



Patent

CM8501C
1.5A Bus TERMINATOR

GENERAL DESCRIPTION

The CM8501C is a low cost switching regulator designed to provide a desired output voltage or termination voltage for various applications by converting voltage supplies ranging from 2.0V to 4.5V. The CM8501C can be implemented to produce regulated output voltages in two different modes. In the default mode, when the VIN/2 pin is open, the output voltage is 50% of the VCCQ. The CM8501C can also be used to produce various user-defined voltages by forcing a voltage on the VIN/2 pin. In this case, the output voltage follows the VIN/2 pin input voltage. The regulated output voltage of CM8501C is internally set to be 50% of the applied VCCQ. The switching regulator is capable of sourcing or sinking up to 1.5A of current while regulating an output V_{TT} voltage to within 3% or less.

The CM8501C provides low profile 8-pin PSOP package to save system space.

FEATURES

- ◆ Patent Filed #6,452,366
- ◆ 8-pin SOP packages
- ◆ Source and sink up to 1.5A, no heat sink required
- ◆ Peak Current to 3A
- ◆ Integrated Power MOSFETs
- ◆ Output voltage can be programmed by external resistors
- ◆ Separate voltages for VCCQ and PVDD
- ◆ V_{OUT} of ±3% or less at 1.5A
- ◆ Minimum external components
- ◆ Shutdown for standby or suspend mode operation
- ◆ Thermal shutdown protection
- ◆ Soft start

APPLICATIONS

- ◆ Mother Board
- ◆ PCI/AGP Graphics
- ◆ Game/ Play Station
- ◆ Set Top Box
- ◆ IPC
- ◆ SCSI-III Bus terminator
- ◆ Buck Converter

