GENERAL DESCRIPTION

The CM3728 low-dropout, pulse-width-modulated (PWM) DC-DC buck regulator is optimized to provide power to the PA in 2.5G/3G cellular phones; however, they may be applied in many other applications where high efficiency is a priority. The supply voltage range is from 2V to 5V, and the guaranteed output current is 1.5A. 1.2MHz PWM switching allows for small external components, while skip mode reduces quiescent current to 220µA with light loads.

The CM3728 is dynamically controlled to provide varying output voltages from 0.8V to 4V. The circuit is designed such that the output voltage settles in <30µs for a full-scale change in voltage and current. The CM3728 is set with external resistors to provide any fixed output voltage in the 1.25V to 5.5V range.

The CM3728 includes a low on-resistance internal MOSFET switch and synchronous rectifier to maximize efficiency and minimize external component count. The device is offered in space-saving 8-pin SOP package.

FEATURES

- Patent Number #6,452,366
- 1.2MHz switching and synchronization
- Fast output setting slew rate < 30µs
- Dynamic output-voltage adjustment from 0.8V to 4V
- Source and sink up to 1.5A, no heat sink required
- Integrated Power MOSFETs
- Output voltage can be programmed by D/A converter
- Minimum external components
- Shutdown < 1uA
- Thermal shutdown protection
- External Soft Start
- 8-pin SOP power packages
- No external Schottky diode required

24 Hours Technical Support---WebSIM

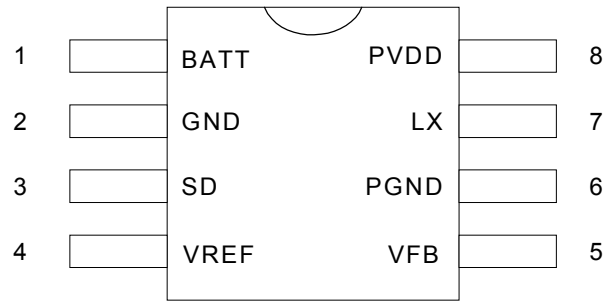
Champion provides customers an online circuit simulation tool called WebSIM. You could simply logon our website at www.champion-micro.com for details.

APPLICATIONS

- 2.5G/3G Cellular Phone
- RF Transceiver
- Microprocessor Core Supplies
- PDA, Palmtop
- Portable Computer
- Hand-Held Instruments

