

GENERAL DESCRIPTION

The CM3718 is a low-noise, pulse-width-modulated (PWM), DC-DC step-down converter. It powers logic and transmitters in small wireless systems such as cellular phones, communicating PDAs, and handy-terminals. The device features an internal synchronous rectifier for high efficiency; it requires no external Schottky diode. Excellent noise characteristics and fixed-frequency operation provide easy post-filtering. The CM3718 is ideally suited for Li-Ion battery applications. It is also useful for +3V or +5V fixed input applications.

The device operates in one of four modes. Forced PWM mode operates at a fixed frequency regardless of the load. Shutdown mode places the device in standby, reducing quiescent supply current to under 0.1µA.

The CM3718 can deliver over 1.5A. The output voltage can be adjusted from VREF to VIN. The input range is from 2.0V to 5.0V. Other features of the CM3718 include high efficiency, low dropout voltage. It is available in a space-saving 8-pin SOP package.

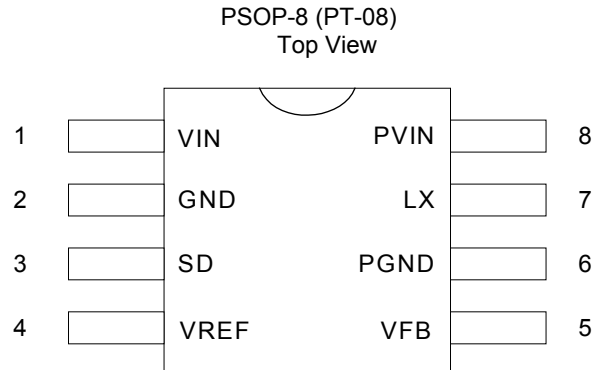
FEATURES

- ◆ Patent Number #6,452,366
- ◆ 1.2MHz switching and synchronization
- ◆ Dynamic output-voltage adjustment from VREF to VIN
- ◆ 1.5A Guaranteed Output Current
- ◆ 95% Efficiency
- ◆ No Schottky Diode Required
- ◆ External Soft Start
- ◆ 8-pin PSOP power packages

APPLICATIONS

- ◆ Cellular Phone
- ◆ Cordless Phone
- ◆ PDAs and Handy-Terminals
- ◆ CPU I/O Supplies
- ◆ Notebook Chipset Supplies
- ◆ Battery Operated Devices

PIN CONFIGURATION



PIN DESCRIPTION

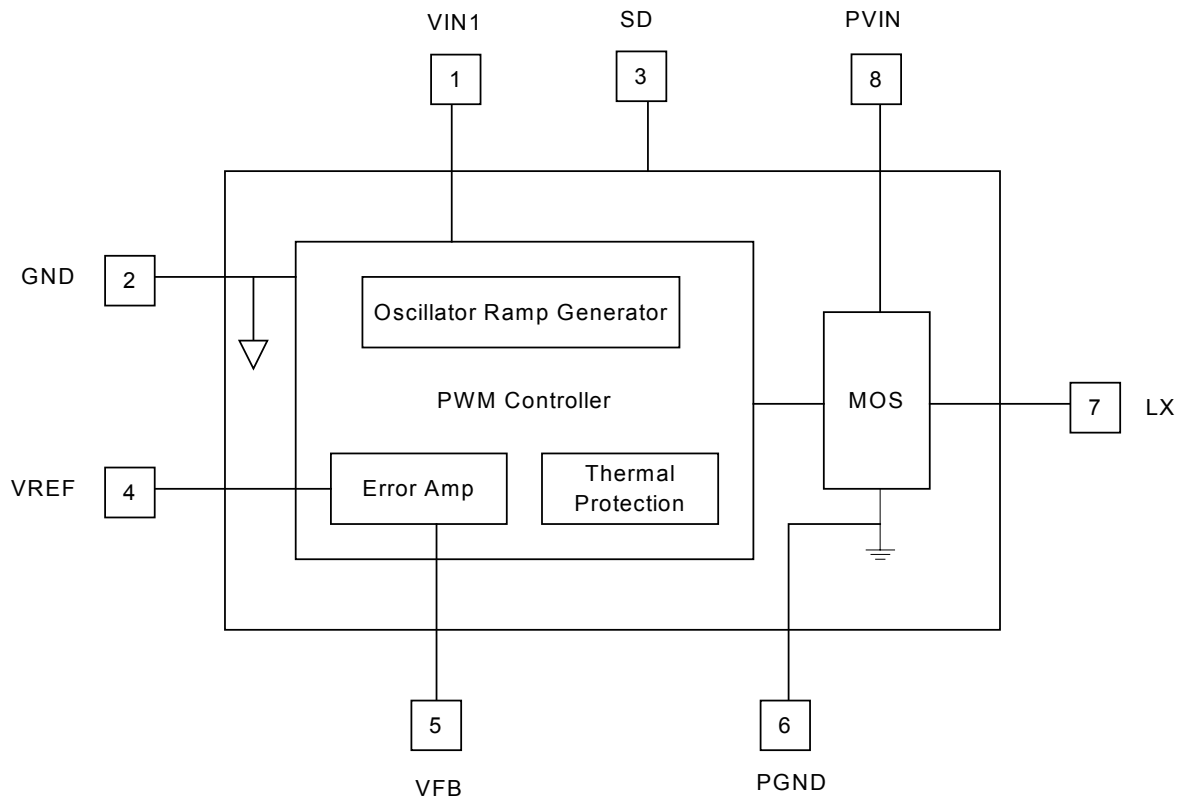
| Pin No. | Symbol | Description | Operating Rating | | | |
|---------|--------|---|------------------|------|-----------|------|
| | | | Min. | Typ. | Max. | Unit |
| CM3718 | | | | | | |
| 1 | VIN | Voltage supply for internal circuits | 2 | 2.5 | 5.5 | V |
| 2 | GND | Ground for internal reference voltage divider | | | | |
| 3 | SD | CMOS input level | Shutdown level | | VIN + 0.3 | V |
| | | | Enable level | | 2.0 | |
| 4 | VREF | V _{OUT} Set Voltage | 1.1 | | VIN | V |
| 5 | VFB | Feedback node for the V _{OUT} | | VREF | | V |
| 6 | PGND | Ground for output power transistors | | | | |
| 7 | LX | Inductor connection to the Drains of the internal power MOSFETs | | | 5.5 | V |
| 8 | PVIN | Voltage supply for output power transistors | 2 | 2.5 | 5.5 | V |

ORDERING INFORMATION

| Part Number | Temperature Range | Package |
|-------------|-------------------|-------------------|
| CM3718IS | -40°C to 85°C | 8-Pin PSOP (PS08) |
| CM3718GIS* | -40°C to 85°C | 8-Pin PSOP (PS08) |

*Note: G : Suffix for Pb Free Product

BLOCK DIAGRAM





Patent

1.5A LOW-NOISE PWM STEP-DOWN REGULATOR

CM3718

ABSOLUTE MAXIMUM RATINGS

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

PVIN/VIN-0.3V to 6.0V
 Voltage on Any Other Pin GND – 0.3V to VIN + 0.3V
 Output Current, Source or Sink1.5A

Junction Temperature150°C
 Storage Temperature -65°C to 125°C
 Lead Temperature (Soldering, 5 sec)..... 260°C
 Thermal Dissipation(θ_{JC})..... .50°C/W

OPERATING CONDITIONS

Temperature Range -40°C to 85°C
 PVIN Operating Range2.0V to 4.0V

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

(Note 1)

| Symbol | Parameter | Test Conditions | CM3718 | | | Unit |
|----------------------------|-------------------------------------|------------------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| SWITCHING REGULATOR | | | | | | |
| V _{REF} | Adjustable Output Voltage | | VREF | | VIN | V |
| f _{sw} | Switching Frequency | CM3718 | | 1.2 | | MHz |
| I _{OUT(RMS)} | Maximum Output RMS Current | CM3718 | | | 1.5 | A |
| I _{OUT(PEAK)} | Maximum Output Peak Current | CM3718 | | | 3 | A |
| MOSFETs | | | | | | |
| R _{DS(ON)} | Drain to Source on-State Resistance | PVIN=5V | | 250 | | mΩ |
| SUPPLY | | | | | | |
| I _{VIN} | Quiescent Current | VFB = 1.4V LC unconnected | | 220 | | μA |
| I _{PVIN} | | VFB = 1.4V LC unconnected | | 500 | | μA |

FUNCTIONAL DESCRIPTION

The CM3718 step-down, pulse-width-modulated (PWM), DC-DC converter has an adjustable output range from VREF to the input voltage (VIN). An internal synchronous rectifier improves efficiency and eliminates an external Schottky diode. Fixed-frequency operation enables easy post-filtering, thereby providing excellent noise characteristics. As a result, the CM3718 is an ideal choice for many small wireless systems.

VREF

The reference voltage could be ranged from 1.1V to VIN.

OUTPUTS

The output voltage pins (LX) are tied to the RF power amp, via an external inductor. Output voltage is determined by the VREF inputs.

INPUTS

The input voltage reference pin, VREF determine the output voltages (LX). If a specific voltage is forced at the VREF pin, the output voltage follows the voltage at the VREF pin.

OTHER SUPPLY VOLTAGES

Several inputs are provided for the supply voltages: PVIN and VIN.

The PVIN provide the power supply to the power MOSFETs.