PIN CONFIGURATION

SOP-8 (S08)
Top View



PIN DESCRIPTION

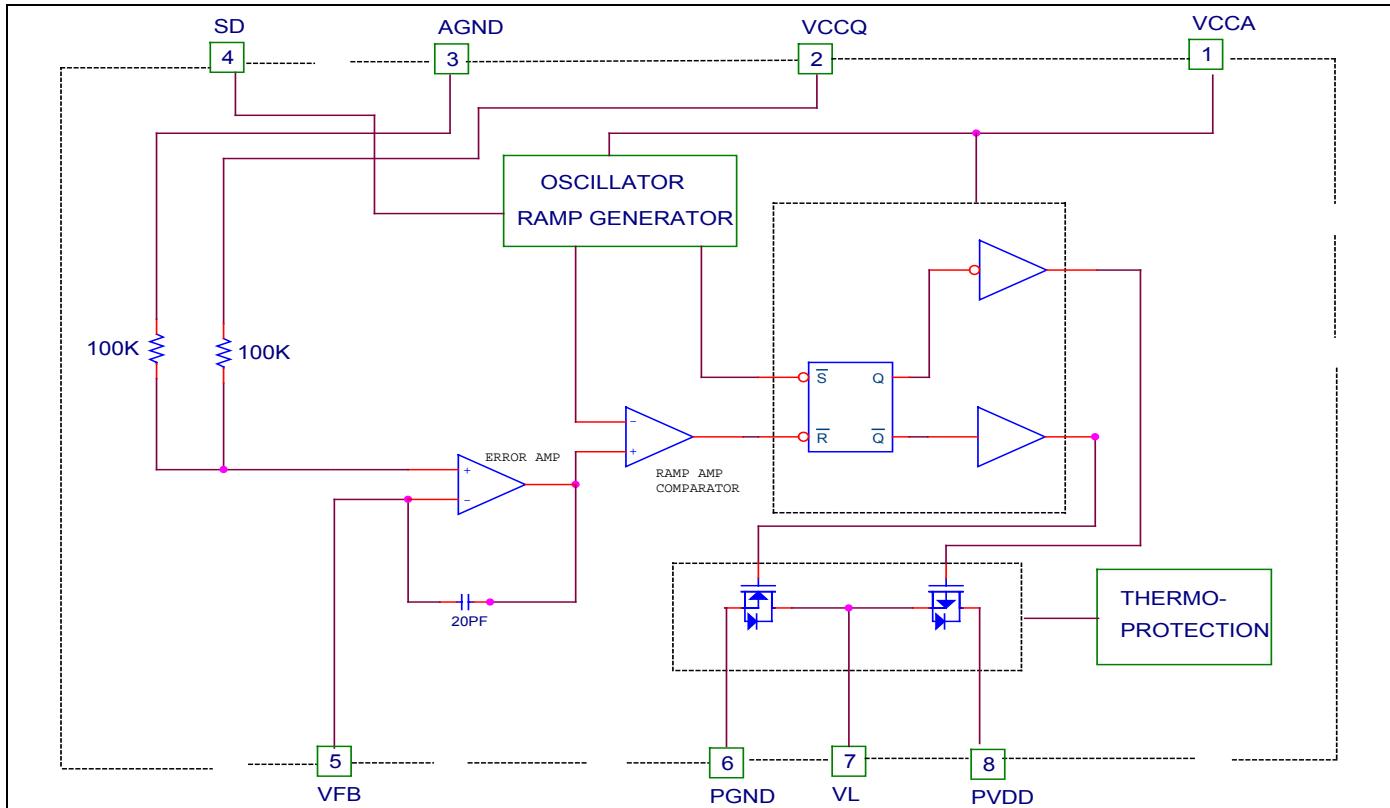
| Pin No. | Symbol | Description | Operating Rating | | | |
|---------|--------|---|------------------|--------|----------------|------|
| | | | Min. | Typ. | Max. | Unit |
| 1 | VCCA | Voltage supply for internal circuits | 2.0 | | 4.5 | V |
| 3 | AGND | Ground for internal reference voltage divider | | | | |
| 4 | SD | Shutdown active high. CMOS input level | 0.75 x VCCA | | VCCA + 0.3V | V |
| 2 | VCCQ | Voltage reference for external voltage divider | | 2.5 | | V |
| 5 | VFB | Feedback node for the V_{TT} | | VCCQ/2 | | V |
| 6 | PGND | Ground for output power transistors | | | | |
| 7 | VL | Output voltage/inductor connection (IDD1+IDD2, Output RMS current) | -1.5 | | +1.5 | A |
| 8 | PVDD | Voltage supply for output power transistors | 2.0 | | 4.5 | V |

ORDERING INFORMATION

| Part Number | Temperature Range | Package |
|-------------|-------------------|-----------------|
| CM8501CIS | -40°C to 85°C | 8-Pin SOP (S08) |
| CM8501CGIS* | -40°C to 85°C | 8-Pin SOP (S08) |

