AP1604A

PWM/PFM DUAL MODE STEP-DOWN DC/DC CONVERTER

Features

- Input voltage range: 2.2V~5.5V (V_{OUT} type)
- Oscillator frequency: 600KHz (Typ.)
- Internal reference: 1.0V (Typ.)
- High efficiency: 93% (Typ.)
- Stand-by capability: I_{STB}=2μA. (Typ.)
- Soft-start time set-up externally type possible
- Current limit and thermal shutdown protection
- Lead Free Package: SOT25
- SOT25: Available in “Green” Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

General Description

The AP1604A series are multi-functional step-down DC/DC converters with built-in speed, low ON resistance drivers. It is capable to deliver more than 800mA output current with external coil, diode and capacitor.

Output voltage is set-up by the external resistors. (±2.5% accuracy). The 600KHz AP1604A that can work out with small value external components comes out more compact board.

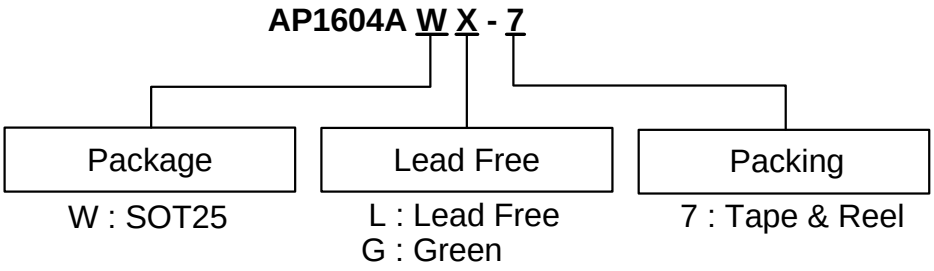
The device switches to and works under PFM mode with light loads. It keeps at high efficiency for both light loads and large output current.

AP1604A can be soft-start with a proper capacitor connected between CE/SS pin and ground. The stand-by current is less than 2uA when CE/SS pin is at “LOW” status. The device is forced to switch off as the voltage at that pin is lower than the stipulated voltage.

Applications

- Electronic Information Organizers
- Palmtops
- Cellular and portable phones
- Portable Audio Systems
- Various Multi-function Power Supplies

Ordering Information

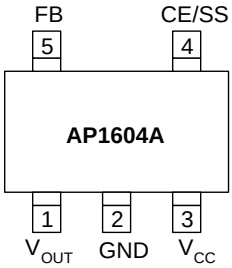


Device	Package Code	Packaging (Note 2)	7” Tape and Reel	
			Quantity	Part Number Suffix
AP1604AWL-7	W	SOT25	3000/Tape & Reel	-7
AP1604AWG-7	W	SOT25	3000/Tape & Reel	-7

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.
2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Pin Assignment

(Top View)

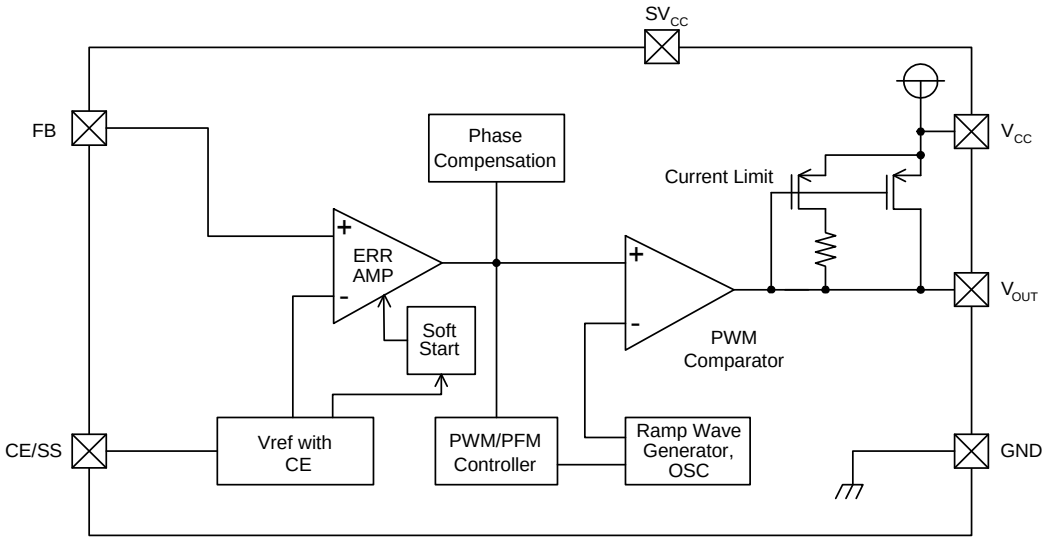


SOT25

Pin Description

Pin Name	Description
V_{OUT}	Output Voltage
GND	Ground
V_{CC}	Input Supply
CE/SS	Chip Enable / Soft Start
FB	Feedback pin