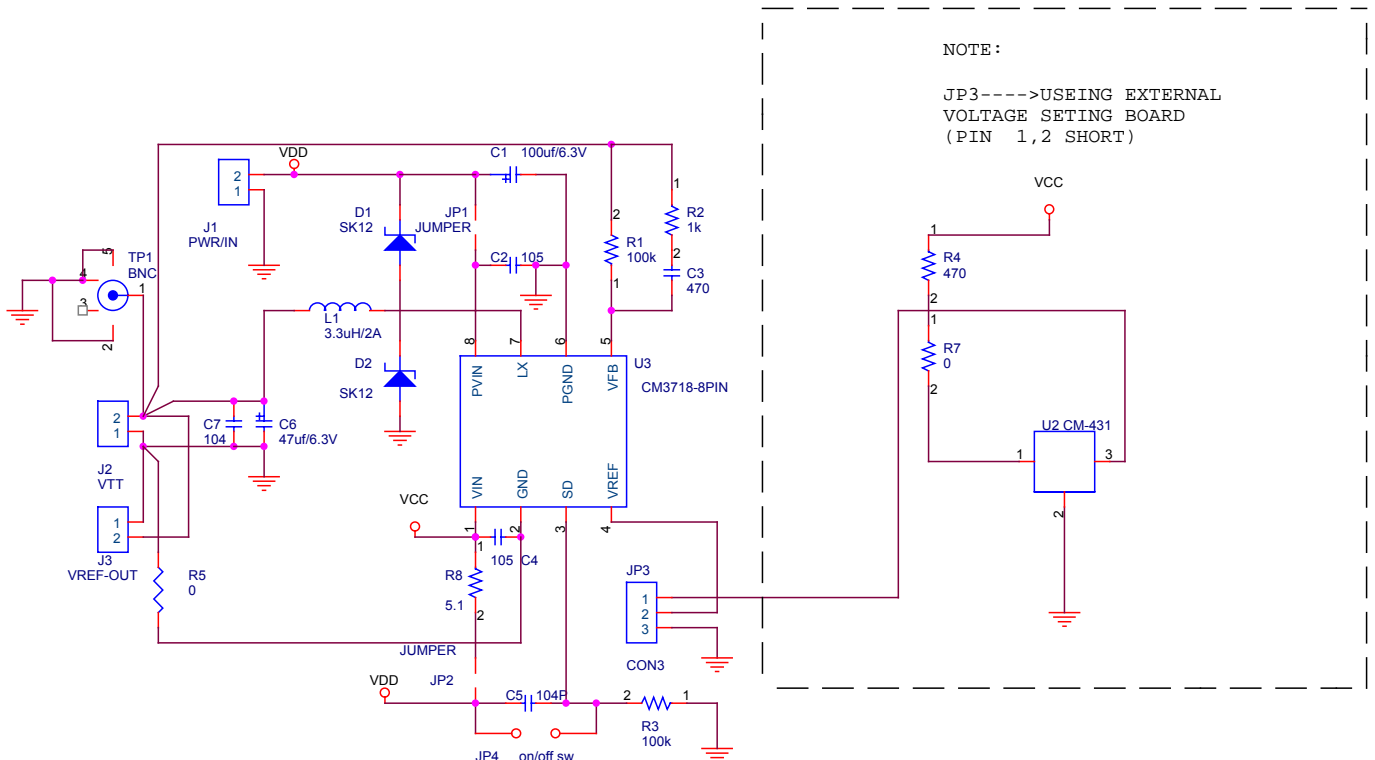
VIN provides the voltage supply to the logic section and internal error amplifiers.

FEEDBACK

The VFB pin is an input that can be used for closed loop compensation. This input is derived from the voltage output.

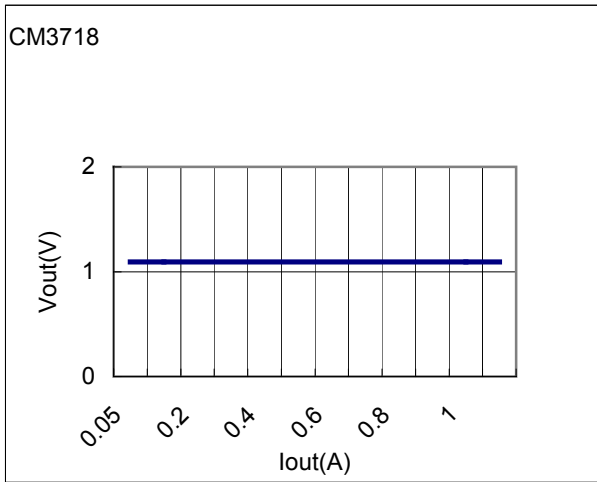
AGND pin is a contact node of internal resistor divider for remote sense.