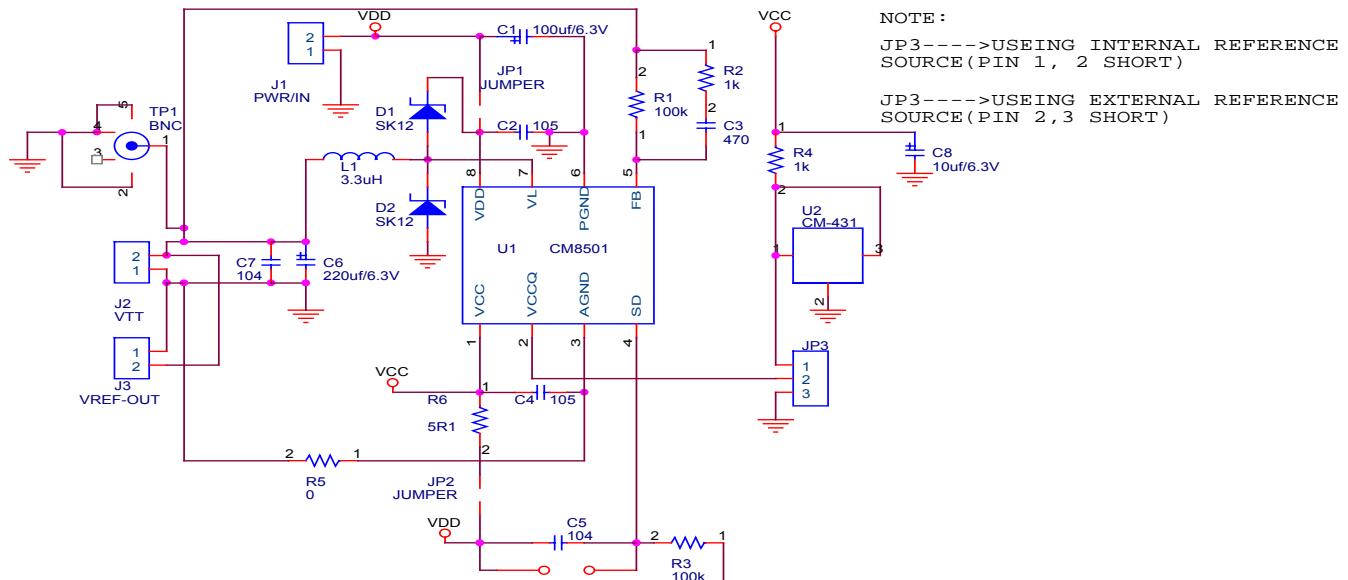
*Note: G : Suffix for Pb Free Product

BLOCK DIAGRAM



APPLICATION CIRCUITS

1.5A DDR BUS TERMINATOR DEMO BOARD CIRCUIT



8-Pin Schematic

ABSOLUTE MAXIMUM RATINGS

Absolute maximum ratings are those values beyond which the device could be permanently damaged.

| | |
|--|--------------------------|
| PVDD/VCCA/VCCQ | -0.3V to 4.5V |
| Voltage on Any Other Pin | GND – 0.3V to VCC + 0.3V |
| Output RMS Current, Source or Sink | 1.5A |

| | |
|---|----------------|
| Junction Temperature | 150°C |
| Storage Temperature | -65°C to 125°C |
| Lead Temperature (Soldering, 5 sec)..... | 300°C |
| Thermal Resistance(θ_{JA}) | 100°C/W |

OPERATING CONDITIONS

Temperature Range -40°C to 85°C
PVDD Operating Range 2.0V to 4.5V



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ELECTRICAL CHARACTERISTICS (Unless otherwise stated, these specifications apply $T_A=25^\circ C$;
VCCA=+3.3V and PVDD=+3.3V) maximum ratings are stress ratings only and functional device operation is not implied.
(Note 1)

| Symbol | Parameter | Test Conditions | CM8501C | | | Unit |
|----------------------------|--|--|-------------|-------|------|-------|
| | | | Min. | Typ. | Max. | |
| SWITCHING REGULATOR | | | | | | |
| VL | Output Voltage, SSTL_2 | IOUT = 0, Note 2 | VCCQ = 2.3V | 1.12 | 1.15 | 1.18 |
| | | | VCCQ = 2.5V | 1.22 | 1.25 | 1.28 |
| | | | VCCQ = 2.7V | 1.32 | 1.35 | 1.38 |
| | | IOUT = $\pm 1.5A$, Note 2 Note 3 | VCCQ = 2.3V | 1.09 | 1.15 | 1.21 |
| | | | VCCQ = 2.5V | 1.19 | 1.25 | 1.31 |
| | | | VCCQ = 2.7V | 1.28 | 1.35 | 1.42 |
| | | IOUT = 0 Note 2 | VCCQ = 2.3V | 1.139 | 1.15 | 1.162 |
| | | | VCCQ = 2.5V | 1.238 | 1.25 | 1.263 |
| | | | VCCQ = 2.7V | 1.337 | 1.35 | 1.364 |
| Z _{IN} | V _{IN} /2 Reference Pin Input Impedance | Note 2 | VCCQ = 0 | | 50 | KΩ |
| f _{sw} | Switching Frequency | | CM8501C | | 1.2 | MHz |
| I _{OUT(RMS)} | Minimum Output RMS Current | | CM8501C | 1.5 | 2.0 | A |
| I _{OUT(PEAK)} | Maximum Output Peak Current | | CM8501C | | 3 | A |
| OTS | Over Temperature Shutdown | | CM8501C | 135 | 150 | °C |
| MOSFETs | | | | | | |
| R _{DSON} | Drain to Source on-State Resistance | PVDD=5V | | 250 | | mΩ |
| SUPPLY | | | | | | |
| I _{VCCA} | Quiescent Current | V _{FB} = 1.4V LC unconnected | | 220 | | μA |
| I _{PVDD} | | V _{FB} = 1.4V LC unconnected | | 500 | | μA |