Block Diagram



Absolute Maximum Ratings (T_A=25°C)

Symbol	Parameter	Ratings	Units
V_{CC}/SV_{CC}	V_{IN} Pin Voltage	-0.3 ~ 6.5	V
V_{OUT}	V_{OUT} Pin Voltage	-0.3 ~ V_{IN}+0.3	V
V_{FB}	FB Pin Voltage	-0.3 ~ V_{IN}+0.3	V
$V_{CE/SS}$	CE/SS Pin Voltage	-0.3 ~ V_{IN}+0.3	V
P_D	Continuous Total Power Dissipation	Internal limited	
T_{OP}	Operating Ambient Temperature	-25 ~ +80	°C
T_{ST}	Storage Temperature Range	-40 ~ +125	°C

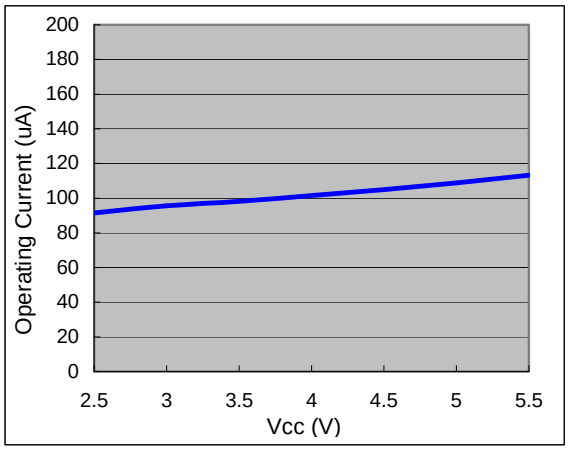
Electrical Characteristics

V_{IN} = 5V, V_{OUT}＝2V, Load = 300mA, T_A = 25°C

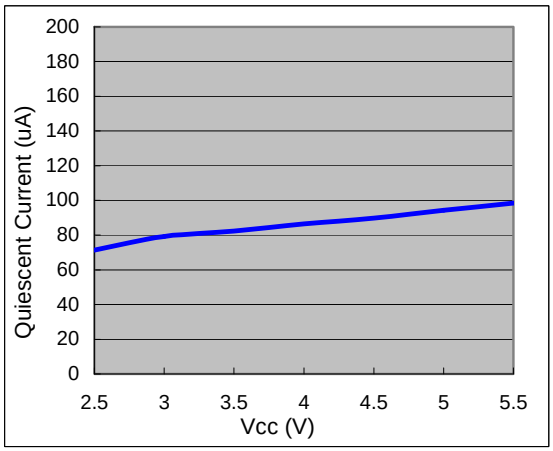
Sym.	Parameter	Conditions	Min	Typ.	Max	Units
V_{FB}	FB		0.975	1.0	1.025	V
V_{IN}	Input Voltage		2.2	-	5.5	V
	Line Regulation	V_{IN} = 2.2 ~ 5.5V, Load = 10mA	-	-	0.12	%
	Load Regulation	I_{OUT} = 10 ~ 800mA	-	-	1.2	%
V_{UVLO}	UVLO Voltage（min. operating voltage）	V_{CC}, voltage required to maintain H at V_{OUT}	-	-	2	V
I_{CC}	Operating Current	CE/SS = V_{IN}, No Load	-	100	150	μA
I_{CCQ}	Supply Current	No external components, CE/SS = V_{IN}, V_{FB} = 1.2V	-	90	120	μA
I_{STB}	Stand-by Current	No external components, CE/SS = 0V, V_{FB} = 0V	-	2	-	μA
I_{CL}	Current Limit	peak current V_{IN} = 5V, V_{OUT} = 2V	800	1000	1200	mA
Fosc	Oscillator Frequency	Load = 300mA, V_{IN} = 5V, V_{OUT} = 2V	500	600	700	kHz
MAXDTY	Maximum Duty Ratio		85	90	-	%
PFMDTY	PFM Duty Ratio	No load	15	25	35	%
V_{CEH}	CE/SS ”High” Voltage	Apply 1.4V (min.) to CE/SS, determine V_{OUT} ”High”	1.4	-	-	V
V_{CEL}	CE/SS ”Low” Voltage	Same as V_{CEH}, determine V_{OUT}/”Low”	-	-	0.6	V
EFFI	Efficiency	V_{CC} = 5V, V_{OUT} = 3.3V, Load = 300mA	-	93	-	%
Rdson	Rdson Condition	I_{OUT} = 300mA, V_{IN} = 5V, V_{OUT} = 2V	-	350	450	mΩ