PIN CONFIGURATION

PSOP-8 (PS08)
Top View



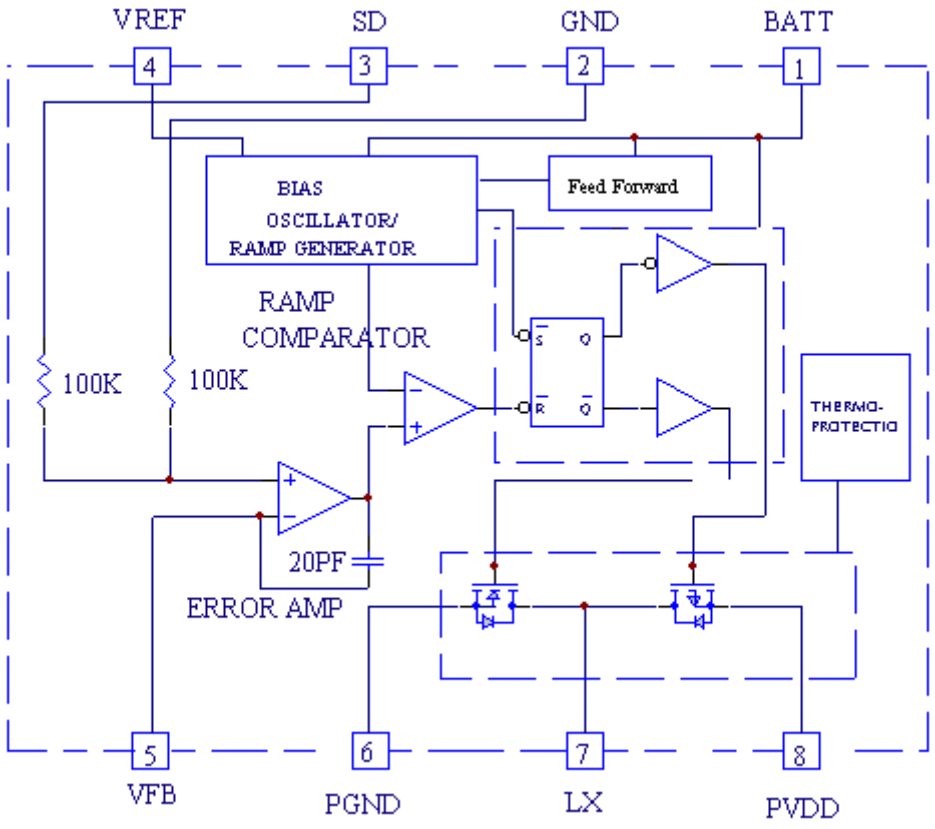
PIN DESCRIPTION

Pin No.	Symbol	Description	Operating Rating			
CM3728			Min.	Typ.	Max.	Unit
1	BATT	Supply Voltage input for internal circuits	2	2.5	5	V
2	GND	Ground for internal reference voltage divider				
3	SD	Shutdown active high. CMOS input level	0.75 x BATT		BATT + 0.3V	V
4	VREF	Input for external reference voltage	0.8		4	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 MOSFET.	-1.5		+1.5	A
8	PVDD	Voltage supply for output power transistors	2	2.5	5	V

ORDERING INFORMATION

Part Number	Temperature Range	Package
CM3728IS	-40℃ to 85℃	8-Pin PSOP (PS08)

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

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

BATT ……..…….....-0.3V to 4.0V
Voltage on Any Other Pin …….. GND – 0.3V to VCC + 0.3V
Output Current, Source or Sink ……..……..…….....1.5A

Junction Temperature ..…… ……150°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
P_{VDD} Operating Range .....2.0V to 4.0V

ELECTRICAL CHARACTERISTICS **(Unless otherwise stated, these specifications apply T_A=25°C; BATT=+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	CM3728			Unit
			Min.	Typ.	Max.	
SWITCHING REGULATOR						
Z_{IN}	VREF Reference Pin Input Impedance			50		KΩ
fsw	Switching Frequency	CM3728		1.1		MHz
$I_{OUT(RMS)}$	Maximum Output RMS Current	CM3728			1.5	A
$I_{OUT(PEAK)}$	Maximum Output Peak Current	CM3728			3	A
MOSFETs						
$RDS_{(ON)}$	Drain to Source on-State Resistance	PVDD=5V		250		mΩ
SUPPLY						
I_{BATT}	Quiescent Current	VFB = 1.4V LC unconnected		220		μA
I_{PVDD}		VFB = 1.4V LC unconnected		500		μA

FUNCTIONAL DESCRIPTION

The CM3728 PWM step-down DC-DC converters are optimized for low-voltage, battery-powered applications where high efficiency and small size are priorities. The CM3728 is a general-purpose device that uses external feedback resistors to power a linear power amplifier (PA) in 2.5G/3G handsets. An analog control signal dynamically adjusts the CM3728's output voltage from 0.8V to 4V with a settling time < 30μs.

The CM3728 operates at a high 1.2MHz switching frequency that reduces external component size. Each device includes an internal synchronous rectifier that provides for high efficiency and eliminates the need for an external Schottky diode. The normal operating mode uses constant frequency PWM switching at medium and heavy loads, and automatically pulse skips at light loads to reduce supply current and extend battery life. An additional forced PWM mode (with optional external synchronization) switches at a constant frequency, regardless of load, to provide a well-controlled spectrum in noise-sensitive applications. Battery life is maximized by low-dropout operation at 100% duty-cycle and a 0.1μA (typ.) logic-controlled shutdown mode.

OUPUTS

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.

