# DC/DC Converter 50/65 W

## 50 DDB 024 M24 W □ □ A

$V_{I\,nom}$ = 24 V $V_{O\,nom}$ = 24 V $I_O$ = 2.1 A / 2.7 A

| SYMBOL | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **INPUT** | | | | | | |
| $V_I$ | Input voltage range | Continuously ($P_O$ = 50 W) | 9.0 | | 36.0 | $V_{DC}$ |
| $V_I$ | Input voltage range | Dynamic t ≤ 1s | 36.0 | | 40.0 | $V_{DC}$ |
| $V_{I\,min}$ | Converter switch ON | | 9.0 | | 10.0 | $V_{DC}$ |
| $V_{I\,min}$ | Converter shutdown | | 8.0 | 8.5 | 8.9 | $V_{DC}$ |
| $V_{I\,max}$ | Converter shutdown | | | 41.0 | | $V_{DC}$ |
| $V_{Enable}$ | Enable Function<br>Reference: - $V_{In}$ | Converter On: Enable = High<br>Converter Off: Enable = Low | 9.0<br>0 | | 36.0<br>6 | $V_{DC}$<br>$V_{DC}$ |
| $V_{Enable}$ | Switch OFF time duration (Default)* | ENABLE High → Low | 1 | | | h |
| | Stand by current | 9.0 V ≤ $V_I$ ≤ 36.0 V, Enable = Low | | | 2.0 | mA |
| $I_I$ | Input current No load<br>Nominal load<br>Nominal load | $V_{In}$ = 36.0 V, $I_O$ = 0 A<br>$V_{In}$ = 24.0 V, $I_O$ = 2.1 A<br>$V_{In}$ = 12.0 V, $I_O$ = 2.1 A<br>$V_{In}$ = 9.0 V, $I_O$ = 2.7 A | | 40<br>2.4<br>4.8<br>8.0 | 50<br><br><br>9.0 | mA<br>A<br>A<br>A |
| | Input current integral, (Inrush current) | $V_I$ = 36.0 V | | | 20 | A²s |
| $I_{I\,max}$ | Max. input switch on current<br>$V_I \geq V_{I\,min}$, | $I_O$ = 2.7 A<br>Δ t ≤ 100 ms | on request | | | |
| | Input fuse | Yes | 15AF | | | |
| $C_I$ | Converter input capacity | | | 330 | | µF |
| | External line inductance | | | | 25 | µH |
| | Reverse input protection | Yes, MOSFET in minus $V_I$ | - 50.4 | | | $V_{DC}$ |
| | Input voltage transient protection | Varistor + Transil Diode | S20K25, 1.5KE68CA | | | |
| **OUTPUT: Power Unit** | | 9.0 V ≤ $V_I$ ≤ 36.0 V | | | | |
| $P_{O\,nom}$ | Output power | $T_A$ = - 40°C … + 70°C | | 50 | | W |
| $P_{O\,nom}$ | Output power continuous | 0 ≤ t ≤ 1s | 50 | | 65 | W |
| $V_{O\,nom}$ | Output voltage adjustment, factory set | | 23.8 | 24.0 | 24.1 | $V_{DC}$ |
| Δ $V_O$ | Regulation | 0 A ≤ $I_O$ ≤ 2.7 A<br>$T_A$ = - 40°C … + 70°C | ≤ 3.0 % $V_{O\,nom}$ | | | V |
| | | $T_A$ = + 70°C … + 85°C Class Tx | 10 | | | Min |
| Δ $V_{O\,dyn.}$ | Load regulation dynamic | Load: 20 - 80 - 20 % x $I_{O\,nom}$ | | 100 | 250 | mV |
| $t_{dyn}$ | Response time | Load: 20 - 80 - 20 % x $I_{O\,nom}$ | | 1 | 3 | ms |
| $V_{O\,rms}$ | Ripple | Nom. load BW 300 kHz | | 100 | 250 | $mV_{rms}$ |
| $V_{O\,pp}$ | Noise | Nom. load BW 20 MHz | | | 350 | $mV_{pp}$ |
| $t_{on}$ | Turn on time $V_O$ | 10.0 V ≤ $V_I$ ≤ 36.0 V, 0 A ≤ $I_O$ ≤ 2.0 A<br>Resistive load | 20 | | 200 | ms |
| $t_h$ | Hold up time $P_o$ = 50W<br>Recharge time loading storage cap: t ≤ 5s,<br>@ 0.5A ≤ $I_O$ ≤ 2.1A | 0 A ≤ $I_O$ ≤ 2.1 A<br>Class S2 @ EN 50155 | 10 | | | ms |
| | Overvoltage shutdown $V_O$ | 0 A ≤ $I_O$ ≤ 2.7 A | Converter off:<br>$V_O$ ≤ 32.4 V | | | V |
| $I_O$ | Output current | $T_A$ = - 40°C … + 85°C | 2.7 | 2.7 | | A |
| | Output current limitation of $I_O$ | $T_A$ = - 40°C … + 85°C | 2.8 | | | A |
| | Output short circuit current | Short circuit between + $V_O$ and – $V_O$ | | | 3.5 | A |
| $C_O$ | Internal output capacity | | | 6 | | mF |
| | Max. external output capacity | Battery charging on request | | | 30 | mF |

