1.5MHz, 600mA SYNCHRONOUS STEP-DOWN CONVERTER

A7106

Description

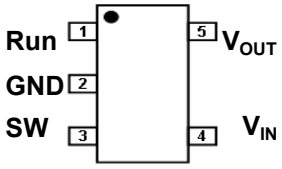
The A7106 is a 1.5MHz constant frequency, slope compensated current mode PWM step-down converter. The device integrates a main switch and a synchronous rectifier for high efficiency without an external shottky diode. It is ideal for powering portable equipment that runs from a single cell lithium-Ion (Li+) battery. The A7106 can also run at 100% duty cycle for low dropout operation, extending better life in portable system. Idle mode operation at light loads provides very low output ripple voltage for noise sensitive applications.

Features

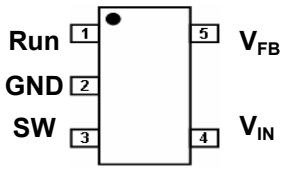
◎1.5MHz constant switching frequency
◎High efficiency, Up to 96%
◎600mA output current at V_{IN}=3V
◎No schottky diode required
◎2.5V to 5.5V input voltage range
◎Output voltage as low as 0.6V
◎100% duty cycle in dropout
◎Low quiescent current: 270uA
◎Short circuit protection
◎Thermal fault protection
◎<1uA shutdown current
◎Space saving 5-pin thin SOT-25 package

Pin Assignment

Fixed Output



Adjustable Output

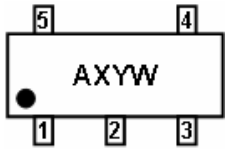


Top View

Applications

◎Cellular and Smart Phones
◎Wireless and DSL Modems
◎PDAs
◎MP3 Player
◎Digital Still and Video Cameras
◎Portable Instruments
◎Microprocessors and DSP Core Supplies

Ordering Information



Part Number
A7106E5-Adj
A7106E5-1.5
A7106E5-1.8
A7106E5-1.2

E5	SOT-25 Package
	PN: A7106E5
Note:	AiT provides all lead free parts
	E5 Package provide in Tape & Reel

Thermal Resistance

Package	θ_{JA}	θ_{JC}
SOT-25	250°C/W	110°C/W
Note:	Thermal Resistance is specified with approximately 1 square of 1oz copper	

Pin Description

PIN	Name	Function
1	RUN	Regulator Enable control input. Drive RUN above 1.5V to turn on the part. Drive RUN below 0.3V to turn it off. In shutdown, all functions are disabled drawing<1uA supply current. Do NOT leave RUN floating.
2	GND	Ground
3	SW	Power Switch Output. It is the Switch note connection to inductor, This pin connects to the drains of the internal P-CH and N-CH MOSFET switches.
4	IN	Supply Input Pin. Must be closely decoupled to GND, Pin2, with a 2.2uF or greater ceramic capacitor.
5	V_{FB}/V_{OUT}	V_{FB} (A7106E5-adj): Feedback Input Pin. Connect FB to the center point of the external resistor driver. The feedback threshold voltage is 0.6V.
		V_{OUT} (A7106E5-1.2/1.5/1.8). Output Voltage Feedback Pin. An internal resistive divider devides the output voltage down for comparison to the internal reference voltage.

Typical Application

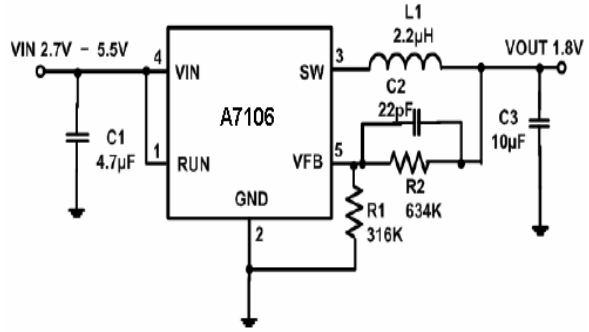
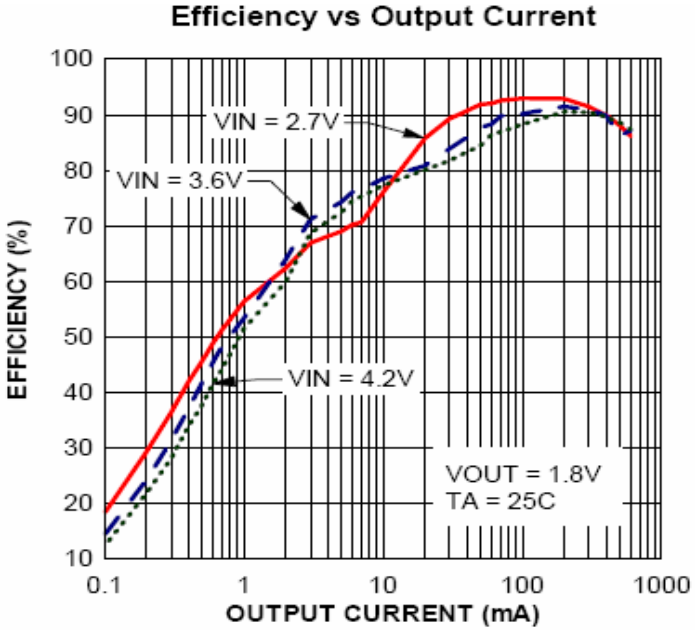


Figure 1. Basic application circuit with A7106 adjustable output, V_{OUT}=1.8V



Absolute Maximum Ratings (Note1)

Input Supply Voltage	-0.3V to +6V
RUN, V_{FB} Voltage	-0.3V to V_{IN}+0.3V
SW, V_{OUT} Voltage	-0.3V to V_{IN}+0.3V
Peak SW Sink and Source Current	1.5A
Operating Temperature Range	-40°C to +85°C
Junction Temperature (Note2)	+125°C
Storage Temperature Range	-60°C to +150°C
Lead Temperature (Soldering, 10s)	+300°C

Note 1	Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.
Note 2	T_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula: $T_J=T_A+P_D \times \theta_{JA}$

Electrical Characteristics (Note3)

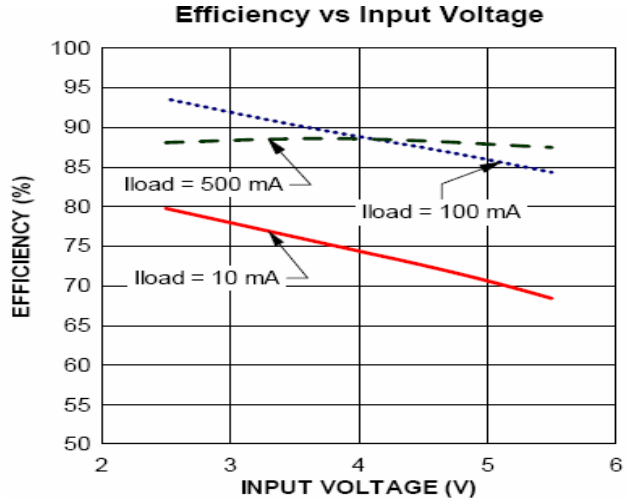
V_{IN}=V_{RUN}=3.6V, T_A=25°C, Test Circuit Figure 1, unless otherwise noted