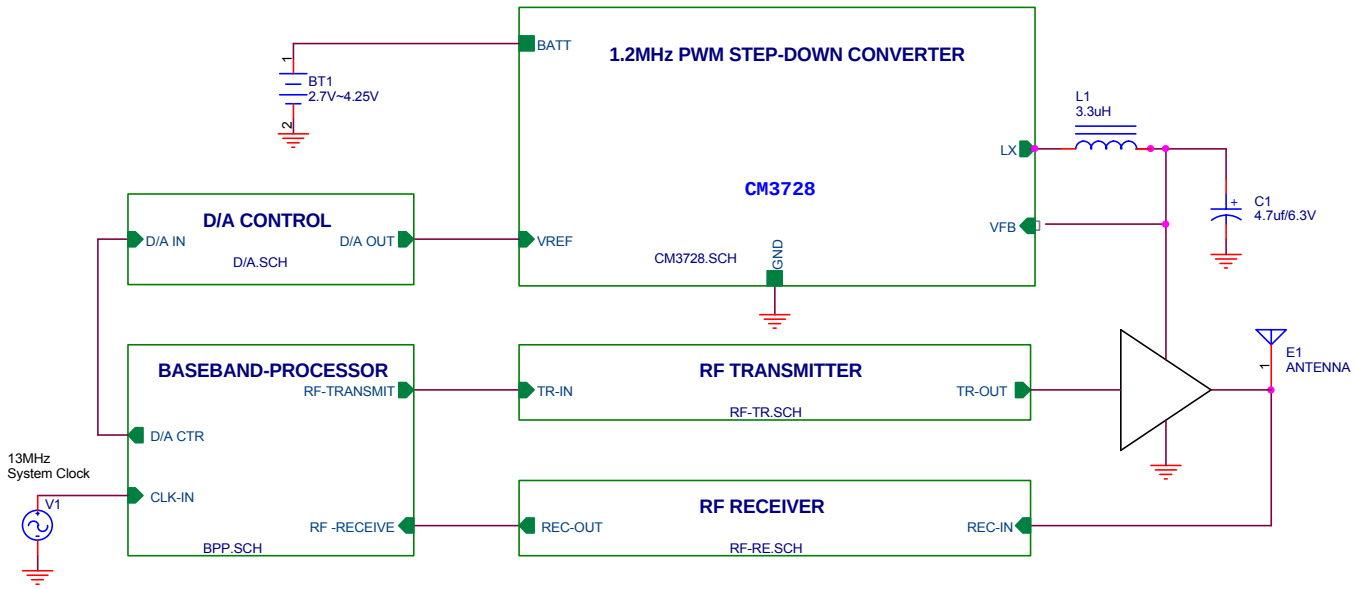
OTHER SUPPLY VOLTAGES

Several inputs are provided for the supply voltages: PVDD and BATT.
The PVDD provide the power supply to the power MOSFETs. BATT provide the voltage supply to the logic section and internal error amplifiers.

