

PWM/PFM Automatic Switching Controlled Synchronous DC-DC Converters

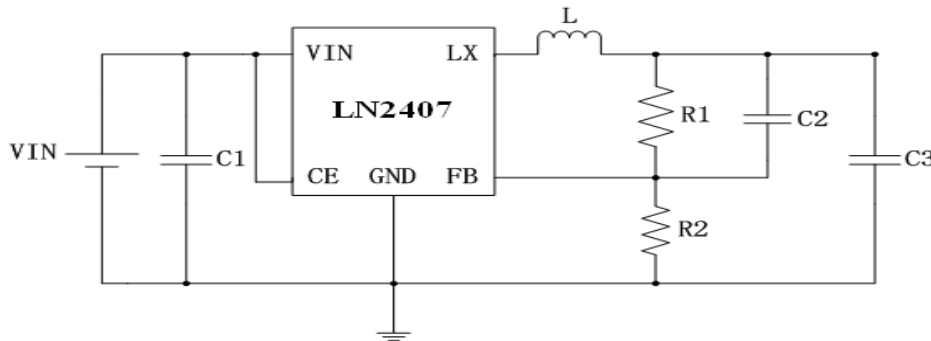
General Description

LN2407 series is a group of high efficiency synchronous-rectification type buck regulator using a constant frequency, current mode architecture. The device is available in an adjustable version and fixed output voltages of 1.8V and 3.3V. Automatic PWM/PFM mode operation increases efficiency and decreases output voltage ripple at light loads, further extending battery life. Switching frequency is internally set at 1.4MHz, allowing the use of small surface mount inductors and capacitors. 100% duty cycle provides low dropout operation.

Features

- High Efficiency: 92%
- Input Voltage Range: 2.0 ~ 6.0V
- Output Current: 800mA
- Shutdown Current: <1uA
- Oscillation Frequency: 1.4MHz

Typical Application Circuit

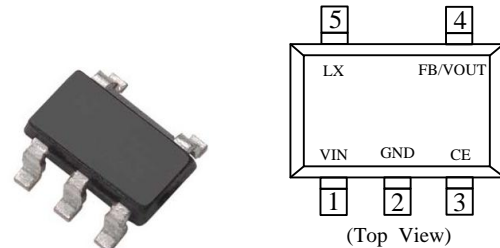


Applications

- Cellular and Smart Phones
- PDAs
- MP3/MP4 Player
- Digital Still and Video Cameras
- Microprocessors and DSP Core Supplies
- Portable Instruments

Package

- SOT-23-5



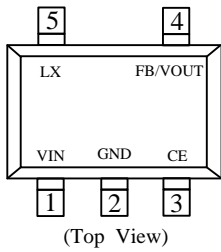
Ordering Information

LN2407 ①②③④⑤

Designator	Symbol				Description
①	1	1	3	4	Output Voltage: 1.2V、1.8V、3.3V、4.2V
②	2	8	3	2	Adjustable version: ①② fixed as 00
③	F				Oscillation Frequency 1.4MHz
④	M				Package Types: SOT-23-5
⑤	R				Embossed Tape :Standard Feed
	S				Embossed Tape :Reverse Feed

For example: LN240700FMR said package pins is defined as LN2407, external feedback, the oscillator frequency of 1.4MHz, Package SOT-23-5, Reverse Feed.

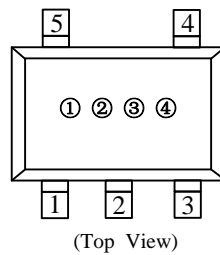
Functional Pin Description



Pin Number	Pin Name	Function
1	VIN	Power Input
2	GND	Common Ground
3	CE	Chip Enable Pin
4	FB/VOUT	Feedback/Output Voltage Pin
5	LX	Switching Output

