Dual Channel 1.5 MHz, 600mA Synchronous Step-Down DC-DC Converter

GENERAL DESCRIPTION

APS1026 is a dual channel high efficiency monolithic synchronous step down current mode DC-DC converter operating at 1.5MHz constant frequency. The device integrates a main switch and a synchronous rectifier for high efficiency without an external Schottky diode for each of the channels. The APS1026 can operate from a 2.5V to 5.5V input voltage and is ideal for powering portable equipment that runs from a single cell lithium-Ion (Li+) battery. It can supply 600mA output current for each channel and can also run at 100% duty cycle for low dropout operation, extending battery life in portable system.

User can select between idle mode or power saving mode via Mode/Sync input pin. Idle mode provides low ripple noise at light load while power saving Mode provides high efficiency at light load.

APPLICATIONS

- Portable Media Players
- Digital Still Cameras
- Cellular Telephones
- PDAs
- Wireless and DSL modems

FEATURES

- High Efficiency: Up to 95%
- 600mA Output Current at Vin=3.0V
- 1.5MHz Constant Frequency Operation
- Very Low Quiescent Current of 40uA
- No Schottky Diode Required
- Low $R_{DS(on)}$ Internal Switches: 0.35Ω
- 0.6V reference allows low Output Voltage
- Current Mode Operation for excellent line and load transient Response
- Short-Circuit & Thermal Fault Protection
- <1μA Shut Down Current
- Power-On Reset Output
- Externally Synchronizable Oscillator
- Small Thermally Enhanced MSOP-10 and DFN-10 Package

EVALUATION BOARD

Board Number	Dimensions (Inches)
EV1026EMJ (MSOP)	2.4"X x 2.4"Y x 0.5"X
EV1026EDJ (DFN)	2.4"X x 2.4"Y x 0.5"X

Typical Application

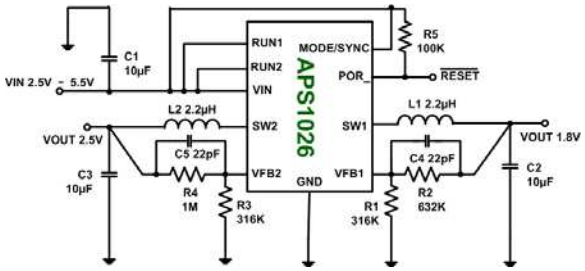
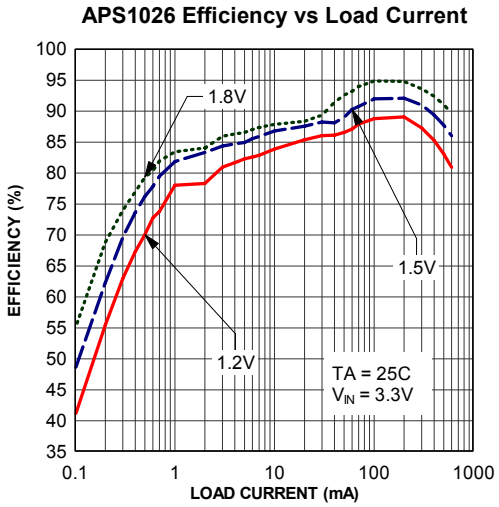


Figure 1. Basic Application Circuit

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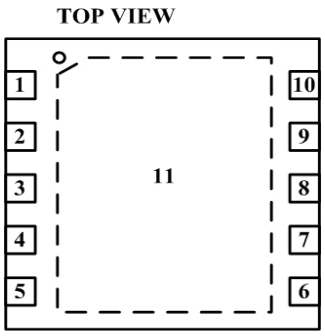


Absolute Maximum Rating (Note 1)

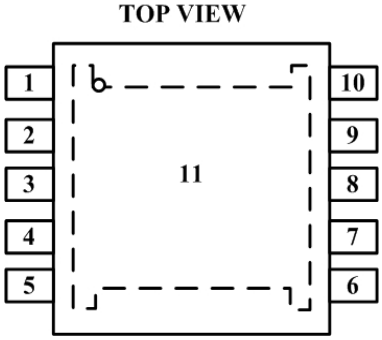
Input Supply Voltage ..... -0.3V to +6V
RUN1, RUN2..... -0.3V to V_{IN}+0.3V
VFB1, VFB2 Voltages ..... -0.3V to V_{IN}+0.3V
SW1, SW2 Voltages..... -0.3V to V_{IN}+0.3V
$\overline{POR}$ Voltages ..... -0.3V to V_{IN}+0.3V

Peak SW1, SW2 Sink & Source Current 1.5A
Operating Temperature Range... -40°C to +85°C
Junction Temperature (Note2) .....+125°C
Storage Temperature Range.... -65°C to +150°C
Lead Temperature (Soldering, 10s).....+300°C

Package/Order Information



10-Lead (3mm X 3mm) Plastic DFN
Exposed Pad is PGND (Pin 11)
Must be connected to GND.



