135 | 3.102 | 3.069 | 3.036 | 3.003 | 2.97 |
| Rt down (K Ω) | 146.768 | 90.296 | 63.080 | 47.063 | 36.512 | 29.036 | 23.463 | 19.148 | 15.708 | 12.902 |
| Trim up % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 3.333 | 3.366 | 3.399 | 3.432 | 3.465 | 3.498 | 3.531 | 3.564 | 3.597 | 3.63 |
| Rt up (K Ω) | 1285.954 | 148.632 | 74.487 | 47.576 | 33.667 | 25.170 | 19.442 | 15.318 | 12.208 | 9.778 |

5V output models

| | | | | | | | | | | |
|--------------|---------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| Trim down % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 4.95 | 4.9 | 4.85 | 4.8 | 4.75 | 4.7 | 4.65 | 4.6 | 4.55 | 4.5 |
| Rt down (KΩ) | 106.981 | 53.954 | 33.797 | 23.178 | 16.623 | 12.173 | 8.955 | 6.519 | 4.611 | 3.077 |
| Trim up % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 5.05 | 5.1 | 5.15 | 5.2 | 5.25 | 5.3 | 5.35 | 5.4 | 5.45 | 5.5 |
| Rt up (KΩ) | 178.156 | 73.079 | 43.774 | 30 | 21.998 | 16.767 | 13.081 | 10.344 | 8.23 | 6.549 |

12V output models

| | | | | | | | | | | |
|--------------|---------|---------|---------|---------|---------|---------|--------|--------|--------|-------|
| Trim down % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 11.88 | 11.76 | 11.64 | 11.52 | 11.4 | 11.28 | 11.16 | 11.04 | 10.92 | 10.8 |
| Rt down (KΩ) | 819.546 | 401.372 | 259.971 | 188.888 | 146.115 | 117.548 | 97.118 | 81.781 | 69.845 | 60.29 |
| Trim up % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 12.12 | 12.24 | 12.36 | 12.48 | 12.6 | 12.72 | 12.84 | 12.96 | 13.08 | 13.2 |
| Rt up (KΩ) | 217.33 | 99.886 | 61.311 | 42.129 | 30.653 | 23.016 | 17.569 | 13.486 | 10.314 | 7.777 |

15V output models

| | | | | | | | | | | |
|--------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| Trim down % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 14.85 | 14.7 | 14.55 | 14.4 | 14.25 | 14.1 | 13.95 | 13.8 | 13.65 | 13.5 |
| Rt down (KΩ) | 1139.984 | 562.028 | 366.415 | 268.044 | 208.839 | 169.294 | 141.009 | 119.775 | 103.248 | 90.019 |
| Trim up % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 15.15 | 15.3 | 15.45 | 15.6 | 15.75 | 15.9 | 16.05 | 16.2 | 16.35 | 16.5 |
| Rt up (KΩ) | 229.923 | 106.022 | 65.367 | 45.158 | 33.07 | 25.027 | 19.29 | 14.991 | 11.65 | 8.979 |

24V output models

| | | | | | | | | | | |
|--------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Trim down % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 23.76 | 23.52 | 23.28 | 23.04 | 22.8 | 22.56 | 22.32 | 22.08 | 21.84 | 21.6 |
| Rt down (KΩ) | 1641.145 | 916.523 | 628.023 | 472.994 | 376.213 | 310.045 | 261.948 | 225.408 | 196.708 | 173.567 |
| Trim up % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Vout (VDC) | 24.24 | 24.48 | 24.72 | 24.96 | 25.2 | 25.44 | 25.68 | 25.92 | 26.16 | 26.4 |
| Rt up (KΩ) | 363.754 | 136.467 | 78.989 | 52.775 | 37.771 | 28.052 | 21.245 | 16.211 | 12.337 | 9.264 |

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