October 27, 1997

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DESCRIPTION:

The MP54C/MP55C series of power modules are low noise (no EMI), economical 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 MP55C is designed to power split voltage plane microprocessors requiring 3.3V $V_{I/O}$ and 2.xV V_{CORE}. The $V_{I/O}$ is always supplied directly from a 3.3V input; either the main system power supply or a low dropout regulator on the motherboard. The CPU core can be supplied either from the 3.3V main supply to reduce heat dissipation (MP55C-3.3) or the 5V main power supply (MP55C-5). The MP55C-3.3 still requires a few mA of 5V power for control circuitry. The MP55C-3.3 will not be available for CPU core voltages higher than 2.8V. Please contact Semtech for availability.

APPLICATIONS:

- Pentium® Processor P55C, Cyrix 6x86 and AMD5$_K$86 power supplies

FEATURES:

- Integral VRM header connector
- Input voltage 5V ± 5%
- 2.8 ± 0.1V output for CPU core power
- 3.3V passes through the I/O power plane
- Maximum output current 6A
- Input power voltage:
  5V ± 5% for MP55C-5 or
  3.3V for MP55C-3.3
- Low noise, no EMI

ORDERING INFORMATION:

DEVICE	Input (V)	Output (V)
MP55C-5-2.8	5.0	2.8
MP55C-5-2.5	5.0	2.5
MP55C-3.3-2.8	3.3	2.8
MP55C-3.3-2.7	3.3	2.7
MP55C-3.3-2.5	3.3	2.5

ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	MIN	TYP	MAX	UNITS
Output Voltage (1)	2.8V version	V_O	2.7	2.8	3.0	V
	2.7V version		2.6	2.7	2.8	
	2.5V version		2.4	2.5	2.6	
Output Current		I_O			6.0	A
Line Regulation(1)		$REG_{(LINE)}$		0.015	0.2	%
Load Regulation(1)		$REG_{(LOAD)}$		0.1	0.4	%
Dropout voltage	(MP55C-5) (MP55C-3.3)	V_D		1.2 0.40	1.3	V
Current Surge Limit		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(2)		V_N		0.003		$\%V_O$
Ripple Rejection Ratio		R_A		72		dB
Linear Airflow Requirements (ambient temperature 55°C)			0.5 100			m/s 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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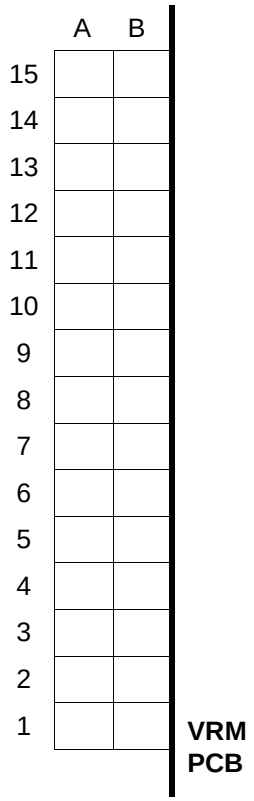
INPUT AND OUTPUT CONNECTIONS			
Pin No.	**Row A**	**Row B**	**Pin No.**
1	V_{SS}	V_{SS}	1
2	V_{SS}	V_{SS}	2
3	ND	$V_{I/O}$	3
4	$V_{I/O}$	$V_{I/O}$	4
5	+3.3V	+3.3V	5
6	+3.3V	+3.3V	6
7	V_{CORE}	V_{CORE}	7
8	V_{CORE}	V_{CORE}	8
9	V_{SS}	V_{CORE}	9
10	V_{CORE}	V_{CORE}	10
11	PWR GOOD	RES	11
12	SENSE	DISABLE	12
13	V_{SS}	V_{SS}	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	Connected directly to $V_{I/O}$. **MP55C-3.3:** Main Power Input
+5.0V	Input	+5.0V Supply	**MP55C-5:** Main power input **MP55C-3.3:** Bias for regulator control
V_{CORE}	Output	Voltage Regulator Module Output	2.8V output for CPU core
$V_{I/O}$	Output	CPU I/O power connection.	Tied to 3.3V input (V_{CC3})
V_{SS}	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.	**MP55C-5:** Not connected **MP55C-3.3:** Connected
RES	Input	Formerly UPVRM#	Tied to output.
ND			Not connected