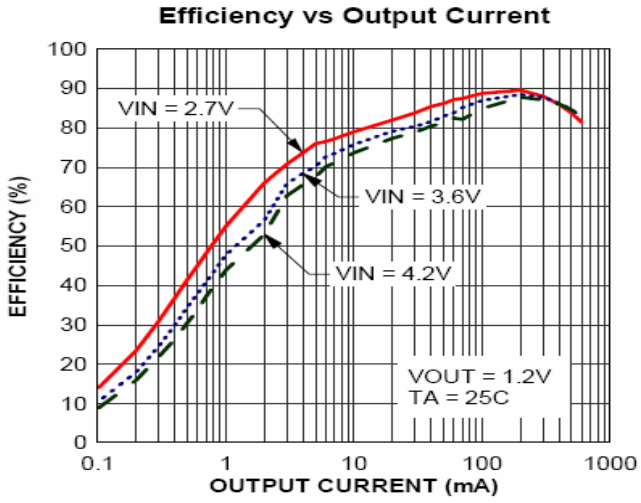
Parameter	Conditions	Min	Typ	Max	Unit
Input Voltage Range		2.5		5.5	V
Input DC Supply Current Active Mode Shutdown Mode	 V_{FB}=0.5V V_{FB}=0V, V_{IN}=4.2V		 270 0.08	 400 1.0	uA
Regulated Feedback Voltage	T_A=+25°C	0.5880	0.6000	0.6120	V
	T_A=0°C≦T_A≦85°C	0.5865	0.6000	0.6135	
	T_A=-40°C≦T_A≦85°C	0.5850	0.6000	0.6150	
V_{FB} Input Bias Current	V_{FB}=0.65V			±30	nA
Reference Voltage Line Regulation	V_{IN}=2.5V to 5.5V V_{OUT}=V_{FB} (R2=0)		0.11	0.40	mA
Regulated Output Voltage	A7106-1.2E5	1.164	1.2	1.236	V
	A7106-1.5E5	1.455	1.5	1.545	
	A7106-1.8E5	1.746	1.8	1.854	
Output Voltage Line Regulation	V_{IN}=2.5V to 5.5V I_{OUT}=10mA		0.11	0.40	%/V
Output Voltage Load Regulation	I_{OUT} from 0 to 600mA		0.0015		%/mA
Maximum Output Current	V_{IN}=3.0V	600			mA
Oscillator Frequency	V_{FB}=0.6V or V_{OUT}=100%	1.2	1.5	1.8	MHz
$R_{DS(ON)}$ of P-CH MOSFET	I_{SW}=300mA		0.30	0.30	Ω
$R_{DS(ON)}$ of N-CH MOSFET	I_{SW}= - 300mA		0.20	0.45	Ω
Peak Inductor Current	V_{FB}=0.5V or V_{OUT}=90% V_{IN}=3V, Duty Cycle<35%		1.2		A
SW Leakage	V_{RUN}=0V, V_{SW}=0V or 5V V_{IN}=5V		±0.01	±1	uA
Output over voltage lockout	ΔV_{OVL}=V_{OVL}-V_{FB}		60		mV
RUN Threshold	-40°C≦T_A≦85°C	0.3	0.45	1.3	V
RUN Leakage Current			±0.1	±1	uA

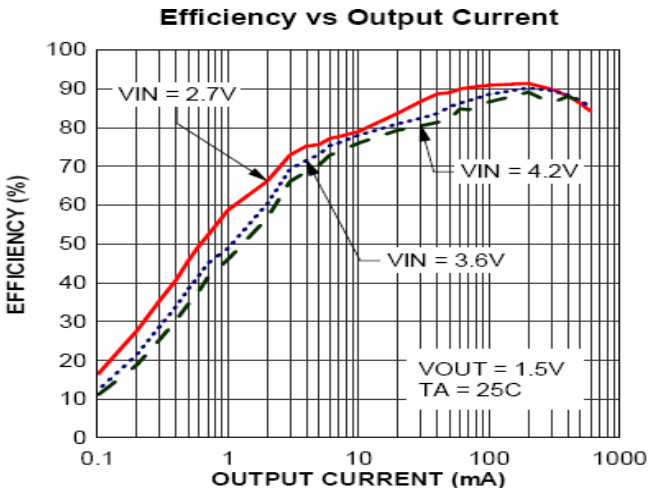
Note3: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization

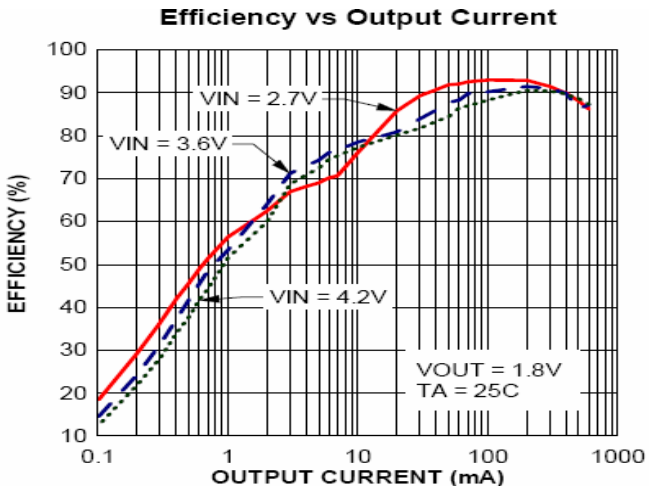
Typical Performance Characteristics

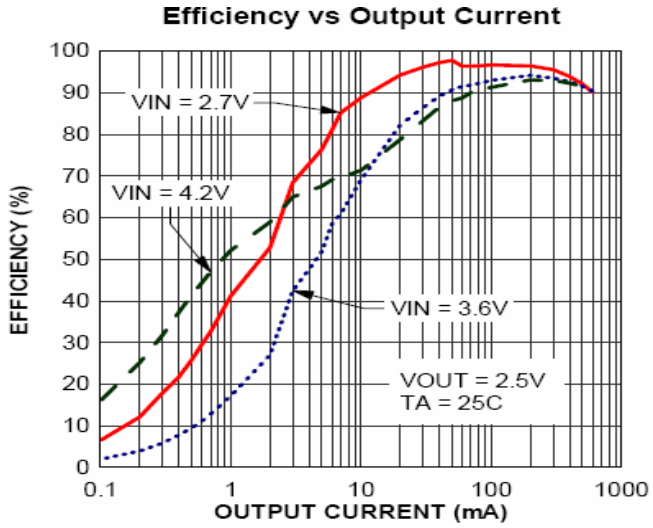
Test Figure 1 above unless otherwise specified

