

H SERIES - DC/DC

DESCRIPTION

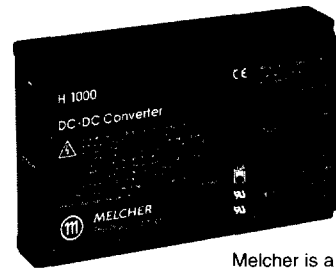
The H Series DC/DC converters has been developed for use in industrial, datacom, and other advanced electronic applications. Features include input transient protection, input over and undervoltage lockout, high efficiency and high reliability. All outputs are short circuit, overvoltage and overtemperature protected. Modules may be chassis mounted or plugged into 19 inch rack systems per DIN 41494.

FEATURES

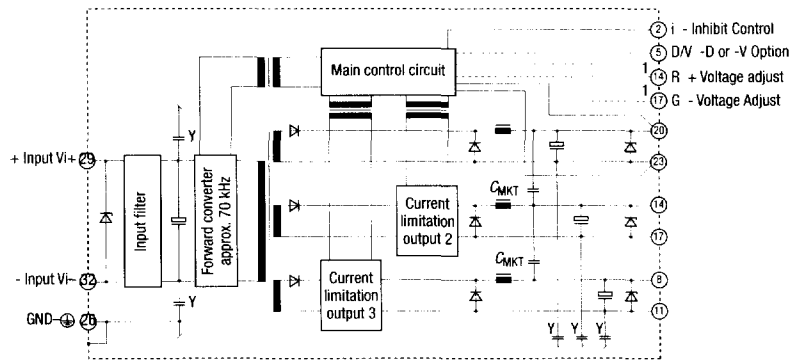
- Single, Dual, and Triple Outputs
- Surge and Transient Suppression Circuitry
- Outputs Individually Isolated and Protected Against Overload
- 4200VDC Isolation
- Safety per UL 1950 and EN60950
- Single Output Models Adjustable Output from 0% to 110%
- Optional DIN-rail mounting with HZZ00610 bracket.

| Selection Chart (Note 1) | | | | |
|--------------------------------------|-----------------|-----|-------------------------|-----------------------|
| Model | Input Range VDC | | Output V1, V2, V3 (VDC) | Output I1, I2, I3 (A) |
| | Min | Max | | |
| SINGLE OUTPUT MODELS | | | | |
| 12 H1001-2R | 8 | 15 | 5 | 8.0 |
| 12 H1301-2R | 8 | 15 | 12 | 4.0 |
| 12 H1501-2R | 8 | 15 | 15 | 3.4 |
| 12 H1601-2R | 8 | 15 | 24 | 2.0 |
| 12 H1901-2R | 9 | 15 | 48 | 1.0 |
| 24 H1001-2R | 14 | 30 | 5 | 8.0 |
| 24 H1301-2R | 14 | 30 | 12 | 4.0 |
| 24 H1501-2R | 14 | 30 | 15 | 3.4 |
| 24 H1601-2R | 14 | 30 | 24 | 2.0 |
| 24 H1901-2R | 18 | 30 | 48 | 1.0 |
| 48 H1001-2R | 28 | 60 | 5 | 8.0 |
| 48 H1301-2R | 28 | 60 | 12 | 4.0 |
| 48 H1501-2R | 28 | 60 | 15 | 3.4 |
| 48 H1601-2R | 28 | 60 | 24 | 2.0 |
| 48 H1901-2R | 36 | 60 | 48 | 1.0 |
| ISOLATED DUAL OUTPUT MODELS | | | | |
| 12 H2320-2 | 8 | 15 | 12, 12 | 2.0, 2.0 |
| 12 H2540-2 | 8 | 15 | 15, 15 | 1.7, 1.7 |
| 24 H2320-2 | 14 | 30 | 12, 12 | 2.0, 2.0 |
| 24 H2540-2 | 14 | 30 | 15, 15 | 1.7, 1.7 |
| 48 H2320-2 | 28 | 60 | 12, 12 | 2.0, 2.0 |
| 48 H2540-2 | 28 | 60 | 15, 15 | 1.7, 1.7 |
| ISOLATED TRIPLE OUTPUT MODELS | | | | |
| 12 H3020-2 | 8 | 15 | 5, 12, 12 | 5.0, 0.7, 0.7 |
| 12 H3040-2 | 8 | 15 | 5, 15, 15 | 5.0, 0.6, 0.6 |
| 24 H3020-2 | 14 | 30 | 5, 12, 12 | 5.0, 0.7, 0.7 |
| 24 H3040-2 | 14 | 30 | 5, 15, 15 | 5.0, 0.6, 0.6 |
| 48 H3020-2 | 28 | 60 | 5, 12, 12 | 5.0, 0.7, 0.7 |
| 48 H3040-2 | 28 | 60 | 5, 15, 15 | 5.0, 0.6, 0.6 |