APPLICATION CIRCUIT

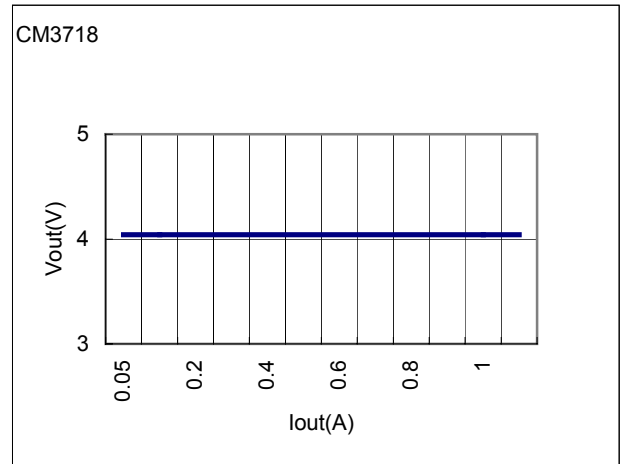


LOAD REGULATION

Vin=5V, VREF input=1.09V

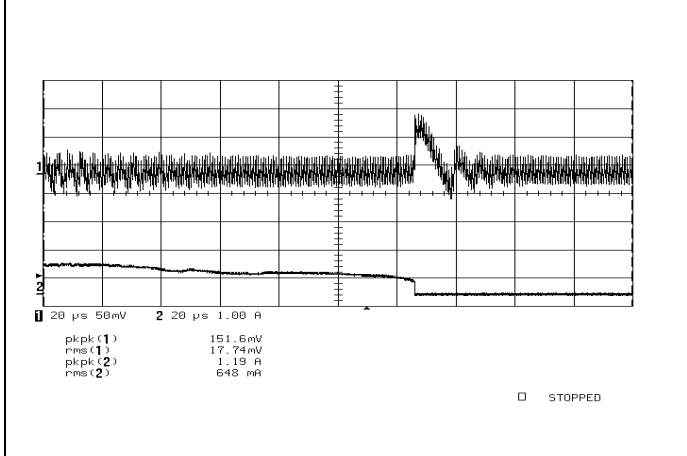


Vin=5V, VREF input=4.04V

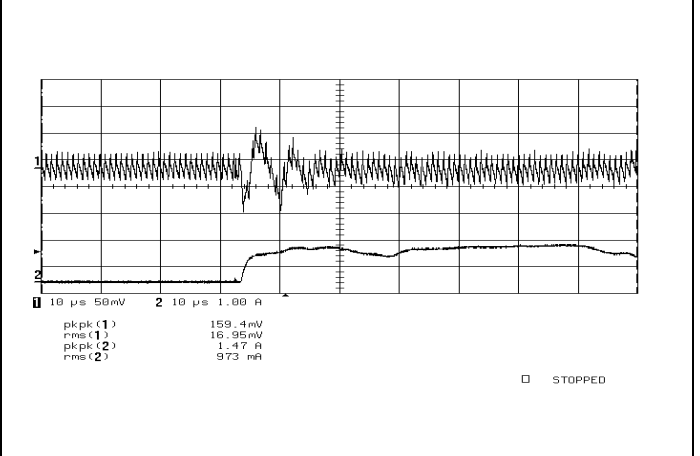


LOAD TRANSIENT RESPONSE

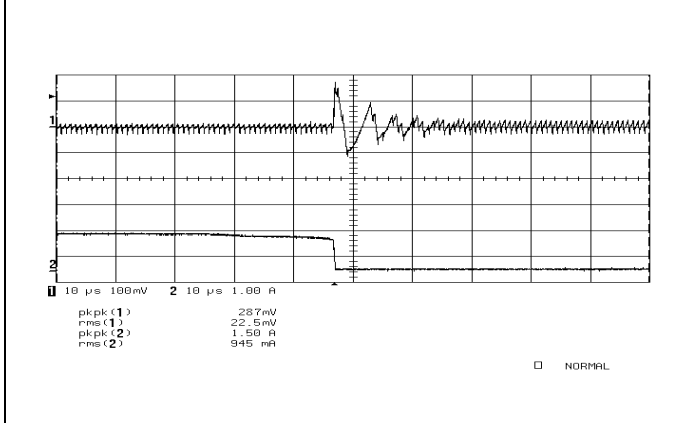
CM3718 Transient Response VREF=1V, (I_{OUT} from 1.5A- 0A)



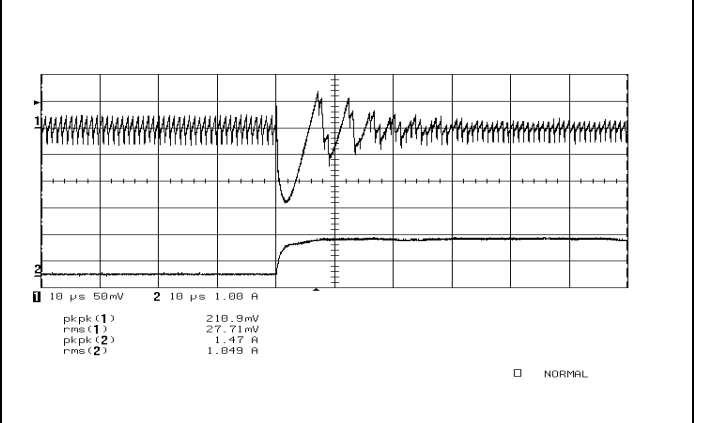
CM3718 Transient Response VREF=1V, (I_{OUT} from 0A- 1.5A)