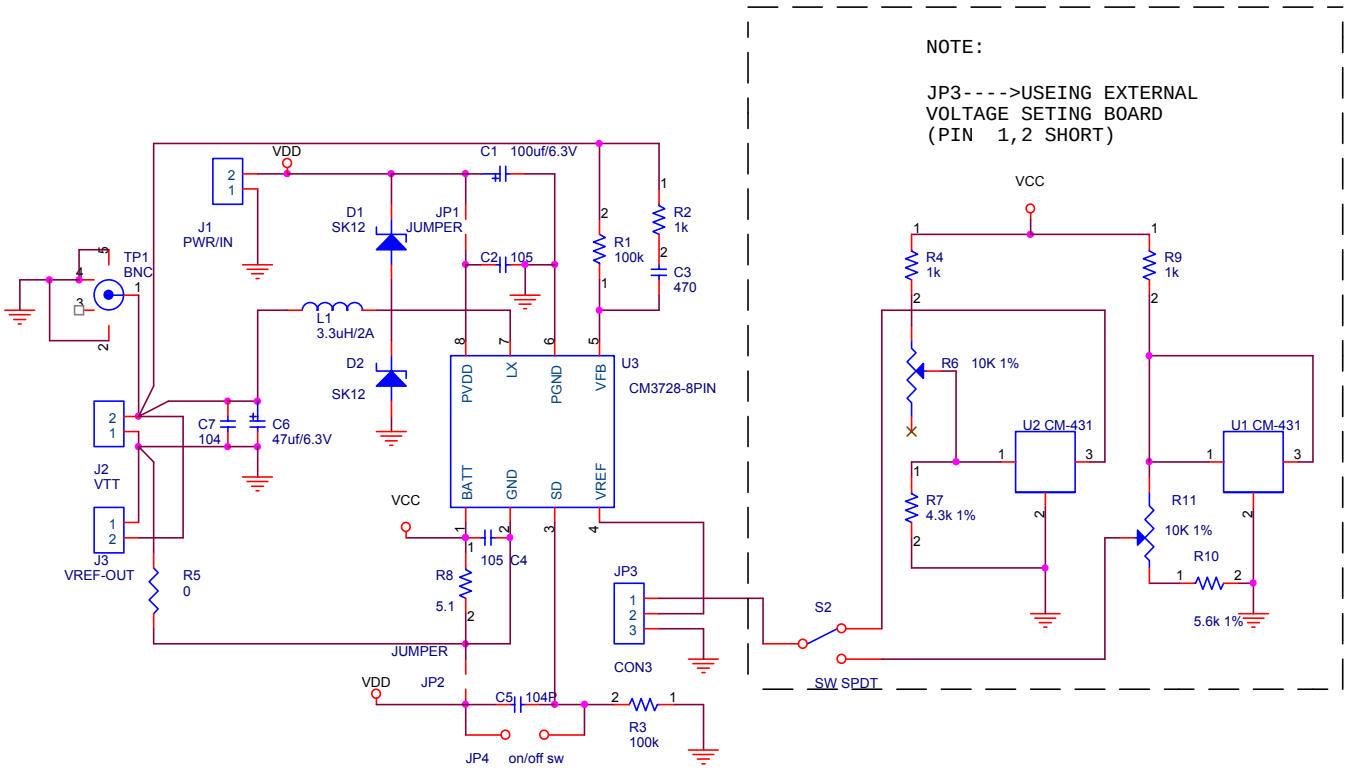
FEEDBACK

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

APPLICATION BLOCK DIAGRAM

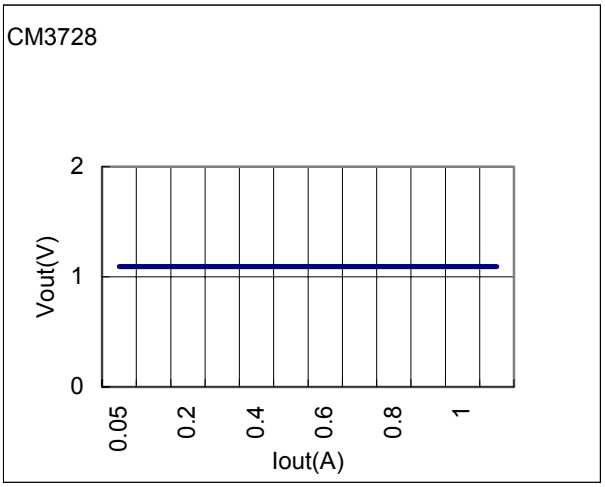


APPLICATION CIRCUIT

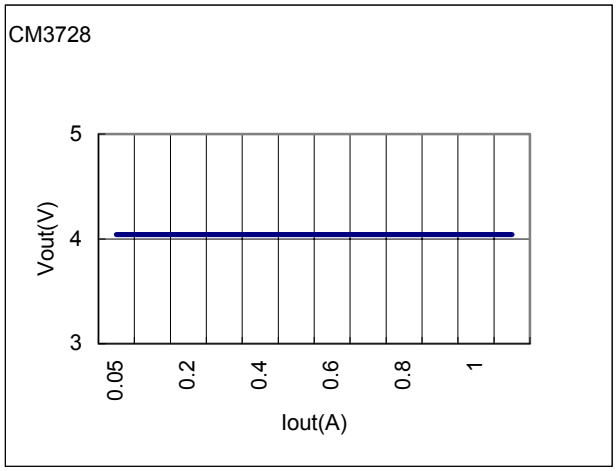


LOAD REGULATION

Vin=5V, VREF input=1.09V

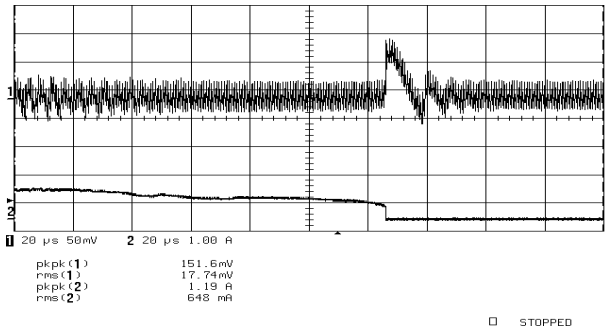


Vin=5V, VREF input=4.04V

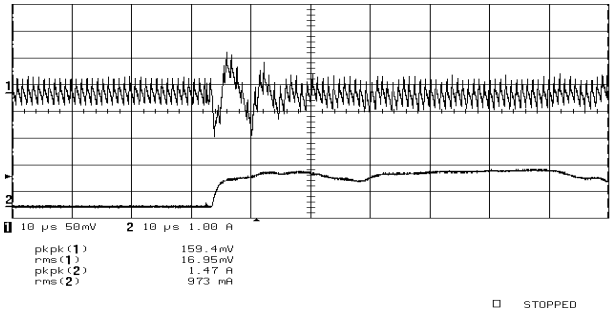


LOAD TRANSIENT RESPONSE

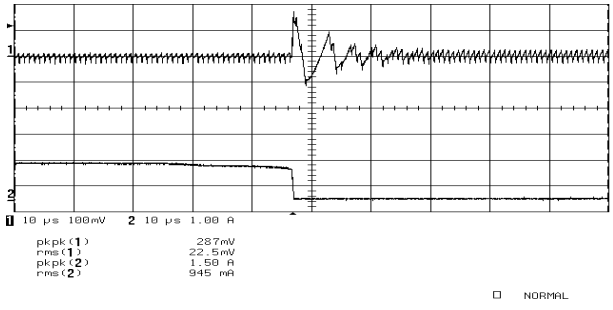
CM3728 Transient Response VREF=1V, (I_{OUT} from 1.5A- 0A)