NOTES: 1) See OPTIONS table for available pinout configurations.



Melcher is a member of the Power-One Group of Companies

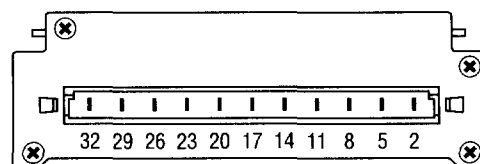


Note 1: Voltage Adjust available only on single output models

DC-DC converter block diagram

| Pin | Single Output | Dual Output | Triple Output |
|-----|-----------------|-----------------|-----------------|
| 2 | Inhibit Control | Inhibit Control | Inhibit Control |
| 5 | -D or -V Option | -D or -V Option | -D or -V Option |
| 8 | +V1 | | +V3 |
| 11 | -V1 | | -V3 |
| 14 | +Voltage Adjust | +V2 | +V2 |
| 17 | -Voltage Adjust | -V2 | -V2 |
| 20 | +V1 | +V1 | +V1 |
| 23 | -V1 | -V1 | -V1 |
| 26 | GND (note1) | GND (note1) | GND (note1) |
| 29 | +Input | +Input | +input |
| 32 | -Input | -Input | -Input |

Note 1: Leading pin (pregrounded)



H SERIES - DC/DC

INPUT SPECIFICATIONS (Note 1)

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|-----------------------------|---|--------------------------|------|------|-------|
| No Load Input Power | Single output models, nominal input. | | 1 | 1.5 | W |
| | Dual output models, nominal input. | | 4 | 6 | |
| | Triple output models, nominal input. | | 4 | 6 | |
| Input Voltage - DC (Note 2) | Continuous input range, 12V. | 8 | 12 | 15 | VDC |
| | Continuous input range, 24V. | 14 | 24 | 30 | |
| | Continuous input range, 48V. | 28 | 48 | 60 | |
| Input Overvoltage | Maximum input overvoltage. | 12V models | 0 | 20 | V |
| | | 24V models | 0 | 40 | |
| | | 48V models | 0 | 80 | |
| Input Current | 12V models, full rated load. | | 5 | | A |
| | 24V models, full rated load. | | 2.5 | | |
| | 48V models, full rated load. | | 1.3 | | |
| Fusing | Recommended value of external fuse. | 12V models | 10 | | A |
| | | 24V models | 8 | | |
| | | 48V models | 3.15 | | |
| Converter Idle Power | S/D Pin high, nominal input voltage. | | | 2 | W |
| Peak Inrush Current | Maximum input voltage, 0Ω source impedance. | 12, 24V models | | 380 | A |
| | | 48V models | | 350 | |
| Line Regulation, V1 | Line changes from minimum input voltage to nominal input voltage. | 5V output | | ±50 | mV |
| | | 12V, 15V outputs | | ±100 | |
| | | 24V, 48V outputs | | ±150 | |
| Turn On Time | Output response of V1 from 10% to 95%. | 5V single output models | 5 | 15 | mS |
| | | 12V single output models | 10 | 30 | |
| | | 15V single output models | 15 | 40 | |
| | | 24V single output models | 20 | 60 | |
| | | 48V single output models | 85 | 220 | |
| | | Dual output models | 25 | 70 | |
| | | Triple output models | 75 | 200 | |
| Operating Frequency | Switching frequency of main transformer, fixed. | | 75 | | kHz |

NOTES: 1) All parameters measured at Tc=25°C, pins 2 and 23 connected, nominal input voltage and full rated load unless otherwise noted.

2) H models with 48V single outputs have higher minimum input voltages. See Selection Chart for specific requirements.