Marking Rule

- SOT-23-5



- ① Represents the product name

Symbol	Product Name
3	LN2407◆◆◆◆M◆

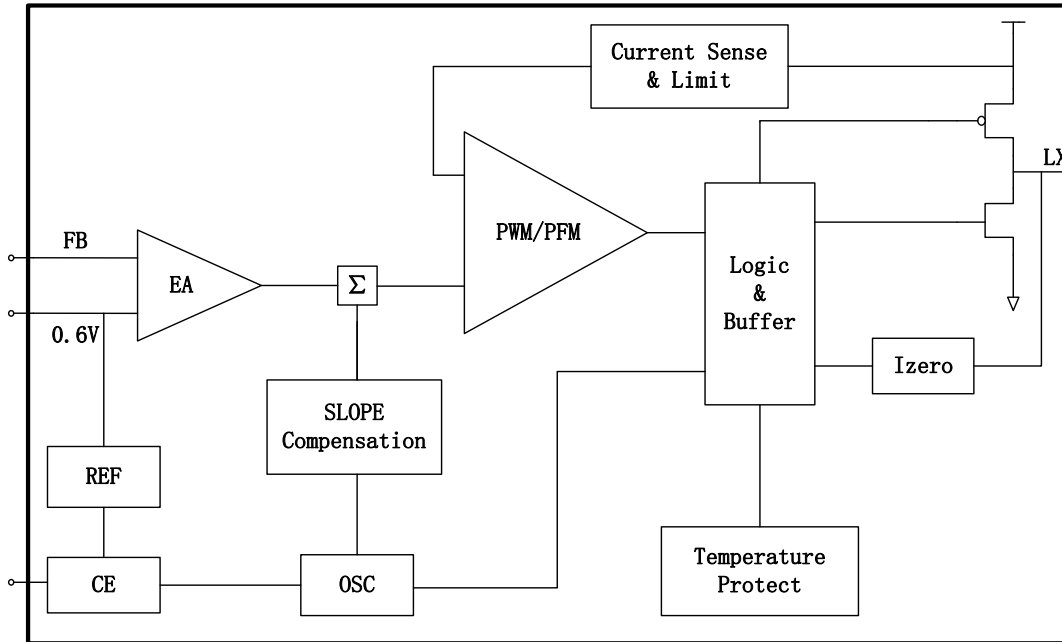
- ② ③ Product Classification

Symbol		Number	
②	Feedback mode	0	Adjustive
		2	1.2V
		8	1.8V
		3	3.3V
		4	4.2V
②	Package foot position	7	Represents the foot position of VIN、GND、CE、FB/VOUT、LX

- ④ Represents the assembly lot No.

0-9, A-Z; 0-9, A-Z mirror writing, repeated (G, I, J, O, Q, W exception)

■ Function Block Diagram



■ Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units	
Input Supply Voltage	V _{IN}	-0.3~6.5	V	
Output Voltage	V _{OUT}	-0.3~6.5		
	V _{LX}	-0.3~V _{IN} + 0.3		
CE Voltage	V _{CE}	-0.3~V _{IN} + 0.3	V	
Peak LX Current	I _{LX}	±1000	mA	
Power Dissipation	SOT23-5	P _D	250	mW
Operating Temperature Range	Topr	-40~+85	°C	
Storage Temperature Range	Tstg	-55~+125		

Note: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Electrical Characteristics

$V_{IN}=3.6V$, $C_{IN}=4.7\mu F$, $C_L=10\mu F$, $L=2.2\mu H$

($T_a=25^\circ C$, unless otherwise noted)

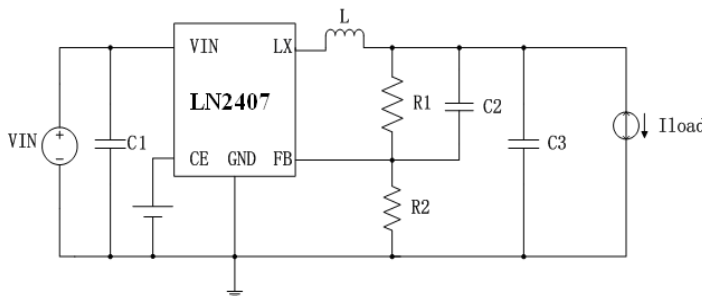
Parameter	Symbol	Conditions	MIN	TYP	MAX	Units	Test Circuits
Feedback Voltage	VFB	-	0.59	0.6	0.61	V	1
Input Voltage Range	V_{IN}		2	-	6		
Load regulation	V_{OUT}	$I_{LMAX}=600mA$		0.5		%	
Line regulation	ΔV_{OUT}	$I_L=300mA$		0.45		%	
Efficiency	EFFI	$V_{IN}=2.7V$; $I_L=100mA$	-	92	-	%	
CE "Low" voltage	VCEL	-	1.8			V	
CE "High" voltage	VCEH	-			1.4	V	
Stand-by Current	ISTB	$V_{CE}=0V$, $V_{IN}=3.6V$	0	-	1	μA	3
Quiescent Current	IDD	$V_{FB}=0.6V*0.9$	-	200	-		
Output Current Limit	ILIM	-	-	1200	-	mA	
PFM switching point	IL	$V_{IN}=3.6V$, $V_{OUT}=1.8V$		150		mA	
Oscillation Frequency	FOSC		-	1.4	-	MHz	2
Maximum Duty Circle	MAXDTY	-	100	-	-	%	