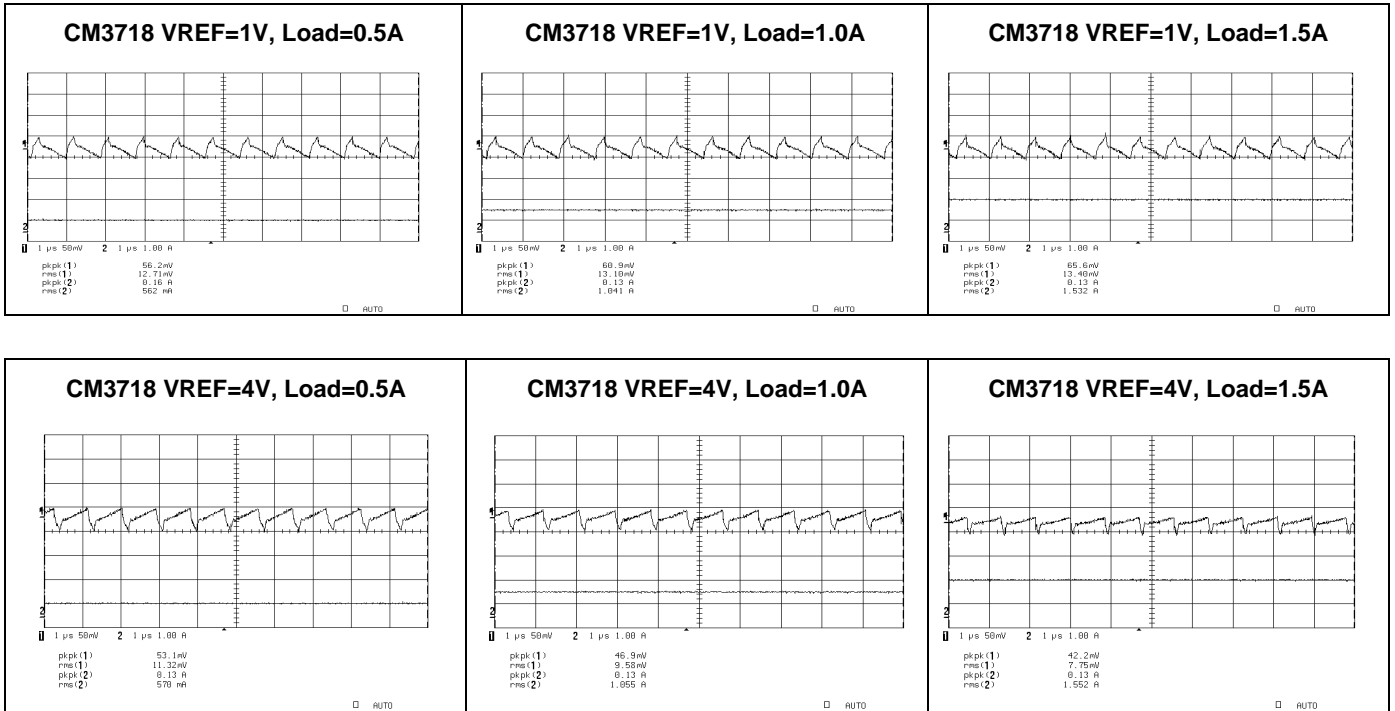
CM3718 Transient Response VREF=4V, (I_{OUT} from 1.5A- 0A)