Note 1: Limits are guaranteed by 100% testing, sampling, or correlation with worst case test conditions

Note 2: VCCA, PVDD = 3.3V $\pm 10\%$

Note 3: Guaranteed by design, not 100% test

FUNCTIONAL DESCRIPTION

The CM8501C is a switching regulator that is capable of sinking and sourcing 1.5A of current without an external heat sink.

The CM8501C integrates power MOSFETs that are capable of source and sink 1.5A of current while maintaining excellent voltage regulation. The output voltage can be regulated within 3% or less by using the external feedback. Separate voltage supply inputs have been added to fit applications with various power supplies for the databus and power buses.

OUTPUTS

The output voltage pins (VL) are tied to the databus, address, or clock lines via an external inductor. Output voltage is determined by the VCCQ and is determined by the VCCQ.

INPUTS

The input voltage pins (VCCQ) determine the output voltages (VL). At CM8501C, the output voltage is always 50% of the VCCQ input. VCCQ is suggested to connect to VCCQ of memory module for better tracking with memory VCCQ.

OTHER SUPPLY VOLTAGES

Several inputs are provided for the supply voltages: PVDD and VCCA

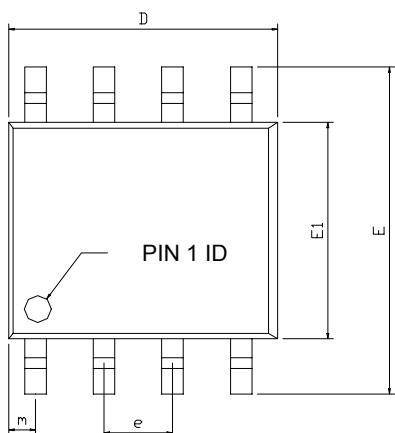
The PVDD provide the power supply to the power MOSFETs. VCCA provide the voltage supply to the logic section and internal error amplifiers of CM8501C.

FEEDBACK

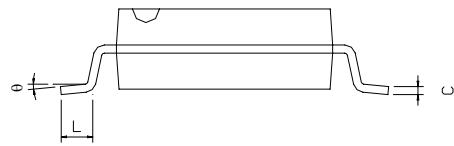
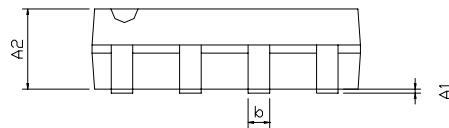
The VFB pin is an input that can be used for closed loop compensation. This input is derived from the voltage output. AGSEN pin is a contact node of internal resistor divider for remote sense.

PACKAGE DIMENSION

8-PIN SOP (S08)



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHS | | |
|----------|---------------------------|------|------|---------------------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A1 | 0.10 | --- | 0.25 | 0.004 | --- | 0.010 |
| A2 | 1.40 | --- | 1.55 | 0.055 | --- | 0.061 |
| b | 0.30 | --- | 0.51 | 0.012 | --- | 0.020 |
| C | 0.15 | --- | 0.26 | 0.006 | --- | 0.010 |
| D | 4.60 | --- | 5.06 | 0.169 | --- | 0.199 |
| E | 5.79 | --- | 6.20 | 0.228 | --- | 0.244 |
| E1 | 3.76 | --- | 4.01 | 0.148 | --- | 0.158 |
| e | --- | 1.27 | --- | --- | 0.050 | --- |
| L | 0.38 | --- | 0.69 | 0.015 | --- | 0.035 |
| m | 0.43 | --- | 0.69 | 0.017 | --- | 0.027 |
| θ | 0° | --- | 8° | 0° | --- | 8° |





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IMPORTANT NOTICE

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