Typical Performance Characteristics

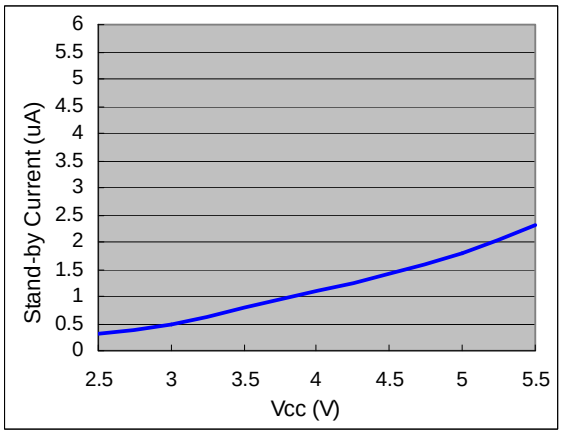
Vcc vs. Operating Current



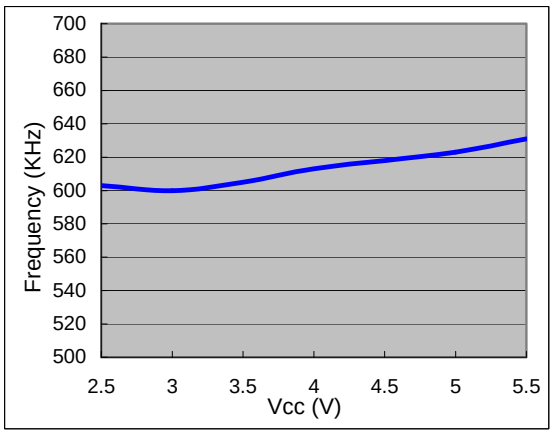
Vcc vs. Quiescent Current



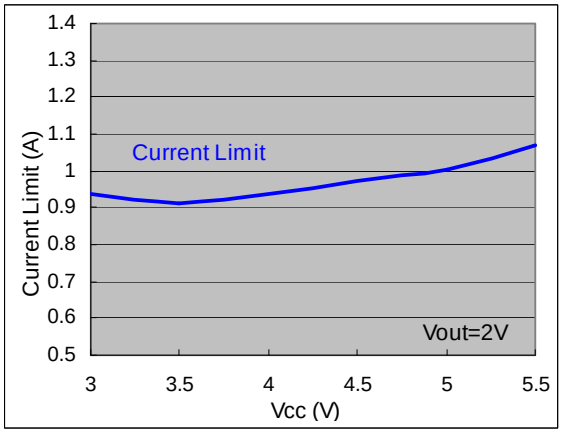
Vcc vs. Stand-by Current



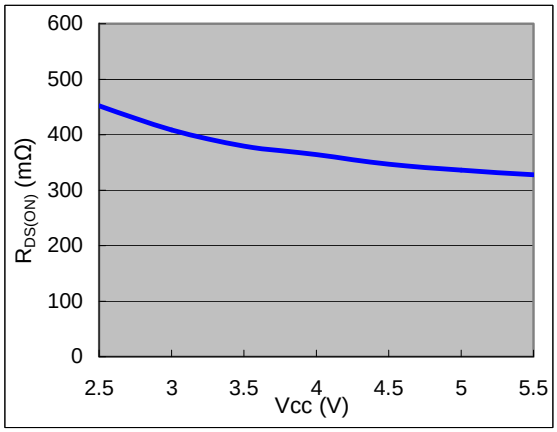
Vcc vs. Frequency



Vcc vs. Current Limit

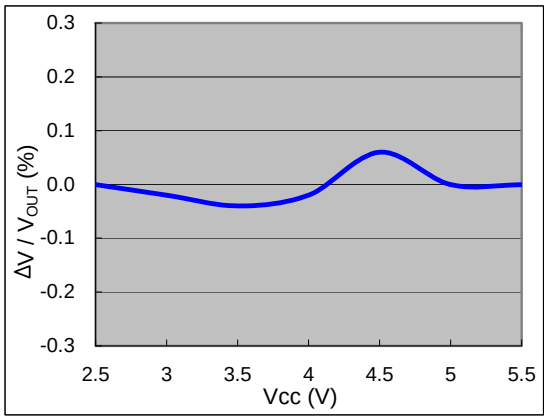


Vcc vs. $R_{DS(ON)}$

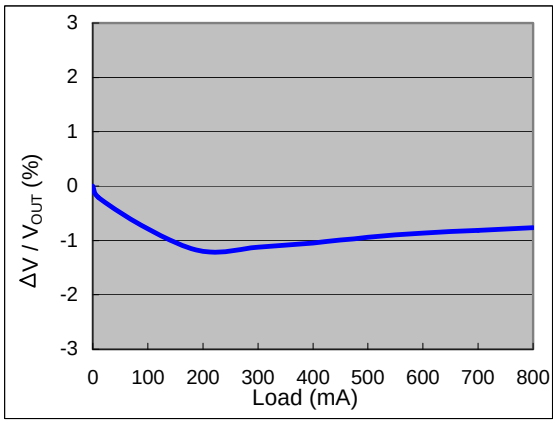


Typical Performance Characteristics (Continued)

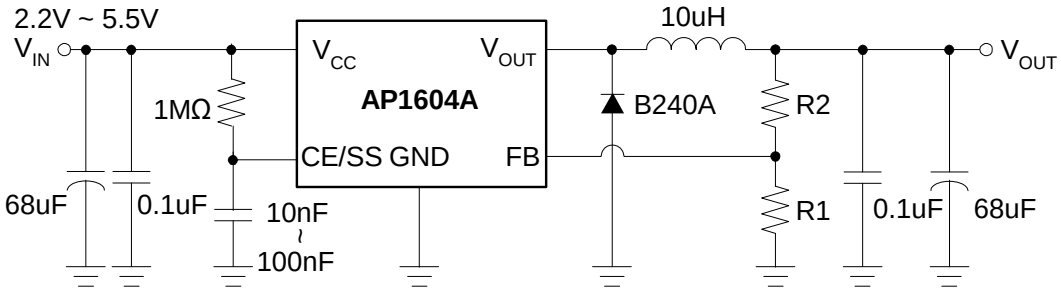