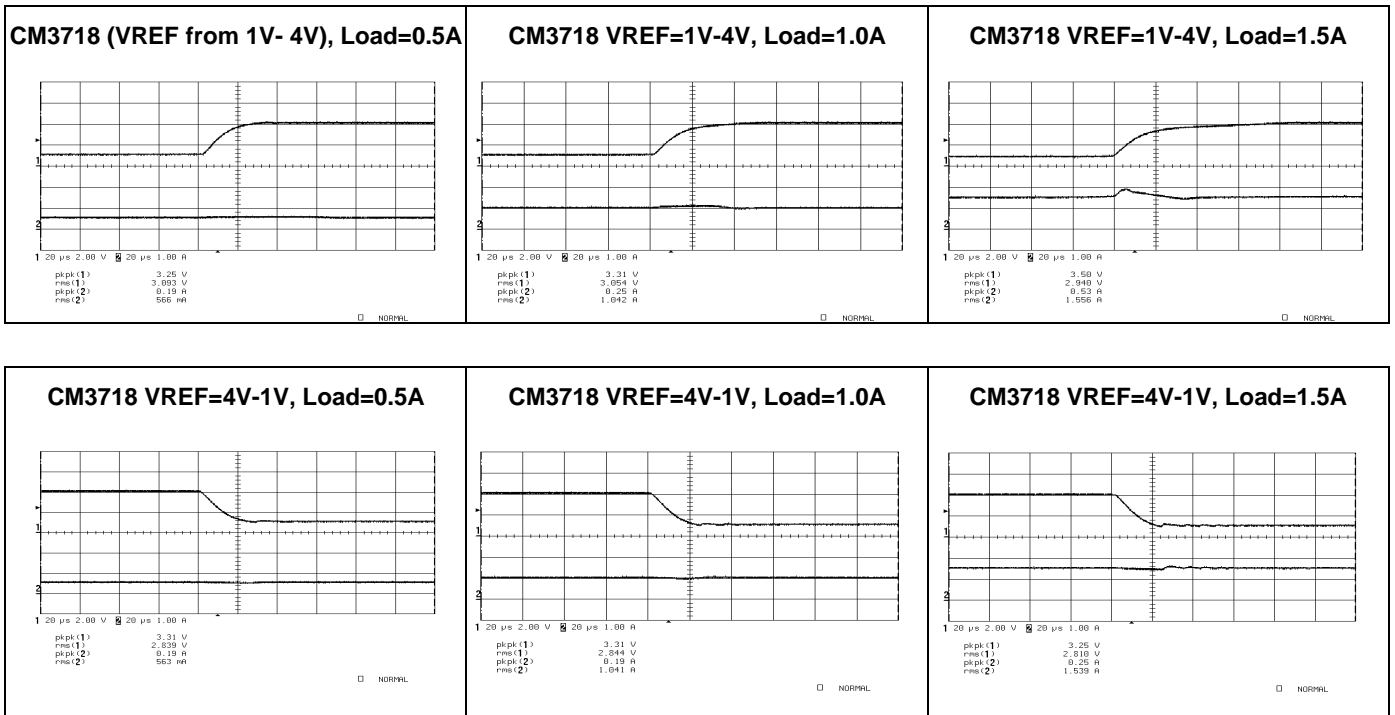
CM3718 Transient Response VREF=4V, (I_{OUT} from 0A- 1.5A)