**OUTPUT: Signals**

| | | | | |
|---|---|---|---|---|
| PF | Power Fail (as option)<br>Open Collector Transistor<br>$V_{CEmax}$ ≤ 70 V, $I_{CEmax}$ ≤ - 20mA<br>Reference: - $V_{Out}$ | Transistor On: PF = Low, $V_O$ < $V_{O\,min}$<br>Transistor Off: PF= High, $V_O \geq V_{O\,min}$<br><br>Signal defined for $V_O \geq 0.6 \times V_{O\,nom}$ | $V_O$ < 0.95 x $V_{O\,nom}$ ± 3 %<br>$V_O \geq 0.95 \times V_{O\,nom}$ ± 3 % | $V_{DC}$<br>$V_{DC}$ |
| | Signals: optionally | Input:<br>Output: | LED yellow<br>LED yellow | |

**GENERAL SPECIFICATIONS**

| | | | | | | |
|---|---|---|---|---|---|---|
| f | Switching frequency | $V_I$ = 24 V, $I_O$ = 2.7 A | | 125 | | kHz |
| η | Efficiency | $P_O \geq 0.7 \times P_{O\,nom}$ | 86 | 91 | | % |
| | MTBF (SN 29500) | $V_I$ = 24 V, $I_O$ = 2.7 A, $T_A$ = + 40°C | | 450 000 | | h |
| | No load, short circuit proof | | Continuously | | | |

*ENABLE High: 0.2 mA ≤ $I_{EN}$ ≤ 1 mA Switch OFF time adjustable: 0, 15Min, 30Min. Default: 60min. Please, consult manufacturer
Low: 0 ≤ $I_{EN}$ ≤ 0.1 mA