10-Lead Plastic MSOP
Exposed Pad is PGND (Pin 11)
Must be connected to GND.

Part Number	Top Mark	Temp Range	Part Number	Top Mark	Temp Range
APS1026EDJ	D2XY(Note4)	-45℃ to 85℃	APS1026EMJ	D1XY	-45℃ to 85℃

Thermal Resistance (Note 3):

Package	Θ_{JA}	Θ_{JC}
MSOP-10 (EXPOSE PAD)	45℃/W	10℃/W
DFN-10 (EXPOSE PAD)	45℃/W	10℃/W

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:
$T_J = T_A + (P_D) \times \Theta_{JA}$.
Note 3: Thermal Resistance is specified with approximately 1 square of 1 oz copper.
Note 4: XY = Manufacturing Date Code. X = Year and Y = Week.

Electrical Characteristics (Note 5)

(V_{IN} =V_{RUN}= 3.6V, TA = 25°C, Test circuit of Figure 3, unless otherwise noted.)

Parameter	Conditions	MIN	TYP	MAX	Unit
Input Voltage Range		2.5		5.5	V
Input DC Supply Current Active Mode Sleep Mode Shutdown Mode	 V_{FB1} = V_{FB2} = 0.5V, MODE = GND V_{FB1} = V_{FB2} = 0.63V, MODE = 3.6V RUN = 0V, V_{IN} = 4.2V, MODE = 0V		 500 45 0.3	 800 60 2	 µA µA µA
Regulated Feedback Voltage	T_A = +25°C, Channel 1 or 2	0.5880	0.6000	0.6120	V
	T_A= 0°C ≤ T_A ≤ 85°C, Channel 1 or 2	0.5865	0.6000	0.6135	V
	T_A= -40°C ≤ T_A ≤ 85°C, Channel 1 or 2	0.5850	0.6000	0.6150	V
Feedback Pin Input Current	V_{FB} = 0.65V			±30	nA
Reference Voltage Line Regulation	V_{IN} = 2.5V to 5.5V, V_{OUT} = V_{FB} (R2=0)		0.04	0.40	%/V
Output Voltage Line Regulation	V_{IN} = 2.5V to 5.5V, V_{OUT} = 1.8V, I_{OUT} = 10mA		0.24	0.40	%/V
Output Voltage Load Regulation	V_{IN} = 3.6V, , I_{OUT} = 0 to 600mA, Mode = 3.6V or 0V		0.0015		%/mA
Maximum Output Current	V_{IN} = 3.0V	600			mA
Oscillator Frequency	$V_{FB1/2}$ = 0.6V	1.2	1.5	1.8	MHz
$R_{DS(ON)}$ of P-CH MOSFET	V_{IN} = 3.6V, I_L = 100mA		0.35	0.45	Ω
$R_{DS(ON)}$ of N-CH MOSFET	V_{IN} = 3.6V, I_L = 100mA		0.28	0.45	Ω
Peak Inductor Current	V_{IN}=3V, V_{FB1} = V_{FB2}= 0V, SW1 or SW2		1.0		A
SW Leakage	V_{RUN} = 0V, V_{SW}= 0V or 5V, V_{IN} = 5V		±0.01	±1	µA
Output Over Voltage Lockout	ΔV_{OVLX} = V_{OVLX} – V_{FBX}	20	50	80	mV
RUN Threshold	-40°C ≤ T_A ≤ 85°C	0.3	0.45	1.30	V
RUN Leakage Current			±0.1	±1	µA
Power-On Reset Threshold (POR)	V_{FBX} Ramping Up, MODE/SYN = 0V		8.5		%
	V_{FBX} Ramping Down, MODE/SYN = 0V		-8.5		%
	Power-On Reset Delay		175		mS
	Power-On Reset On-Resistance		100		Ω

Note 5: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization.