AP1635

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

Features

- Input voltage range: 2.2V~5V (V_{OUT} type)
- Oscillator frequency: 700KHz (Typ.)
- Internal reference: 1.0V (Typ.)
- High efficiency: 93% (Typ.)
- Current limit and thermal shutdown protection
- Lead Free Package: SOP-8L
- SOP-8L: Available in “Green” Molding Compound (No Br, Sb)
- **Lead Free Finish/ RoHS Compliant (Note 1)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

General Description

The AP1635 series are multi-functional step-down DC/DC converters with built-in speed, low ON resistance drivers. It is capable to deliver more than 1.2A output current with external coil, diode and capacitor.

Output voltage is set-up by the external resistors. (±2.5% accuracy). The 700KHz AP1635 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.

AP1635 can be soft-start with a proper capacitor connected between CE/SS pin and ground. The stand-by current is less than 6uA 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

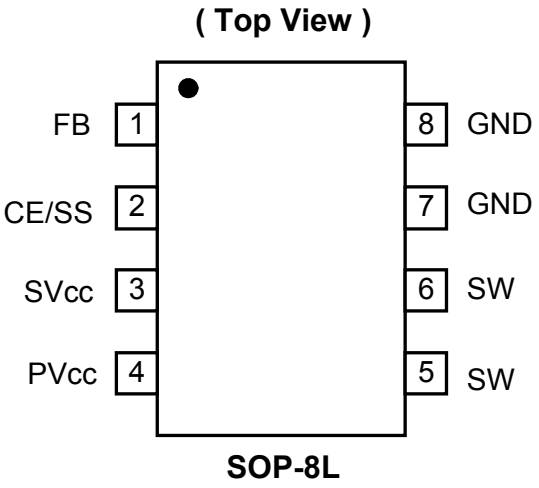
AP 1635 S X - 13

Package	Lead Free	Packing
S : SOP-8L	L : Lead Free G : Green	13 : Tape & Reel

Device	Package Code	Packaging (Note 2)	13” Tape and Reel	
			Quantity	Part Number Suffix
AP1635SL-13	S	SOP-8L	2500/Tape & Reel	-13
AP1635SG-13	S	SOP-8L	2500/Tape & Reel	-13

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.