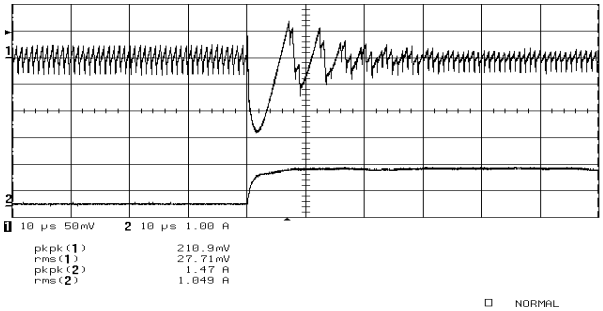
CM3728 Transient Response VREF=1V, (I_{OUT} from 0A- 1.5A)



CM3728 Transient Response VREF=4V，(I_{OUT} from 1.5A- 0A)

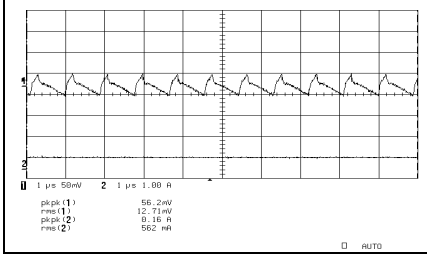


CM3728 Transient Response VREF=4V，(I_{OUT} from 0A- 1.5A)