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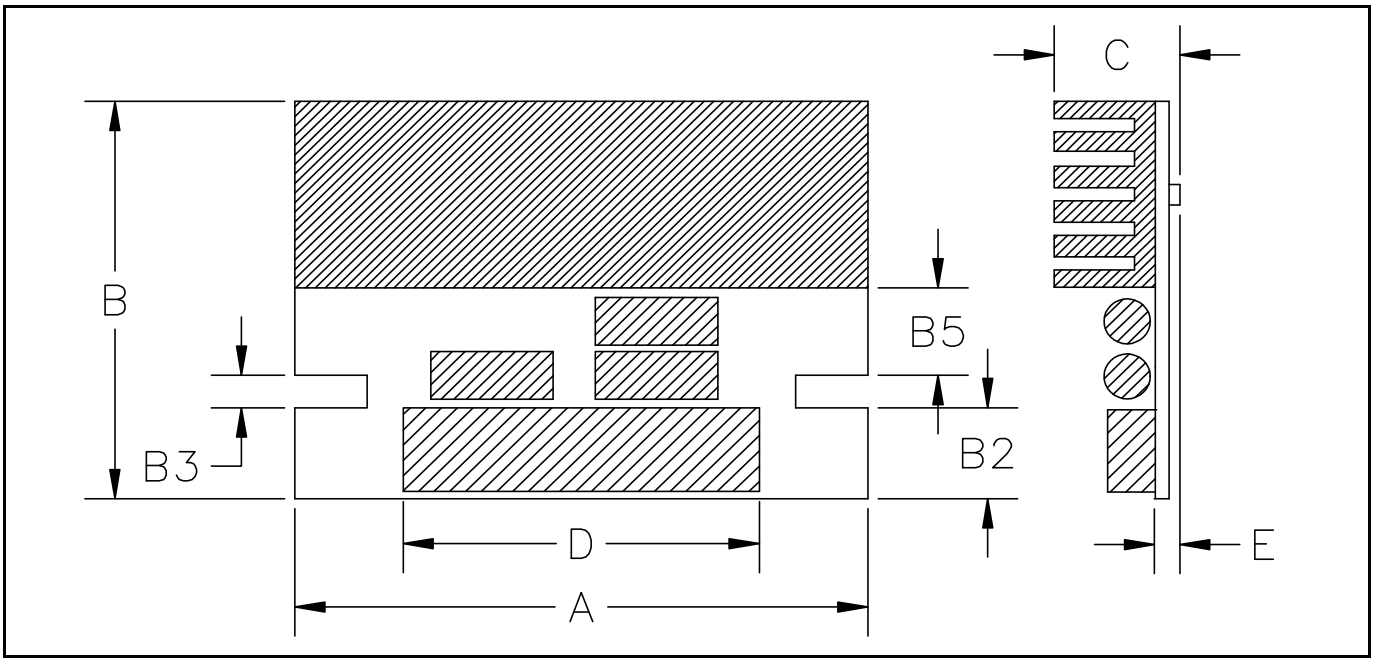
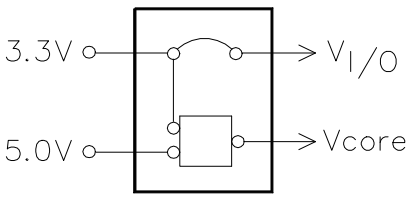
MECHANICAL DIMENSIONS

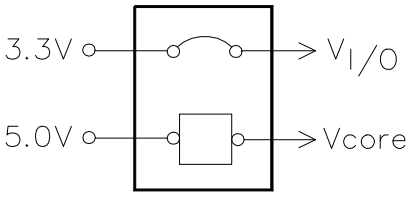


Dimension	Inches	Millimeters
A	2.575	65.4
B	1.8	45.7
C	0.8	20.3
D	1.6	40.6
E	0.24	6.1
B_2	0.42	10.7
B_3	0.15	3.8
B_5	0.5	12.7

Component size and location for illustration only

INPUT VOLTAGE CONFIGURATIONS





MP55C-3.3
Uses 3.3V input (from main system power supply) for conversion to CPU core voltage. Lowest dropout at 4A is 0.35V; VCORE higher than 2.8V must use MP55C-5.

A few milliamps of power at 5V is necessary for control circuit bias.

MP55C-5
Uses 5V for main power and 3.3V for $V_{I/O}$. 3.3V can be supplied by a low dropout regulator such as an EZ1085. 5V is supplied by main system power supply.