Test Circuits

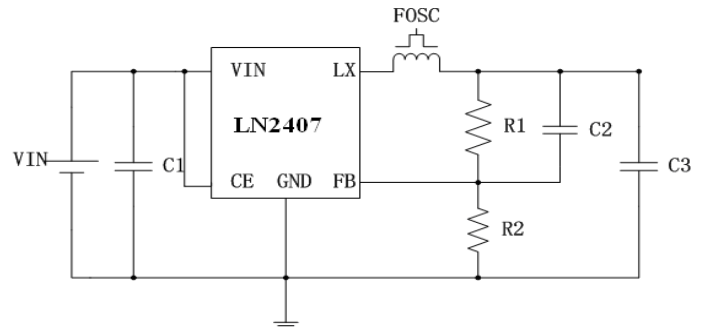
Parameters: $L_X=2.2\mu H$, $C_1=4.7\mu F$, $C_2=22pF$, $C_3=10\mu F$.

According to the required output voltage regulate R_1 , R_2 , $V_{OUT} = V_{FB}(1+R_1/R_2)$, $V_{FB}=0.6V$.

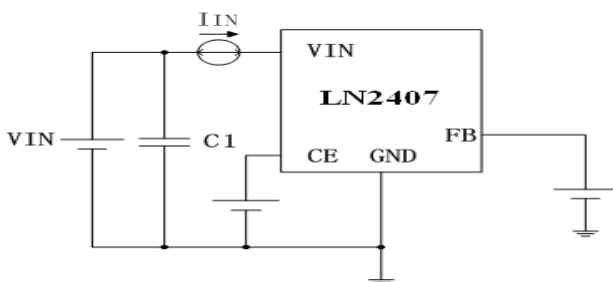
Circuit 1



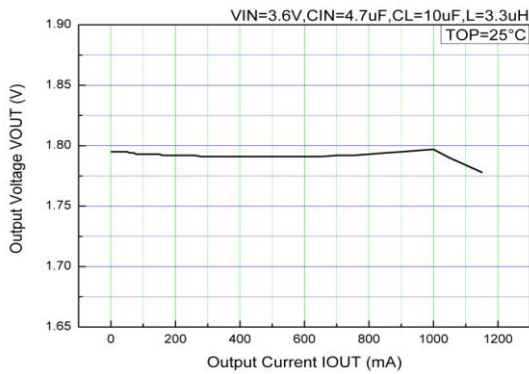
Circuit 2



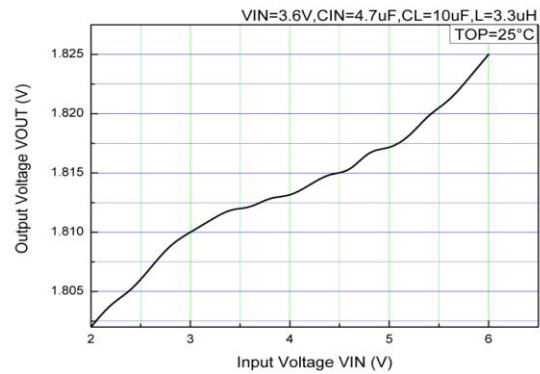
Circuit3



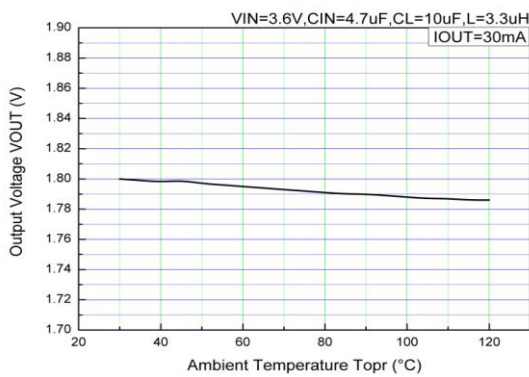