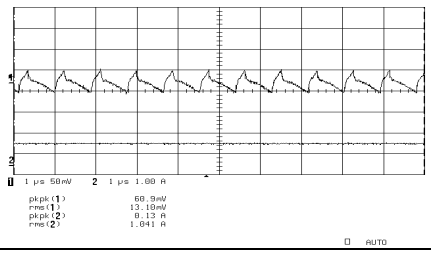


VOUT OUTOUT RIPPLE AND NOISE

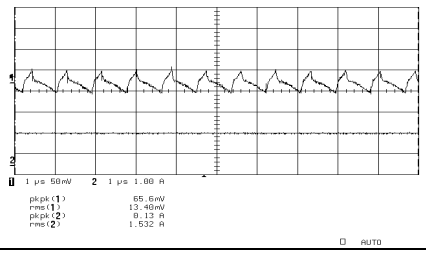
CM3728 VREF=1V, Load=0.5A



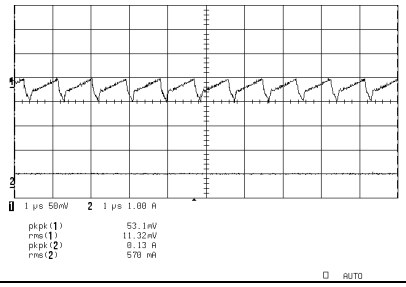
CM3728 VREF=1V, Load=1.0A



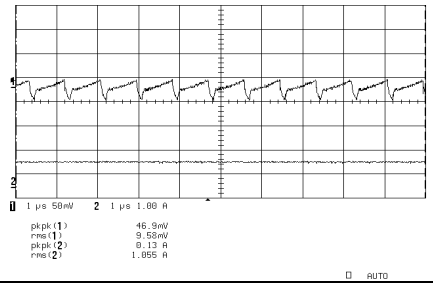
CM3728 VREF=1V, Load=1.5A



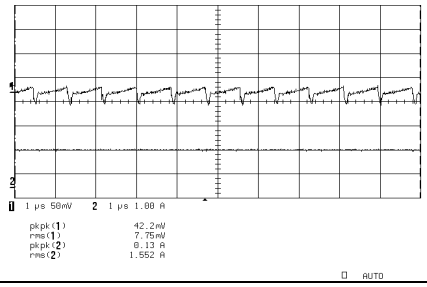
CM3728 VREF=4V, Load=0.5A



CM3728 VREF=4V, Load=1.0A

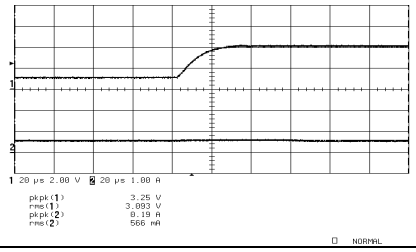


CM3728 VREF=4V, Load=1.5A

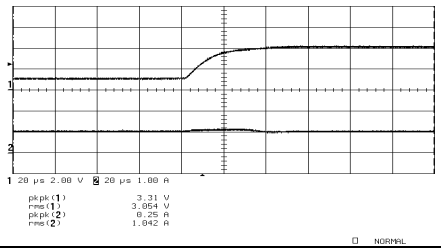


VOLTAGE SETTING STEP RESPONSE

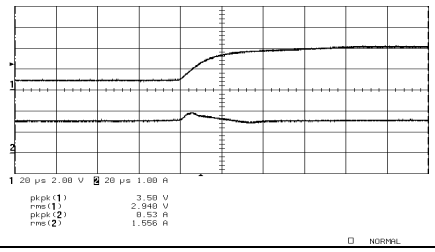
CM3728 (VREF from 1V- 4V), Load=0.5A



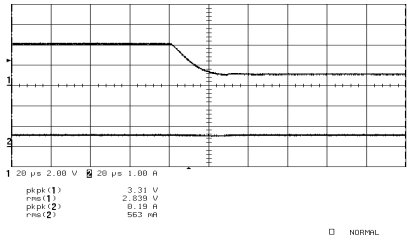
CM3728 VREF=1V-4V, Load=1.0A



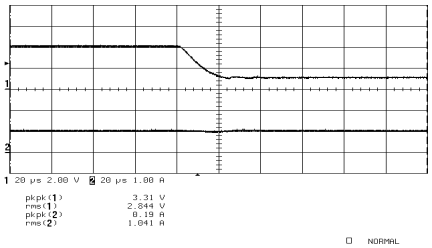
CM3728 VREF=1V-4V, Load=1.5A



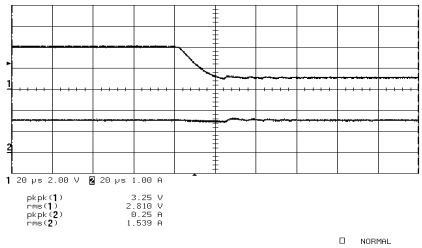
CM3728 VREF=4V-1V, Load=0.5A



CM3728 VREF=4V-1V, Load=1.0A

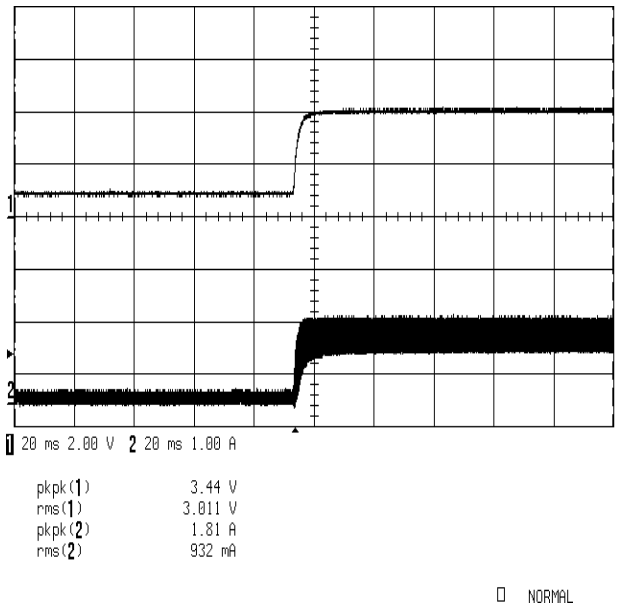


CM3728 VREF=4V-1V, Load=1.5A

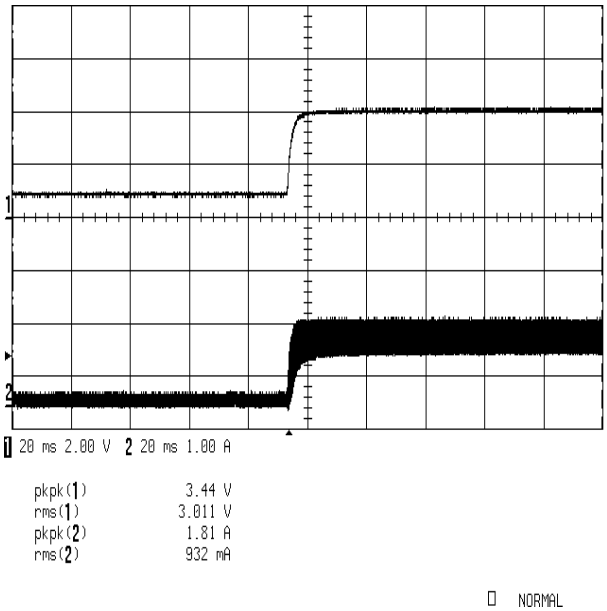


IN-RUSH CURRENT

CM3728 Vin=5V, VREF=1V, Load=1.5A, Ip-p=1.81A

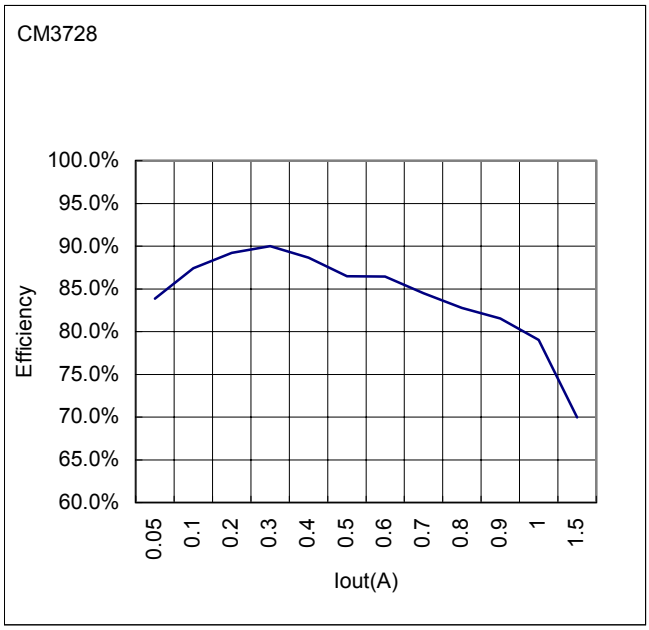


CM3728 Vin=5V, VREF=4V, Load=1.5A, Ip-p=1.81A

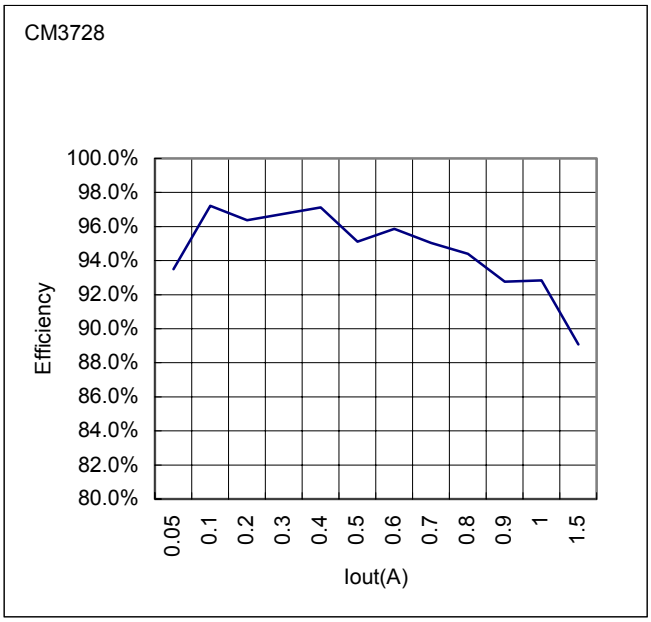


EFFICIENCY

CM3728 efficiency (V_{OUT}=1V, load from 0.05A~1.5A)

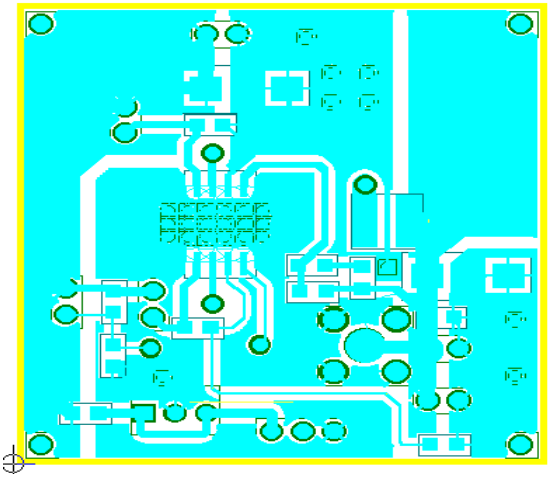


CM3728 efficiency (V_{OUT} =4V, load from 0.05A~1.5A)