OUTPUT SPECIFICATIONS (Note 1)

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|--------------------------|--|------------------------------------|------------------------|-------|-------|
| Set Point Accuracy | Nominal input, full rated load. | 5V single output | 5.00 | 5.20 | VDC |
| | | 12V single output | 11.76 | 12.24 | |
| | | 12V output, dual and triple models | 11.10 | 12.90 | |
| | | 15V single output | 14.70 | 15.30 | |
| | | 15V output, dual and triple models | 13.90 | 16.10 | |
| | | 24V single output | 23.52 | 24.48 | |
| | | 48V single output | 47.04 | 48.96 | |
| Load Regulation, V1 | Voltage variation for changes in load starting at 100% load and changing to 0% load. | 5V models | | 50 | mV |
| | | All other models | | 150 | |
| Load Regulation, V2, V3 | Voltage variation for changes in load starting at 100% load and changing to 0% load. | 12V output | See Regulation Graph 1 | | |
| | | 15V output | See Regulation Graph 2 | | |
| Cross Regulation, V1 | Voltage variation for changes in load of V2 or V3 outputs starting at 100% load and changing to 0% load. | 5V outputs | ±5 | ±15 | mV |
| | | 12V output | ±10 | ±30 | |
| | | 15V output | ±15 | ±45 | |
| Cross Regulation, V2, V3 | Voltage variation for changes in load of V2 or V3 outputs starting at 100% load and changing to 0% load. | 12V outputs | See Regulation Graph 1 | | |
| | | 15V outputs | See Regulation Graph 2 | | |
| Minimum Loads | | 0 | | | Amps |
| Ripple and Noise | Full load, 20MHz bandwidth | 48V output models | | 150 | mVpp |
| | | All other models | | 200 | |
| Output Power | | 5V single output models | | 41 | Watts |
| | | 12V single output models | | 48 | |
| | | 15V single output models | | 51 | |
| | | 24V single output models | | 48 | |
| | | 48V single output models | | 48 | |
| | | Dual output models | | 48 | |
| Triple output models | | 43 | | | |
| Overshoot/Undershoot | Output voltage overshoot/undershoot at turn-on | | | 0 | % |
| Efficiency | Full rated load, nominal input | 5V single output models | 73 | | % |
| | | 12V single output models | 79 | | |
| | | 15V single output models | 80 | | |
| | | 24V single output models | 81 | | |
| | | 48V single output models | 83 | | |
| | | Dual output models | 79 | | |
| | | Triple output models | 77 | | |

NOTES: 1) All parameters measured at Tc=25°C, pins 2 and 23 connected, nominal input voltage and full rated load unless otherwise noted.

H SERIES - DC/DC

INTERFACE SIGNALS AND INTERNAL PROTECTION

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|----------------------------|---|------------|------|-------------|--------------------|
| Undervoltage Lock Out | Inhibits converter operation due to excessive input undervoltage. | | 0.8 | | V _{inmin} |
| Overtvoltage Lock Out | Inhibits converter operation due to excessive input overvoltage. | | 1.1 | | V _{inmax} |
| Inhibit Control Voltage | Voltage to enable outputs (or connect pins 2 and 23 together): Voltage to disable outputs (or leave open): | -50 2.4 | | 0.8 50.0 | V |
| Inhibit Control Current | Outputs enabled. | -60 | -100 | -220 | μA |
| Inhibit LED | Red LED illuminated when output is inhibited. | | | | |
| Overtemperature Protection | Case temperature which activates protective shutdown. Automatic restart below this temperature. | 95 | 105 | | °C |
| Overtvoltage Protection | Output voltage trip point. | | | | V |
| | 5V single output models | | 7.5 | | |
| | 12V single output models | | 21 | | |
| | 15V single output models | | 25 | | |
| | 24V single output models | | 41 | | |
| | 48V single output models | | 85 | | |
| | 12V output, dual and triple output models | | 25 | | |
| | 15V output, dual and triple output models | | 31 | | |
| Overcurrent Protection | Percentage of maximum output required to initiate current limit. | | | | % |
| | V1 output | 110 | | | |
| | V2, V3 output | 120 | | | |
| Output Adjust Range | Percentage of output, single output models only. | 0 | | 110 | % |
| Output Adjust Limits | Voltage limits of +Voltage Adjust input. | 0 | | 8 | V |
| Power OK LED | Green LED illuminated when output is within regulation limits. | | | | |