Line Regulation



Load Regulation



Typical Application Circuit



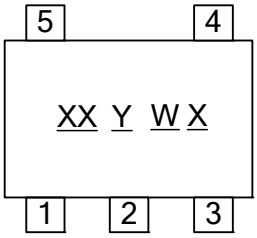
$$Vout = 1 \times (1 + \frac{R2}{R1})$$

R1 = 100K ~ 200K

Marking Information

(1) SOT25

(Top View)

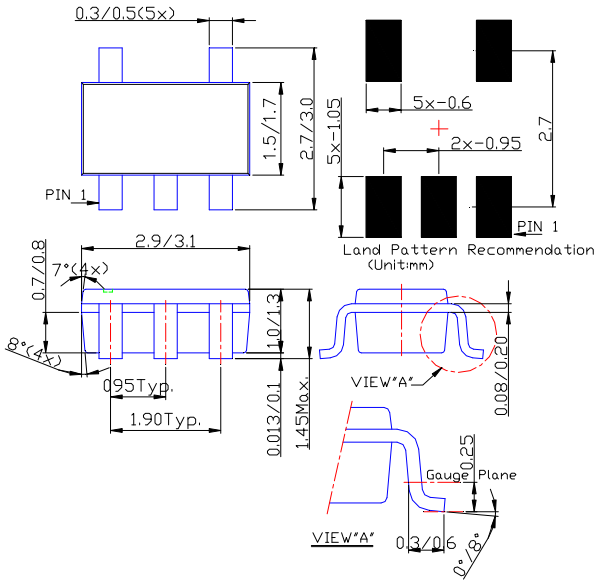


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents 52 and 53 week
X : a~z : Lead Free
A~Z : Green

Part Number	Package	Identification Code
AP1604AW	SOT25	ER

Package Information (All Dimensions in mm)

(1) Package Type: SOT25



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