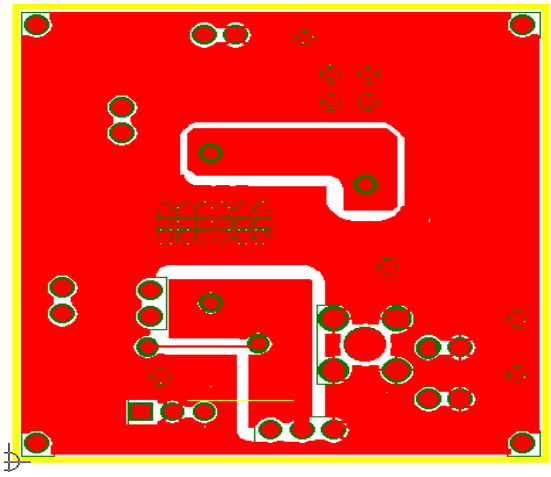


PCB LAYOUT

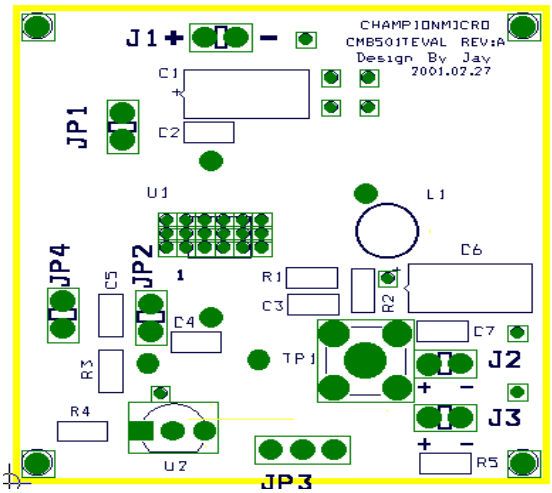
Top layer



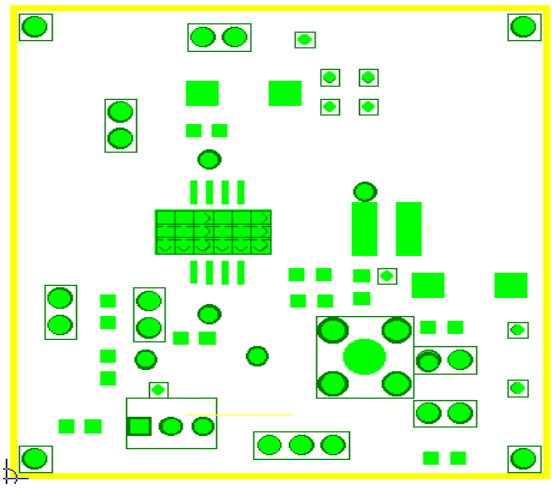
Bottom Layer



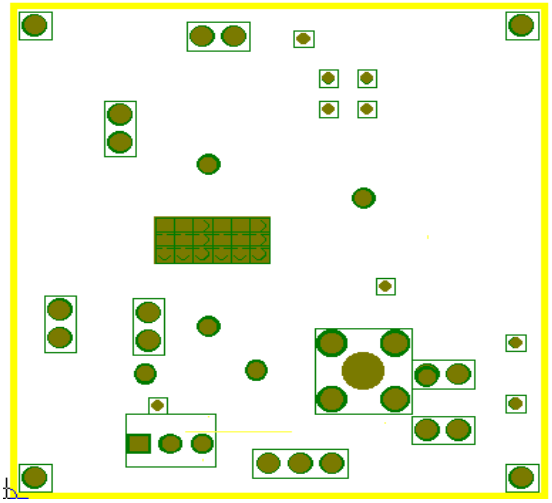
Silkscreen Top



Sold-mask Top

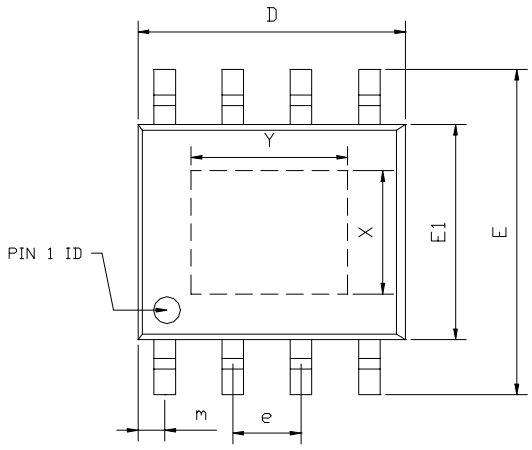


Sold-mask Bottom



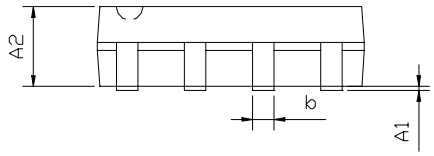
PACKAGE DIMENSION

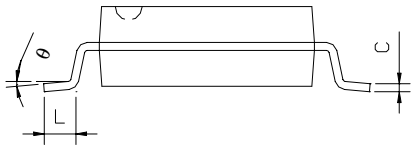
8-PIN PSOP (PS08)



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





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HsinChu Headquarter

5F, No. 11, Park Avenue II,
Science-Based Industrial Park,
HsinChu City, Taiwan 300

TEL: +886-3-567 9979
FAX: +886-3-567 9909
http://www.champion-micro.com

Sales & Marketing

11F, No. 306-3, Sec. 1, Ta Tung Rd.,
Hsichih, Taipei Hsien,
Taiwan 221

TEL: +886-2-8692 1591
FAX: +886-2-8692 1596