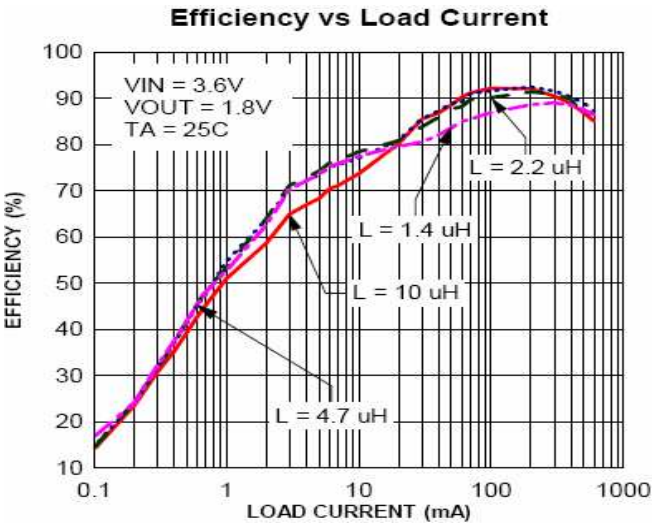




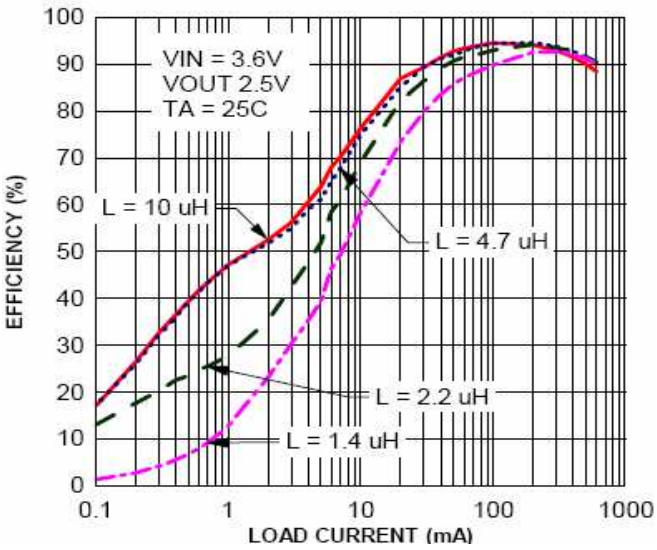




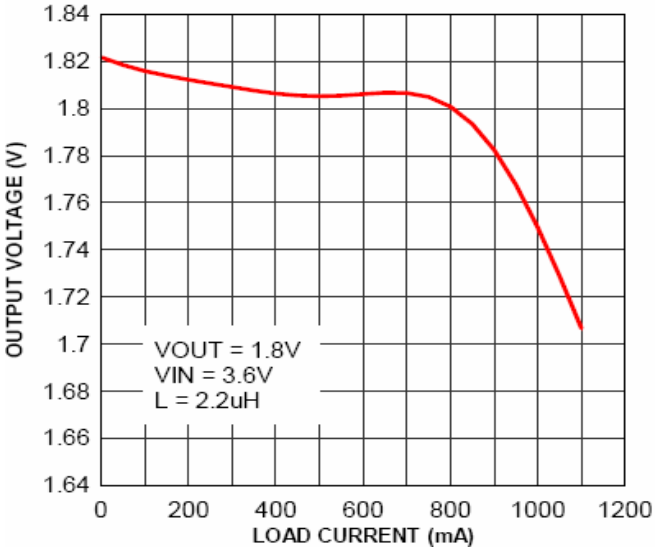




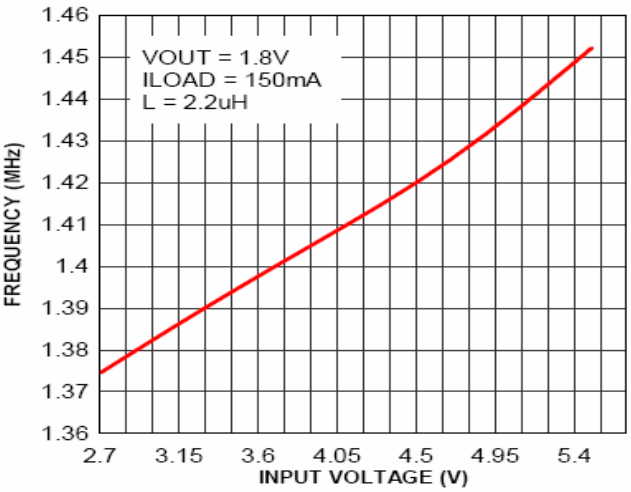
Efficiency vs Load Current



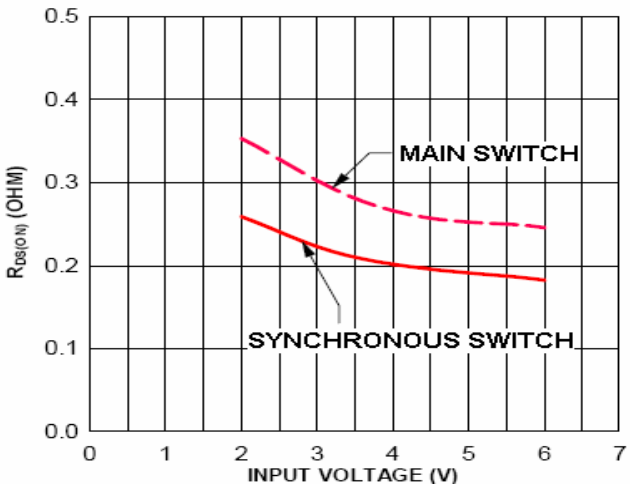
Outpu Voltage vs Load Current



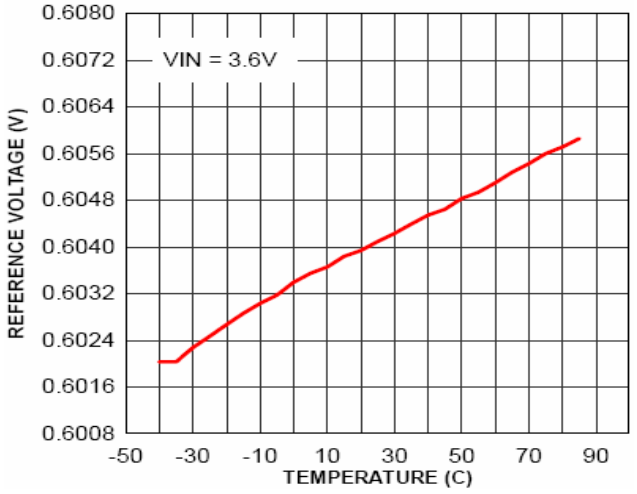