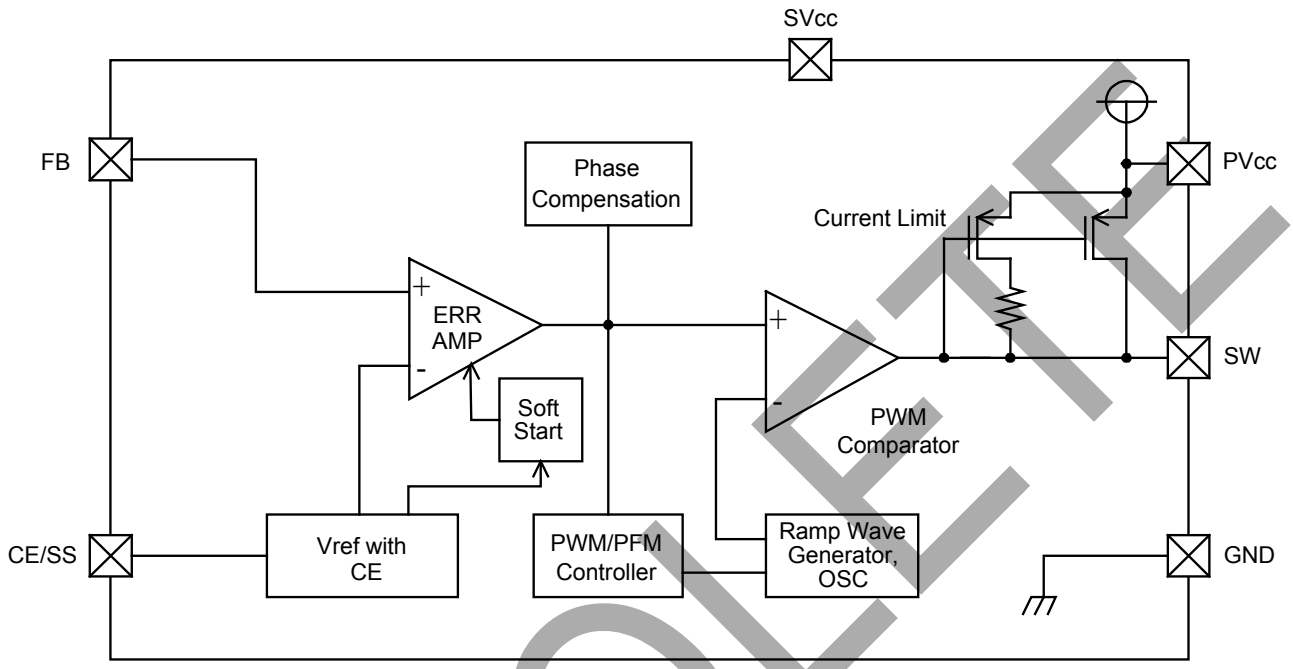
Pin Assignments



Pin Descriptions

Pin Name	Pin No.	Description
FB	1	Feedback pin
CE/SS	2	Chip Enable/ Soft Start: H: Enable L: Disable
SVcc	3	IC signal power supply pin, add a 20Ω resistor to PVcc and a 0.1μF capacitor to GND.
PVcc	4	IC power supply pin
SW	5/6	Switch Pin. Connect external inductor/diode here. Minimize trace area at this pin to reduce EMI.
GND	7/8	GND Pin

Block Diagram



Absolute Maximum Ratings (T_A=25°C)

Symbol	Parameter	Ratings	Units
V_{CC}/SV_{CC}	V_{IN} Pin Voltage	-0.3 ~ 5.0	V
V_{SW}	SW 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_{OPR}	Operating Ambient Temperature	-25 ~ +80	°C
T_{STG}	Storage Temperature	-40 ~ +125	°C

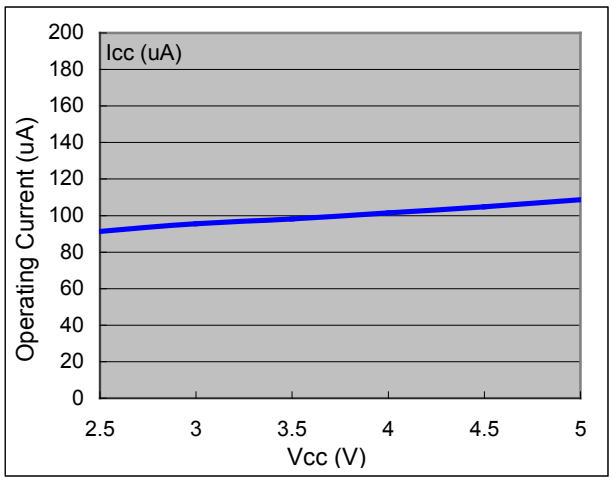
Electrical Characteristics

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

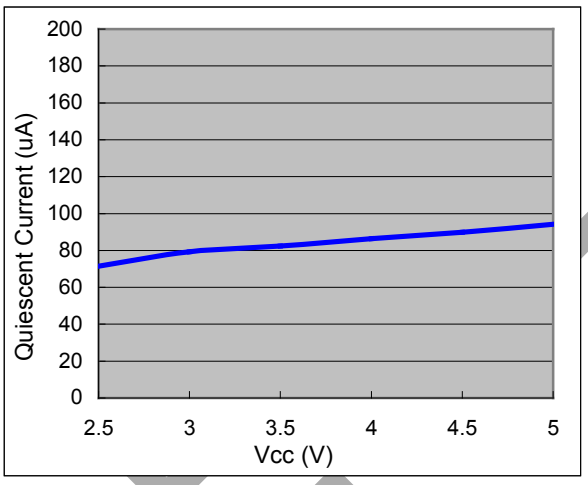
Symbol	Parameter	Conditions	Min	Typ.	Max	Units
V_{FB}	FB		0.975	1.0	1.025	V
V_{IN}	Input Voltage		2.2	-	5	V
	Line Regulation	V_{IN}=2.2~5V, Load=10mA	-	-	0.12	%
	Load Regulation	I_{OUT}=10~1200mA	-	-	1.2	%
V_{UVLO}	UVLO Voltage（min. operating voltage）	V_{CC}, voltage required to maintain H at V_{OUT}	-	-	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	-	6	-	μA
I_{CL}	Current Limit	Peak current V_{IN}=5V, V_{OUT}=2V	1200	1400	1600	mA
Fosc	Oscillator Frequency	Load=300mA, V_{IN}=5V, V_{OUT}=2V	500	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