Typical Performance Characteristics



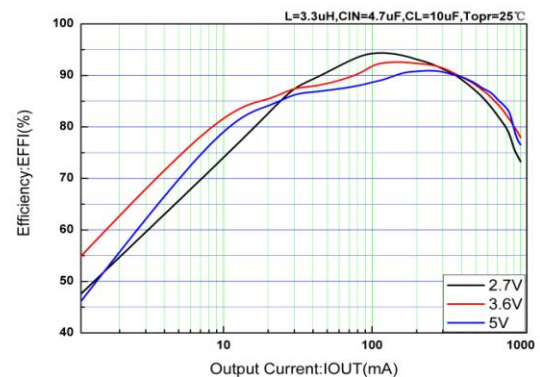
Output voltage vs output current



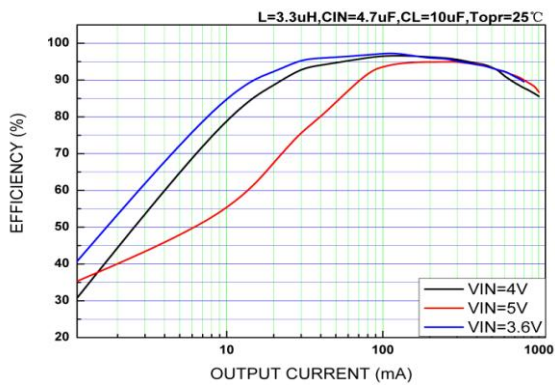
Input voltage vs output voltage



Output voltage vs Temperature



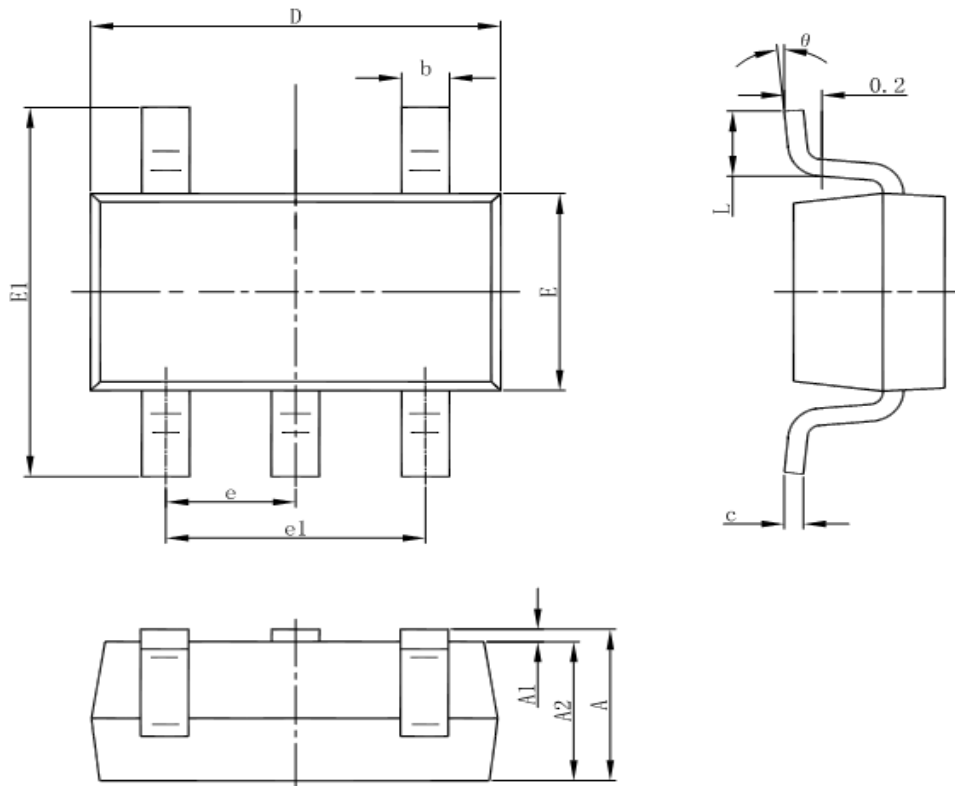
1.8V Efficiency vs output current



3.3V Efficiency vs output current

Package Information

- SOT-23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°