Frequency vs Input Voltage



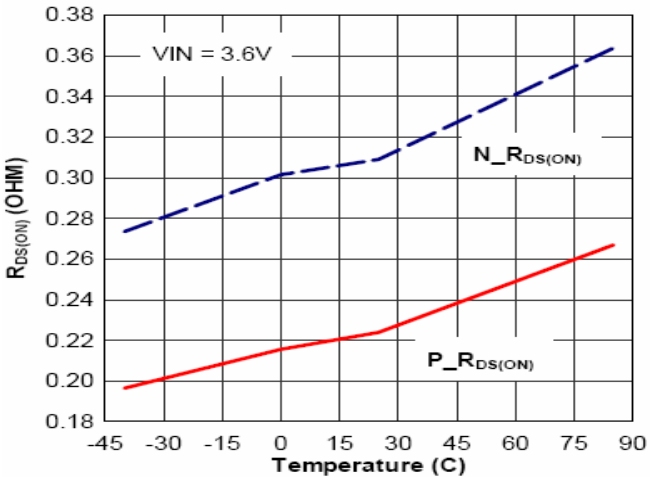
$R_{DS(ON)}$ vs Input Voltage



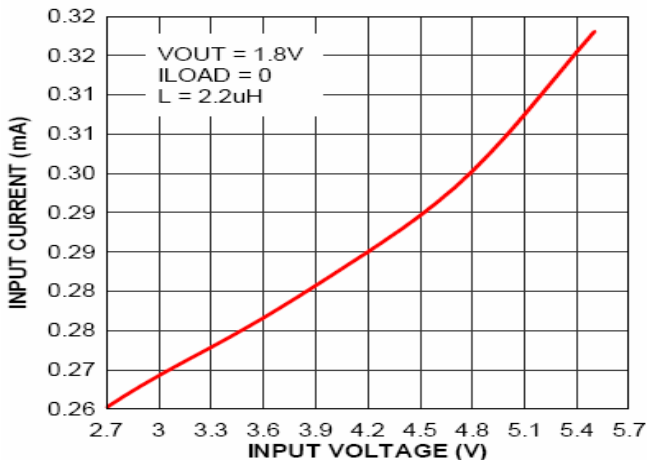
Reference Voltage vs Temperature



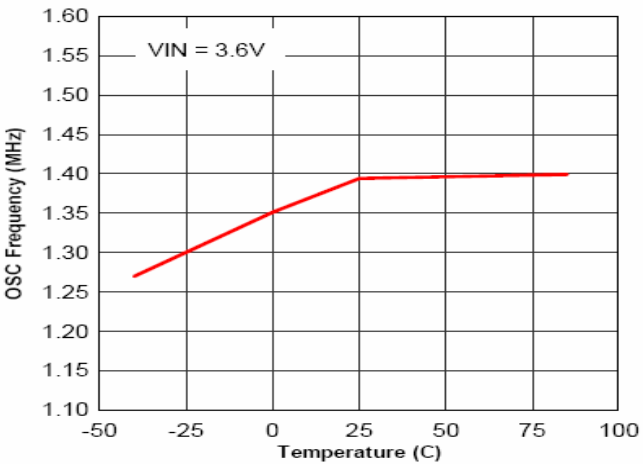
$R_{DS(ON)}$ vs Temperature



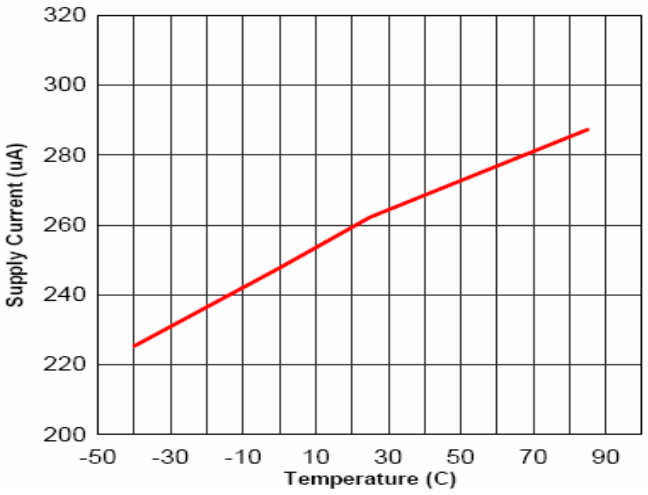