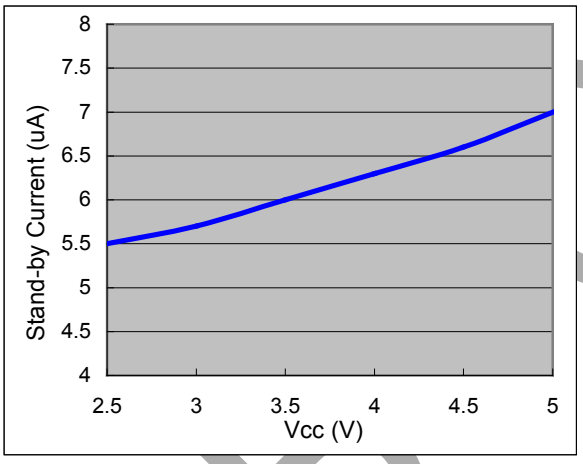
Vcc vs. Operating Current



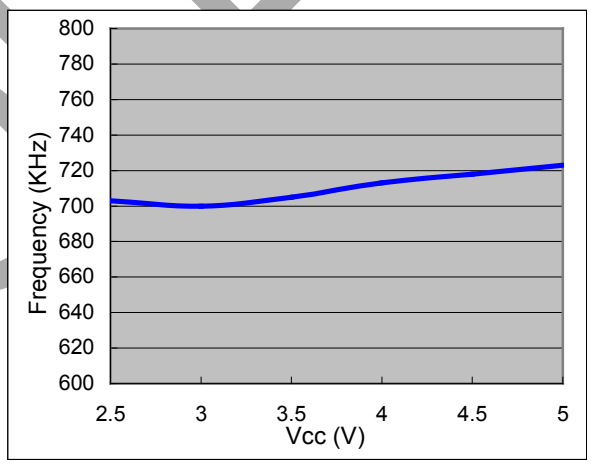
Vcc vs. Quiescent Current



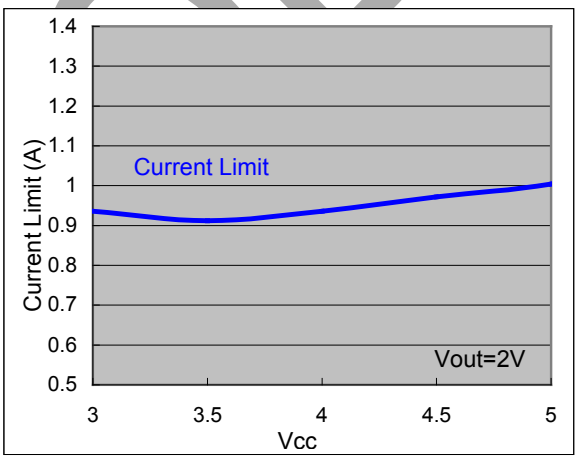
Vcc vs. Stand-by Current



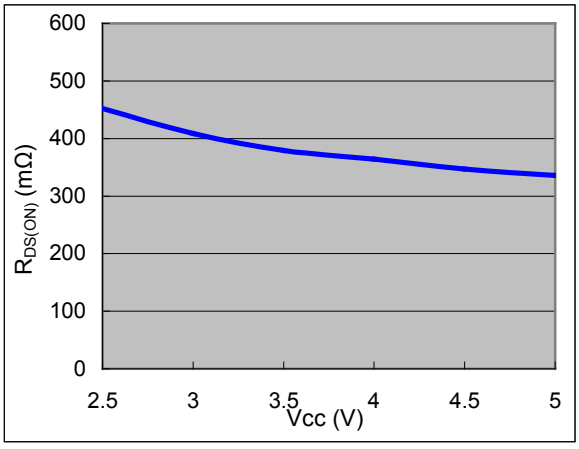
Vcc vs. Frequency



Vcc vs. Current Limit

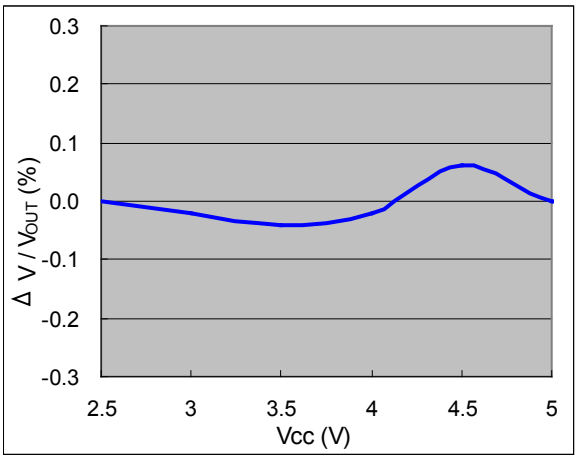


Vcc vs. $R_{DS(ON)}$

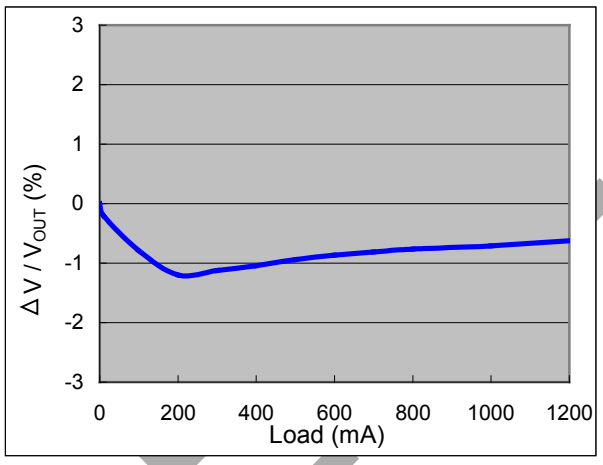


Typical Performance Characteristics (Continued)

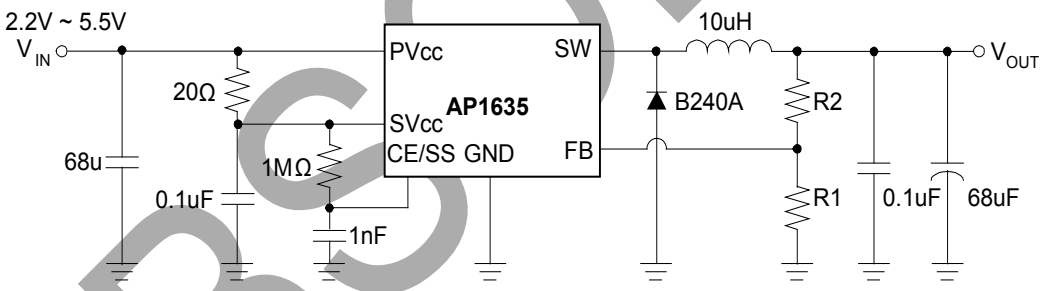
Line Regulation



Load Regulation



Typical Application Circuit

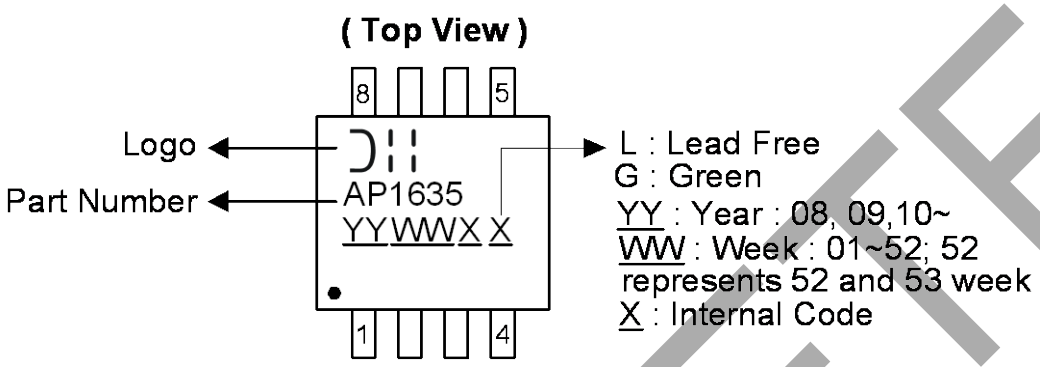


$$Vout = 1 \times (1 + \frac{R2}{R1})$$

R1=100K ~ 200K

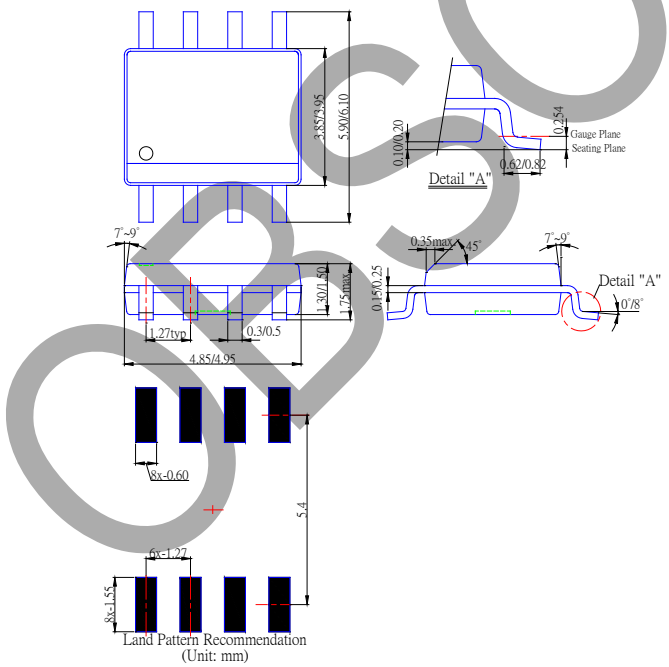
Marking Information

(1) SOP-8L



Package Information (All Dimensions in mm)

(1) Package Type: SOP-8L



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