

October 27, 1997

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**DESCRIPTION:**

The MP54C/MP55C series of power modules are low noise (no EMI), economical 25W (nominal) linear DC:DC converters with an integral connector conforming to Intel Corporation's Voltage Regulator Module specification for the Pentium® Processor.

Outstanding features include internal current limiting and thermal shutdown, providing full device protection against load faults and thermal overstress. The MP54C series is designed to supply power for the Pentium Processor P54C & P54CS and associated chip sets. With a tightly controlled output voltage, nominally 3.525V, the MP54C meets all requirements for powering VRE specification processors.

The MP54C-5E is a reduced cost version offering a maximum current of 5A. For P55C processors, please see Semtech's datasheet, MP55C.

**FEATURES:**

- Integral VRM header connector
- Input voltage  $5V \pm 5\%$
- Fixed output voltage 3.525V for all Pentium® Processor variants (VRE or standard voltage)
- Steady state output current 5.8A/7.5A peak (MP54C-E) or 5A (MP54C-5E)
- Low dropout voltage
- Fast transient response
- Low noise, no EMI
- Fully qualified by Intel Corporation for Intel Pentium® Processor P54C & P54CS 90 - 200MHz module

**APPLICATIONS:**

- Intel Pentium® Power Supply

**ORDERING INFORMATION:**

| DEVICE   | Max Current (A) | Output Voltage (V) |
|----------|-----------------|--------------------|
| MP54C-E  | 7.5A            | 3.525              |
| MP54C-5E | 5.0A            | 3.525              |

**ELECTRICAL CHARACTERISTICS**

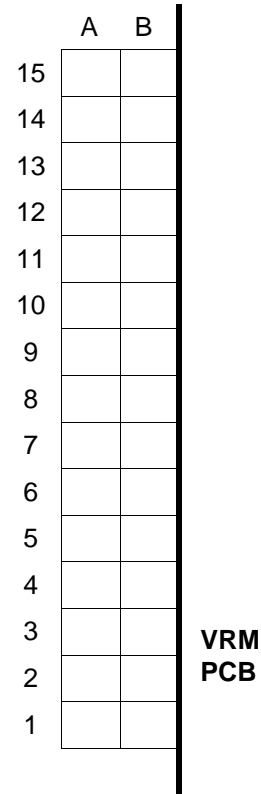
| PARAMETER   | SYMBOL         | MIN        | TYP   | MAX   | UNITS         |
|---|----------------|------------|-------|-------|---------------|
| Output Voltage <sup>(1)</sup>                             | $V_O$          | 3.400      | 3.525 | 3.600 | V             |
| Output Current (MP54C-E)                                  | $I_O$          | 0.01       | 5.8   | 7.5   | A             |
| Output Current (MP54C-5E)                                 | $I_O$          | 0.01       |       | 5.0   | A             |
| Line Regulation <sup>(1)</sup>                            | $REG_{(LINE)}$ |            | 0.015 | 0.2   | %             |
| Load Regulation <sup>(1)</sup>                            | $REG_{(LOAD)}$ |            | 0.1   | 0.4   | %             |
| Dropout Voltage   | $V_D$          |            | 1.1   | 1.2   | V             |
| Current Surge Limit (MP54C-E)                             | $I_S$          |            | 9.5   |       | A             |
| Current Surge Limit (MP54C-5E)                            | $I_S$          |            | 7.5   |       | A             |
| Quiescent Current   | $I_Q$          |            | 12    | 16    | mA            |
| Temperature Coefficient                                   | $T_C$          |            | 0.005 |       | %/°C          |
| Temperature Stability                                     | $T_S$          |            | 0.5   |       | %             |
| RMS Output Noise <sup>(2)</sup>                           | $V_N$          |            | 0.003 |       | % $V_O$       |
| Ripple Rejection Ratio                                    | $R_A$          |            | 72    |       | dB            |
| Linear Airflow Requirements<br>(ambient temperature 55°C) |                | 0.5<br>100 |       |       | m/s<br>ft/min |

**NOTES:**

- (1) Low duty cycle pulse testing with Kelvin connections required.  
 (2) Bandwidth of 10 Hz to 10 kHz.

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| INPUT AND OUTPUT CONNECTIONS |                   |                   |         |
|------------------------------|-------------------|-------------------|---------|
| Pin No.                      | Row A             | Row B             | Pin No. |
| 1                            | V <sub>SS</sub>   | V <sub>SS</sub>   | 1       |
| 2                            | V <sub>SS</sub>   | V <sub>SS</sub>   | 2       |
| 3                            | ND                | V <sub>I/O</sub>  | 3       |
| 4                            | V <sub>I/O</sub>  | V <sub>I/O</sub>  | 4       |
| 5                            | +3.3V             | +3.3V             | 5       |
| 6                            | +3.3V             | +3.3V             | 6       |
| 7                            | V <sub>CORE</sub> | V <sub>CORE</sub> | 7       |
| 8                            | V <sub>CORE</sub> | V <sub>CORE</sub> | 8       |
| 9                            | V <sub>SS</sub>   | V <sub>CORE</sub> | 9       |
| 10                           | V <sub>CORE</sub> | V <sub>CORE</sub> | 10      |
| 11                           | PWR GOOD          | UPVRM#            | 11      |
| 12                           | SENSE             | DISABLE           | 12      |
| 13                           | V <sub>SS</sub>   | V <sub>SS</sub>   | 13      |
| 14                           | +5.0V             | +5.0V             | 14      |
| 15                           | +5.0V             | +5.0V             | 15      |



End view of VRM connector  
(viewed from motherboard side)

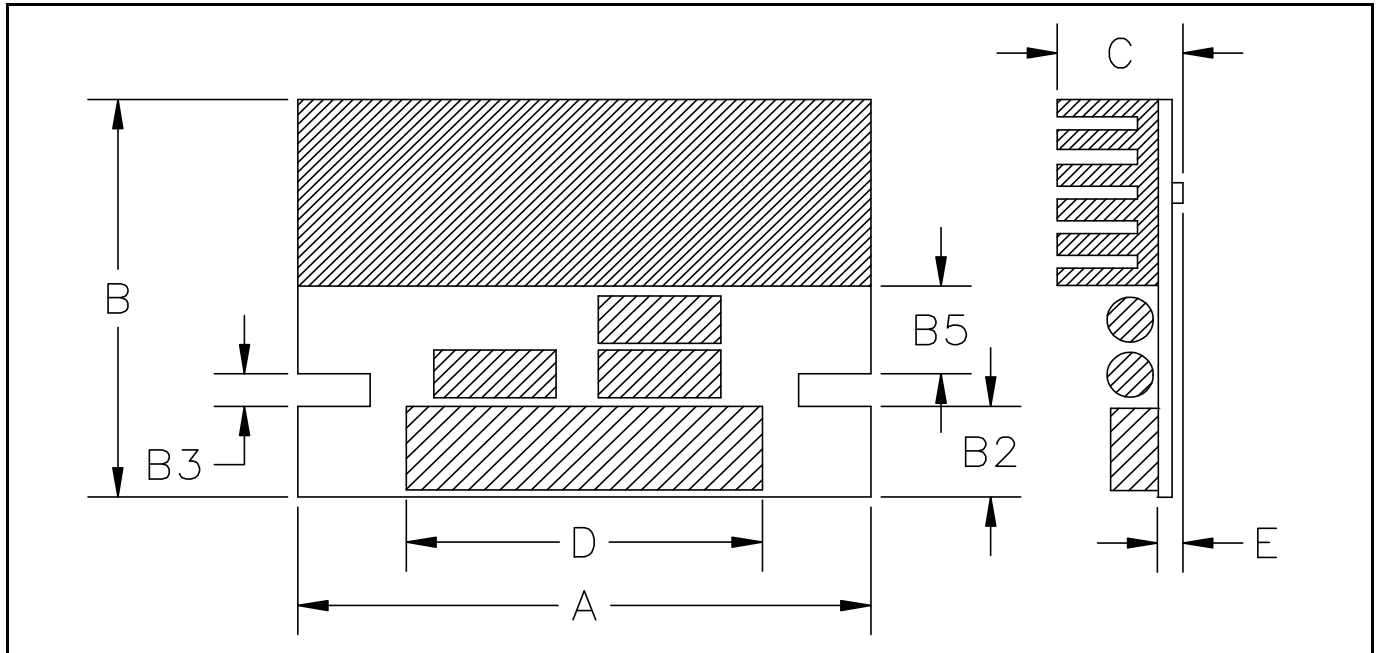
### VOLTAGE REGULATOR MODULE CONNECTOR PIN REFERENCE

| Pin Name          | I/O    | Function   | Notes           |
|-------------------|--------|--|-----------------|
| +3.3V             | Input  | +3.3V Supply   | Not connected   |
| +5.0V             | Input  | +5.0V Supply   | Input           |
| V <sub>CORE</sub> | Output | Voltage Regulator Module Output  | Output          |
| V <sub>I/O</sub>  | Output | CPU I/O power connection. Allows for split voltage plane for I/O circuitry.  | Tied to output  |
| V <sub>SS</sub>   | Input  | Ground Reference   | Ground          |
| DISABLE           | Input  | When driven high, this input will disable the Voltage Regulator Module output and the output of the module will float.                 | Not connected   |
| PWR GOOD          | Output | Power Good is driven low when the VRM output is not within valid levels.   | Not connected   |
| SENSE             | Input  | Sense is provided for the regulator to correct for voltage drops across the connector and motherboard powerplane.                      | Not connected   |
| UPVRM#            | Input  | This signal indicates to future upgrade processors that the proper module is installed. This signal must be tied HIGH for this module. | Tied to output. |
| ND                |        | This pin may be used as a +12V supply input, otherwise it should be left as a no connect (NC)  | Not connected   |

**Note:** The functions of DISABLE, SENSE, PWR\_GOOD & UPVRM# are optional features specified by Intel. These are not included in the standard Voltage Regulator Module.

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## MECHANICAL DIMENSIONS



| Dimension      | Inches | Millimeters |
|----------------|--------|-------------|
| A              | 2.575  | 65.4        |
| B              | 1.8    | 45.7        |
| C              | 0.8    | 20.3        |
| D              | 1.6    | 40.6        |
| E              | 0.24   | 6.1         |
| B <sub>2</sub> | 0.42   | 10.7        |
| B <sub>3</sub> | 0.15   | 3.8         |
| B <sub>5</sub> | 0.5    | 12.7        |

Component size and location for illustration only