SAFETY, REGULATORY, AND EMI SPECIFICATIONS

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|------------------------------|--|-----------------------------|-----|----------|-------|
| Agency Approvals | UL1950. CAN/CSA 22.2 NO. 950-95. EN60950 (LGA). | | | Approved | |
| Dielectric Withstand Voltage | Input to output. Input to case. Output to output. Output to case. | 4200 2800 300 1400 | | | VDC |
| Insulation Resistance | Input to output, 500VDC | | 300 | | MΩ |
| Electromagnetic Interference | EN55011/CISPR11, EN55022 / CISPR 22 Conducted (Note 1). EN55011/CISPR11, EN55022 / CISPR 22 Radiated. | B B | | | Class |
| ESD Susceptibility | Per EN61000-4-2, level 2. | 4 | | | kV |
| Radiated Susceptibility | Per EN61000-4-3, level X. | 20 | | | V/M |
| EFT/Burst | Per EN61000-4-4, level 1. | ±0.5 | | | kV |
| Input Transient Protection | Per EN61000-4-5, class 1. | | | | kV |
| | Line to Line | 0.5 | | | |
| | Line to Ground | 0.5 | | | |
| Leakage Current | Per EN60950. | | | 10 | μA |

NOTES: 1) All 12V input models are rated for Class A.