| SYMBOL | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **SAFETY / DIMENSIONS** | | | | | | |
| | Creepage / clearance distances PD2 OV 2 (3)<br>PCB FR4, V0, TG = + 140°C (+150°C on request) | Input \| Output<br>Input \| Case<br>Output \| Case | 2.0<br>2.0<br>2.0 | | | mm<br>mm<br>mm |
| | Converter dielectric strength test<br>every unit<br>ramp function 2 s - 3 s - 2 s | Input \| Output<br>Input \| Case<br>Output \| Case | | | 2100<br>1500<br>750 | $V_{DC}$<br>$V_{DC}$<br>$V_{DC}$ |
| | Connectors | Input, Output: 7 pins<br>Req. external female plug | DFK-MSTBTA 2,5/7-GF-5,08<br>MSTB_2,5_HC/_7-STF-5,08<br>(Phönix: 1912236) | | | |
| | Protection class, protection system | SE M4 metal case | I, IP 50 | | | |
| | Dimensions with mounting plate<br>*see drawing* | w x h x d Chassis mounting | 120 x 154 x 42 | | | mm |
| | Assembling | Chassis mounting with screws | 4 x M4 | | | |
| | Weight | | | 750 | | g |
| **ENVIROMENTAL CONDITIONS** | | | | | | |
| $T_A$ | Operating temperature range $T_A$ | Continuously<br>EN 50155 Classe Tx 10 minutes | - 40<br>+ 70 | | + 70<br>+ 85 | °C<br>°C |
| $T_{Storage}$ | Storage Temperature | | - 40 | | + 85 | °C |
| | Cooling | | free air convection | | | |
| | Humidity | EN 50155, IEC 60571 | 75% averaged year,<br>95% 30 days | | | |
| | Vibration / Shock<br>valid only for chassis mounting | IEC 61373, IEC 68-2-27<br>Cat. I 3 Shocks per axis | 50 m / s² , 30 ms | | | |
| **EMC** | | | | | | |
| | Emission | Line conducted and radiated | EN 50121 - 3 - 2: 2006 | | | |
| | Immunity | ESD<br>EN 61000 - 4 - 2 | 6 kV / 8 kV<br>Performance criteria - B - | | | |
| | | High frequency field<br>EN 61000 - 4 - 3 | 20 V / m 80 MHz ... 1 GHz<br>Performance criteria - A - | | | |
| | | Burst<br>EN 61000 - 4 - 4 | Level 3 asym., sym.<br>Performance criteria - A - | | | |
| | | Surge<br>EN 61000 - 4 - 5 | 2 kV asym. / 1 kV sym.<br>$R_i$ = 42 Ω, Perf. criteria - A - | | | |
| | | HF – Current injection<br>EN 61000 - 4 - 6 | 10 $V_{rms}$, $R_i$ = 150 Ω<br>Performance criteria - A - | | | |

**STANDARDS**

| | | | | | | |
|---|---|---|---|---|---|---|
| | Applied standards: | EN 50155: 2008 | EN 60529 | EN 50124 - 1: 2006 | EN 50121 - 3 - 2: 2006 | IEC 60571 |
| | | SN 29500 | EN 50121 - 1 | EN 50125 - 1 | EN 60068 - 2 - 6, 2…27 | EN 61000 - 4 - 2…6 |
| | | IEC 571 | IEC 61373: 1999 | EN 60721 - 3 - 5 | EN 61373 : 1999 | ISO 7637-1 *) |

Technical specifications valid for: - 40° C ≤ $T_A$ ≤ + 70° C, 12.0 V ≤ $V_I$ ≤ 36.0 V, unless otherwise noted. *) beside load dump

**Pin Assignment XP10**

| Pin | | Recommended wire gauge |
|---|---|---|
| 7 | + $V_{In}$ | 2.5mm² |
| 6 | - $V_{In}$ | 2.5mm² |
| 5 | ENABLE | 1.0mm² |
| 4 | NC | |
| 3 | Power Fail | |
| 2 | - $V_{Out}$ | 1.5mm² |
| 1 | + $V_{Out}$ | 1.5mm² |

SE: ≥ 4,0mm² connected to case

**Order Code:**
**50 DDB 024 M24 W □ □ A** ***select***

**W = Chassis mounting**

| | |
|---|---|
| | **0 0 = class S1 0ms** |
| | **0 1 = class S1 and external counter connector** |
| **IP 20** | **1 0 = class S2 10ms** |
| | **1 1 = class S2 and external counter connector** |
| | **2 0 = class S1 0ms** |
| | **2 1 = class S1 0ms and ext. connector** |
| **IP 50** | **3 0 = class S2 10ms** |
| | **3 1 = class S2 10ms and external connector** |

Keep free space on top and below the converter unit: ≥ 25 mm.

Attention: Take care to a close thermal connection between converter mounting plate and wall.