Input Voltage vs Input Current



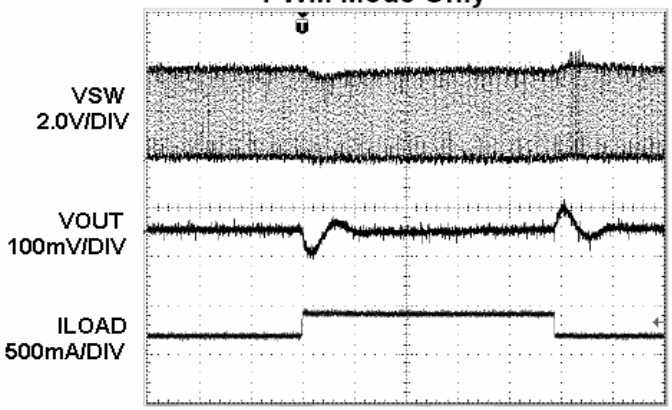
Frequency vs Temperature



Supply Current vs Temperature

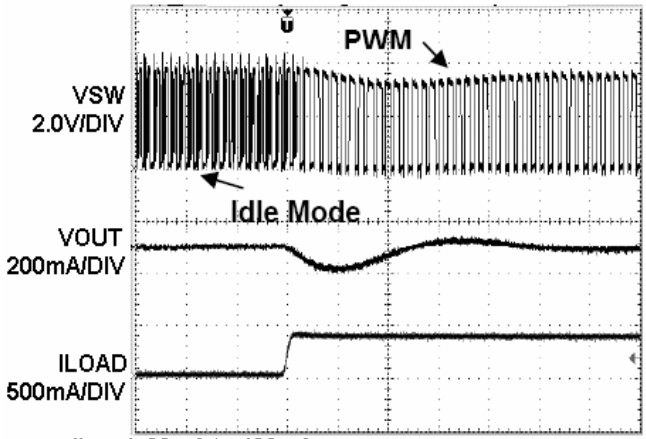


Load Transient Response
PWM Mode Only



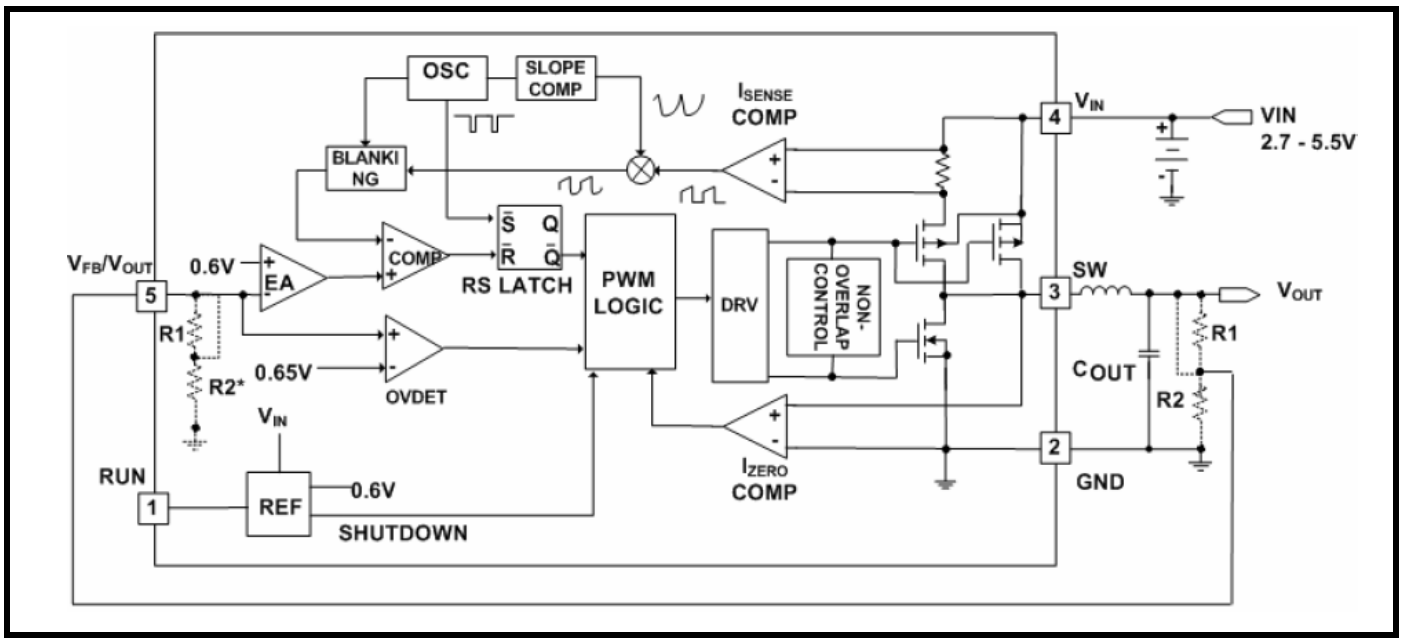
ILoad=100mA to 400A
L=2.2uH, Cin=10uF, Cout=10uF, Vin=3.6V, Vout=1.8V