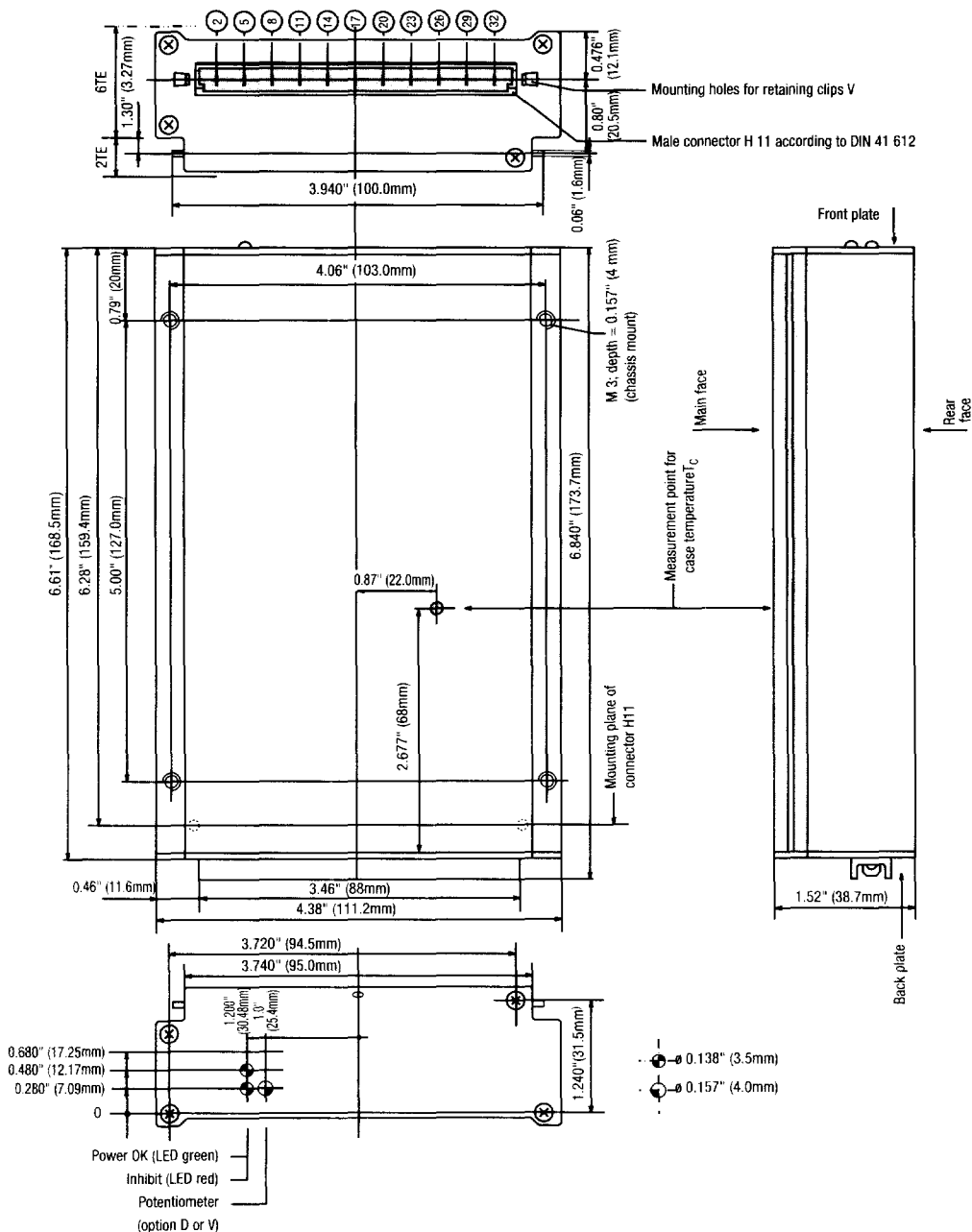
ENVIRONMENTAL SPECIFICATIONS

| PARAMETER | CONDITIONS/DESCRIPTION | MIN | NOM | MAX | UNITS |
|-------------------------|---|------|-------------------------------|------------|--------------------|
| Coupling Capacitance | Input to output. | | | | pF |
| | 12V models | 2200 | | 3300 | |
| | 24V models | 750 | | 1200 | |
| | 48V models | 190 | | 300 | |
| Altitude | Operating. Non-operating. | | | 10k 40k | ASL Ft. ASL Ft. |
| Temperature - Ambient | At 100% load. | -10 | | 50 | °C |
| Temperature - Case | At 100% load. | -10 | | 80 | °C |
| Temperature - Storage | | -25 | | 100 | °C |
| Temperature Coefficient | 0°C to 50°C (after 15 minute warm-up). | | | ±0.02 | %/°C |
| Relative Humidity | Non-condensing. | 5 | | 93 | %RH |
| Shock | | | | 15 | G |
| Vibration | | | | 2 | GRMS |
| MTBF | Calculated, MIL-HDBK-217F, 40°C, ground benign, single output models. Calculated, MIL-HDBK-217F, 40°C, ground benign, dual output models. Calculated, MIL-HDBK-217F, 40°C, ground benign, triple output models. | | 384,000 306,000 270,000 | | Hours |
| Unit Weight | | | 27.1/770 | | oz/gm |

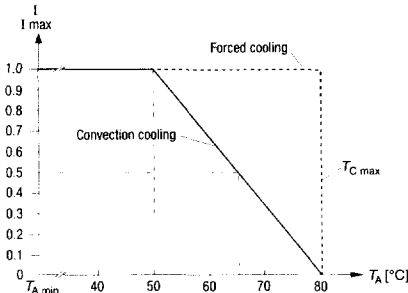
H SERIES - DC/DC

OPTIONS

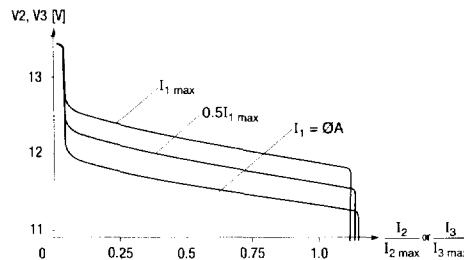
| DESCRIPTION | OPTION | NOTES |
|------------------------------------|--------------|--|
| Extended Ambient Temperature Range | -7 | Add '-7' suffix to part number. Increases ambient temperature operation to -25° to 71°C. |
| Save Data Signal | -D1 thru -D8 | Input and/or V1 output monitoring circuitry. A logic "low" (JFET output) or "high" (NPN output) is generated if one or both output falls below a preselected threshold. Consult factory for specific types. Not compatible with -V option. |
| ACFAIL Signal (VME) | -V | This option defines an undervoltage monitoring circuit for the input or the input and main output voltage. Equivalent to option D, option V generates an ACFAIL signal which conforms to the VME standard. Not compatible with -D option. |
| Front Panel for 19" Rack | | Order HZZ00802 front panel for 19" rack mounting on Schroff systems. |
| Chassis Mounting Plate | | Order HZZ01215 for chassis mounting plates. Designed for mounting the 19" cassette to a chassis/wall where only frontal access is given. |
| DIN Rail Bracket | | Order HZZ01210 universal mounting bracket for DIN-rail or chassis mounting. |
| Mating Connectors | | Order as follows for mating H11 connectors: HZZ00101: Faston, straight, 0.250" x 0.030" (6.3 x 0.8 mm) HZZ00102: Screw terminals, 90°, #13 AWG (2.5 mm ²) max HZZ00103 Solder pin 0.200" (5.2 mm), Ø 0.063" (1.6 mm) |