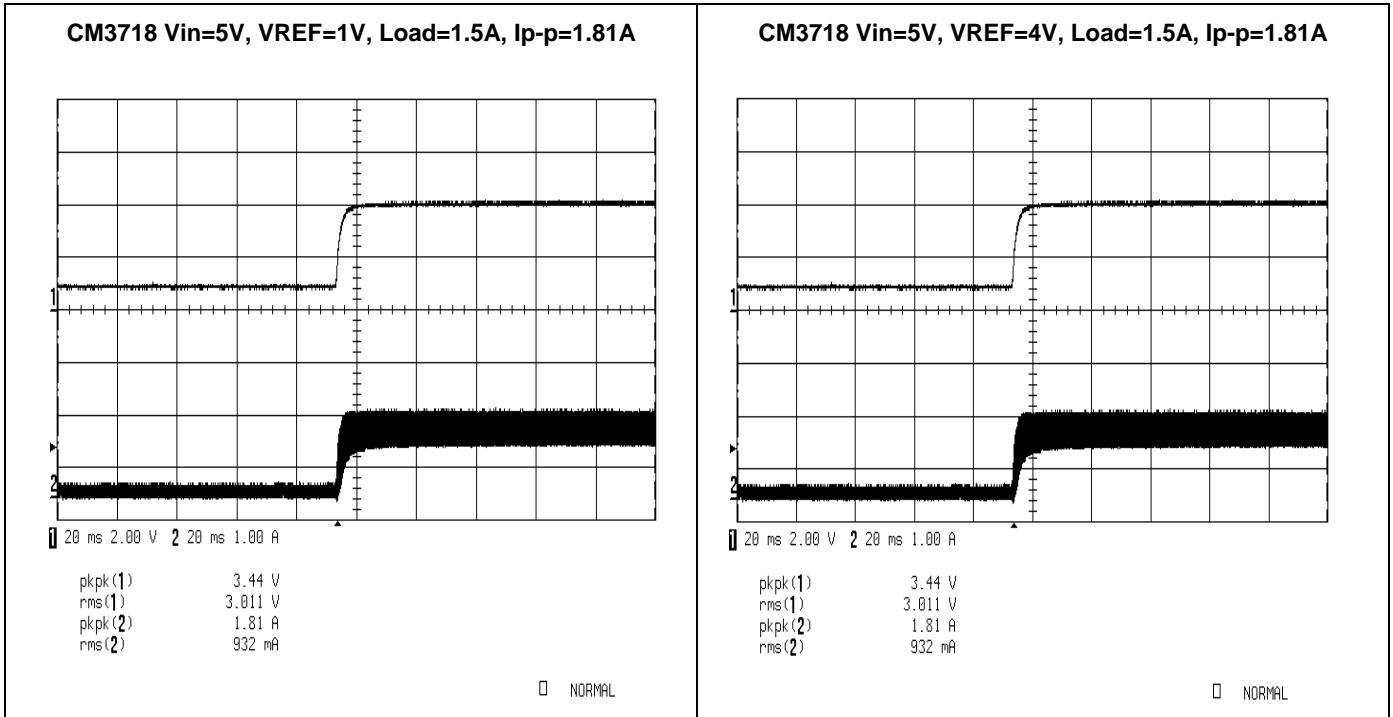
V_{OUT} OUTPUT RIPPLE AND NOISE



VOLTAGE SETTING STEP RESPONSE

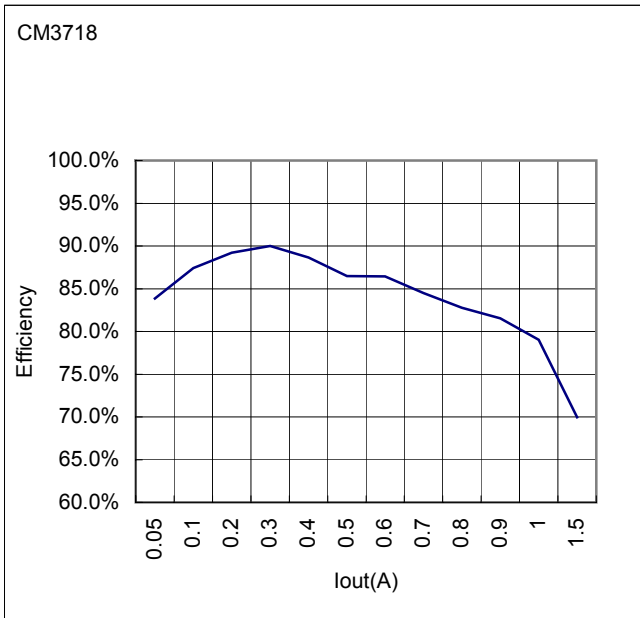


IN-RUSH CURRENT

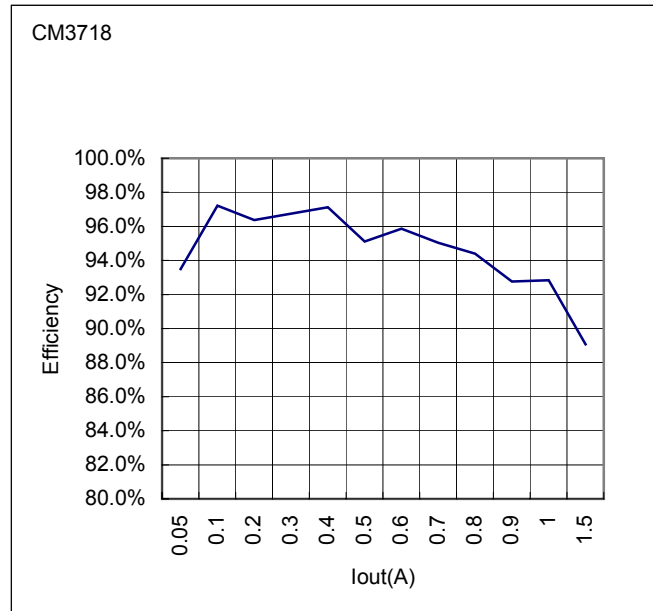


EFFICIENCY

CM3718 efficiency (V_{OUT}=1V, load from 0.05A~1.5A)

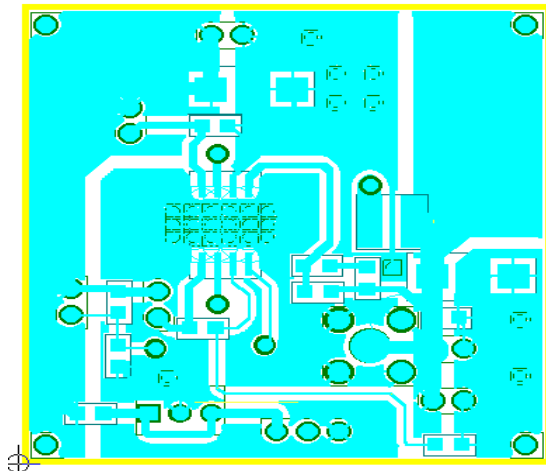


CM3718 efficiency (V_{OUT}=4V, load from 0.05A~1.5A)

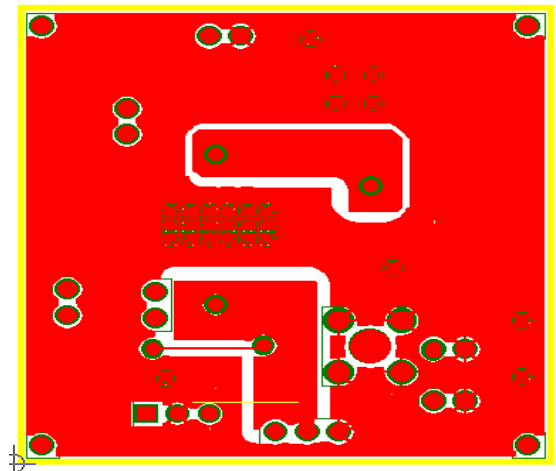


PCB LAYOUT

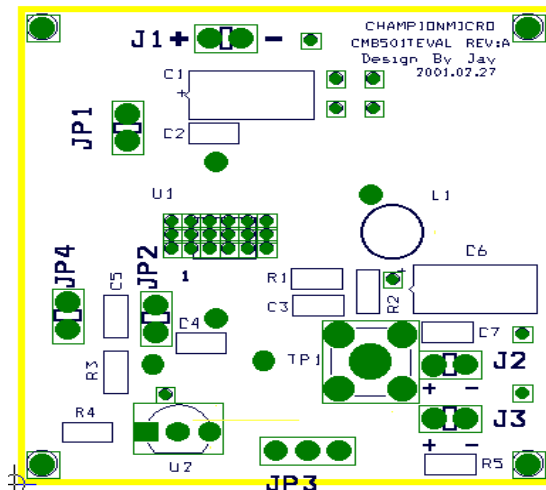
Top layer



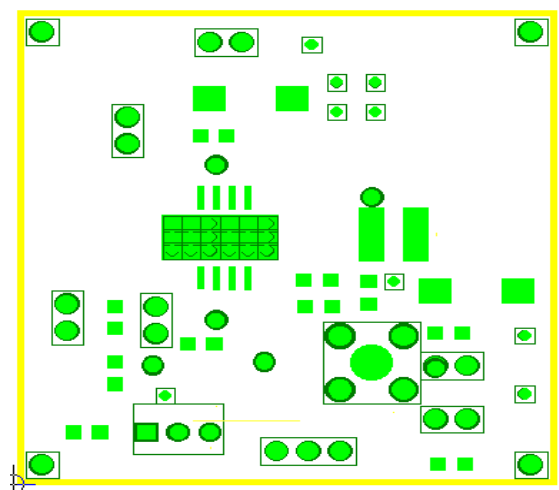
Bottom Layer



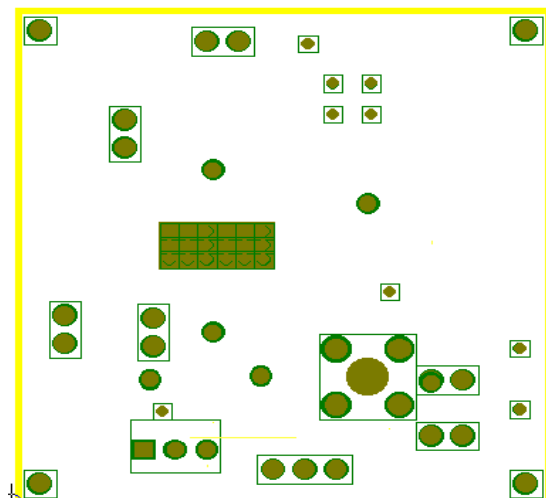
Silkscreen Top



Sold-mask Top

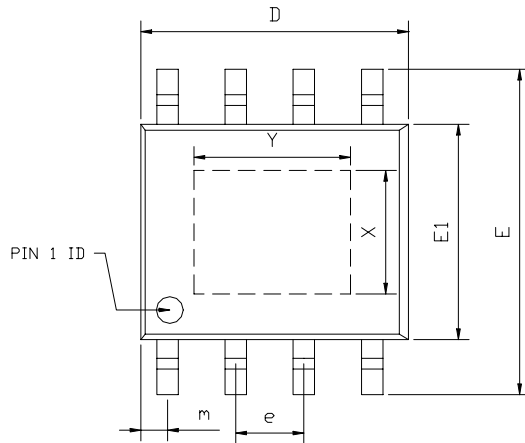


Sold-mask Bottom



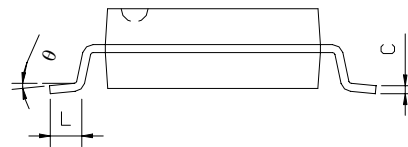
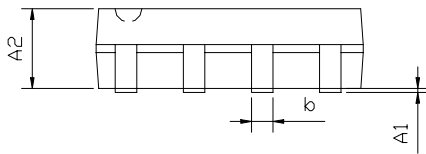
PACKAGE DIMENSION

8-PIN PSOP (PS08)



| 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° |

EXPOSED PAD DIMENSION : (mm)
 PAD SIZE: X=2.34 ; Y=2.92





IMPORTANT NOTICE

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