Load Transient Response
Idle Mode to PWM Mode



ILoad=28mA to 400mA
L=2.2uH, Cin=10uF, Cout=10uF, Vin=3.6V, Vout=1.8V

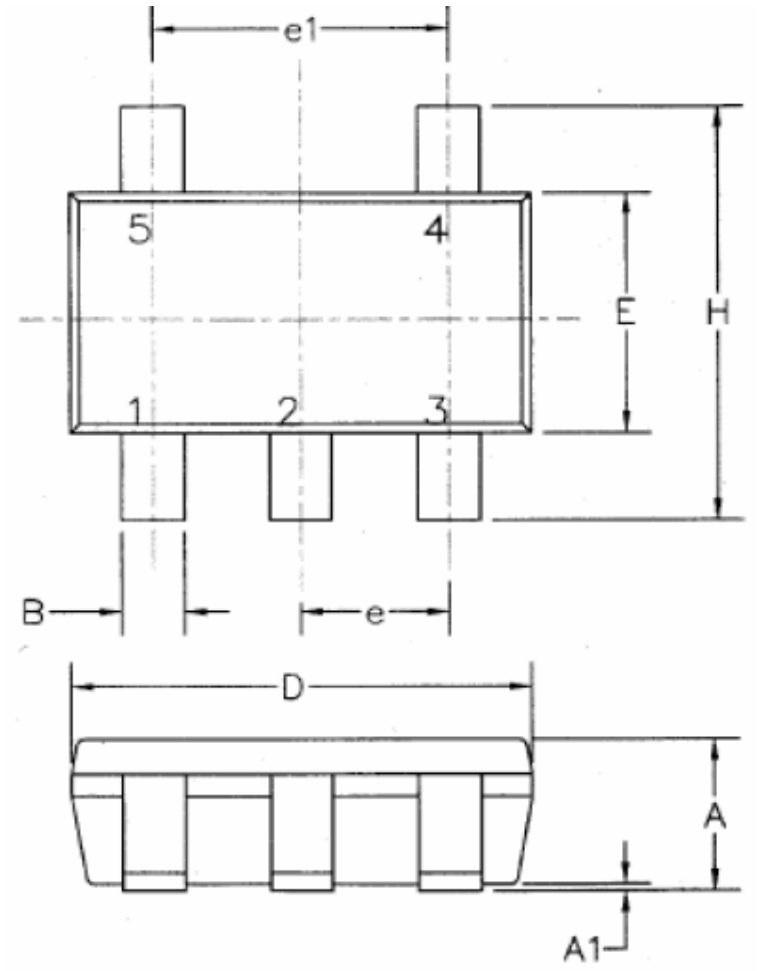
Block Diagram

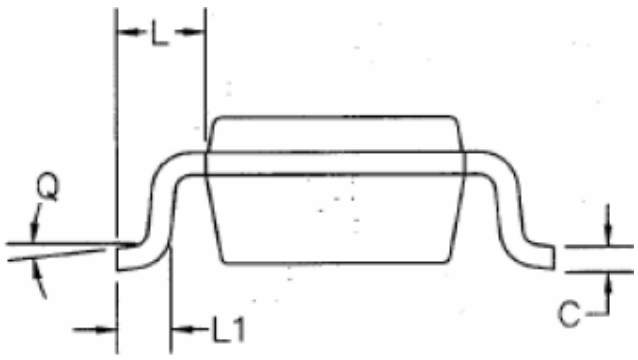


* For Adjustable output R1+R2 is external

Figure 2. A7106 Block Diagram

Mechanical Dimensions of SOT-25 package





Outline Dimensions

(All Dimensions in mm)

Dimension	Min	Max
A	0.9	1.1
A1	0.01	0.13
B	0.3	0.5
C	0.09	0.2
Dimension	2.8	3
H	2.5	3.1
E	1.5	1.7
e	0.95 REF.	
E1	1.90 REF	
L1	0.2	0.55
L	0.35	0.8
Q	0^o	10^o

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