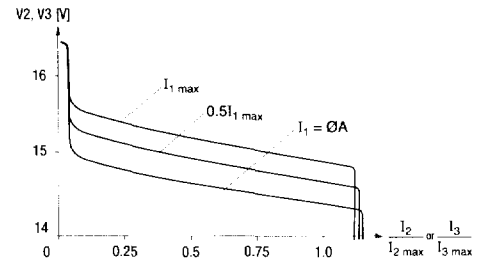
H SERIES - DC/DC



Output current derating vs. temperature for -2 units.



Regulation Graph 1



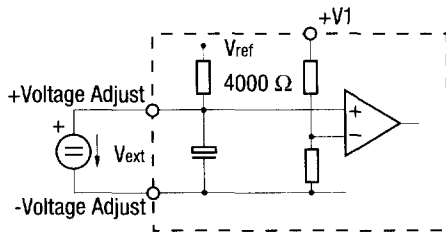
Regulation Graph 2

OUTPUT VOLTAGE ADJUSTMENT

As a standard feature, single output modules offer an adjustable output voltage, identified by the letter "R" in the part number. The output voltage $V1$ can either be adjusted with an external voltage (V_{ext}) or with an external resistor ($R1$ or $R2$) to the new value, $V1_A$. The adjustment range of $V1_A$ is approximately 0% to 110% of the nominal output voltage, $V1$. For output voltages above the nominal output value, the minimum input voltage must be increased proportionally to the increase in output. For example, to increase the output of an H Series DC/DC Converter to 110% of initial value, the minimum input voltage must be increased by an additional 10%.

Method 1:

Adjust output voltage $V1_A$ from 0% to 110% of $V1$ using V_{ext} between +VOLTAGE ADJUST (pin 14) and -VOLTAGE ADJUST (pin 17). NOTE: Values of V_{ext} must be between 0.0V and 8.0V.

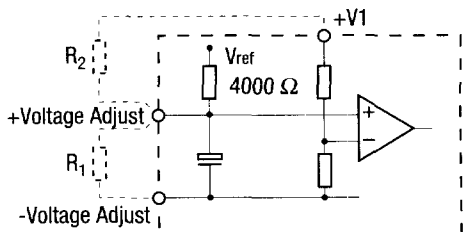


Voltage Adjustment with external voltage V_{ext}

$$V1_A = \frac{V_{ext} \times V1}{2.5V} \text{ where } V_{ext} = \frac{2.5V \times V1_A}{V1}$$

Method 2:

Adjust output voltage $V1_A$ from 0% to 100% of $V1$ using resistor $R1$ between +VOLTAGE ADJUST (pin 14) and -VOLTAGE ADJUST (pin 17).



Voltage Adjustment with external resistor $R1$ or $R2$

$$V1_A = \frac{V1 \times R1}{R1 + 4000\Omega} \text{ where } V_{ext} = \frac{4000\Omega \times V1_A}{V1 - V1_A}$$

Method 3:

Adjust output voltage $V1_A$ from 100% to 110% of $V1$ using resistor $R2$ between +VOLTAGE ADJUST (pin 14) and output $V1$ (pin 20).

$$R2 = \frac{4000\Omega \times V1_A \times (V1 - 2.5V)}{2.5V \times (V1_A - V1)} \quad \text{and } V1_A = \frac{V1 \times 2.5V \times R2}{2.5V \times (R2 + 4000\Omega) - (V1 \times 4000\Omega)}$$

NOTES: To prevent damage, $R2$ should never be less than 47k Ω . R inputs of n units with paralleled outputs may be paralleled, but if one single external resistor is to be used, its value should be $R1/n$, or $R2/n$ respectively.