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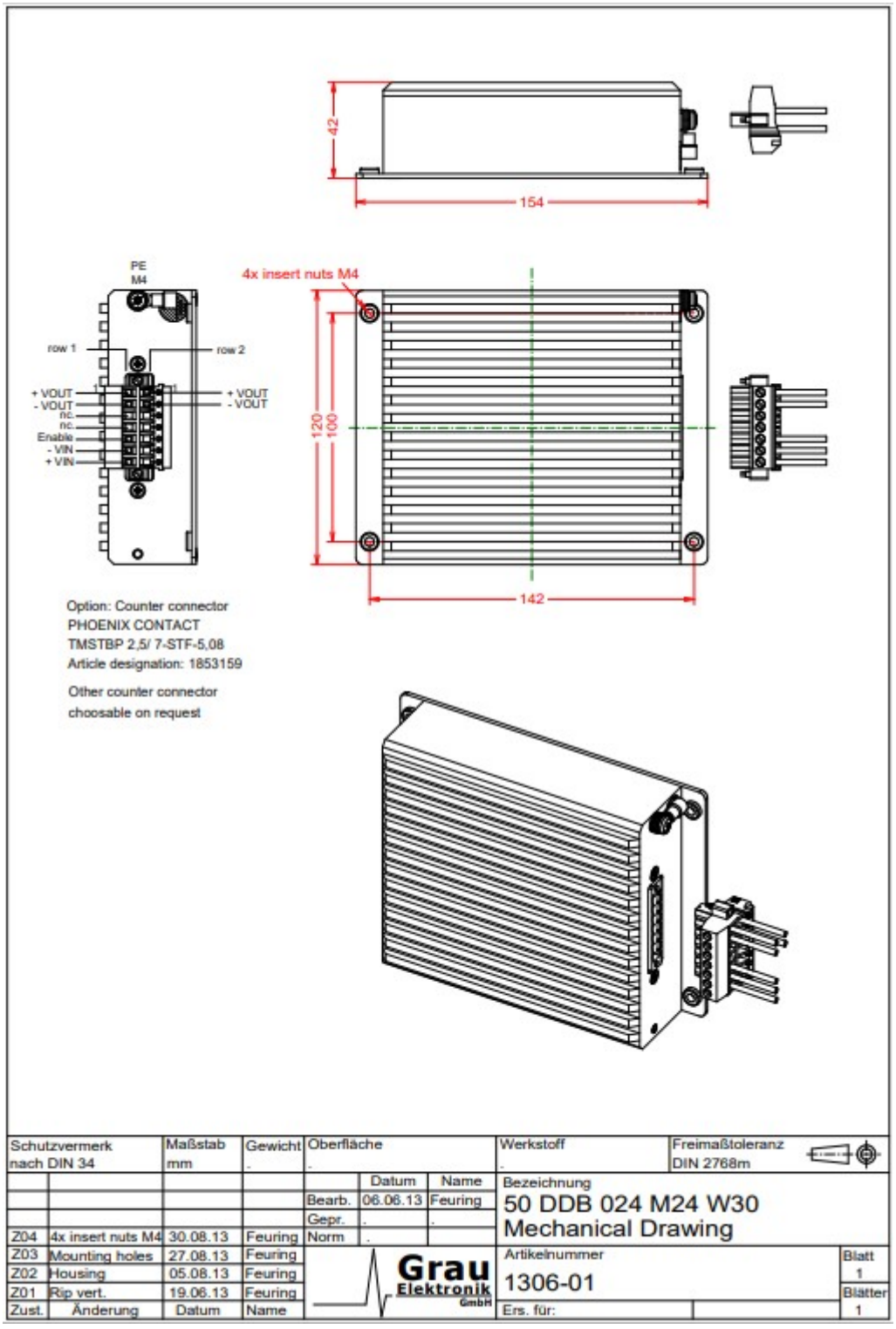


| Schutzvermerk nach DIN 34 | | Maßstab mm | Gewicht . | Oberfläche . | | | Werkstoff . | Freimaßtoleranz DIN 2768m | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Datum | Name | Bezeichnung | | |
| | | | | Bearb. | 06.06.13 | Feuring | 50 DDB 024 M24 W30 Mechanical Drawing | | |
| | | | | Gepr. | . | . | | | |
| Z04 | 4x insert nuts M4 | 30.08.13 | Feuring | Norm | . | | | | |
| Z03 | Mounting holes | 27.08.13 | Feuring | Grau Elektronik GmbH | | | Artikelnummer 1306-01 | | Blatt 1 |
| Z02 | Housing | 05.08.13 | Feuring | | | | | | |
| Z01 | Rip vert. | 19.06.13 | Feuring | | | | | | Blätter 1 |
| Zust. | Änderung | Datum | Name | | | | Ers. für: | | |