

BCD DC-DC Production Introduction



BCD SEMICONDUCTOR
MANUFACTURING LIMITED

亚进宝盛电子（深圳）有限公司

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Oreh Zhang
09/02/18

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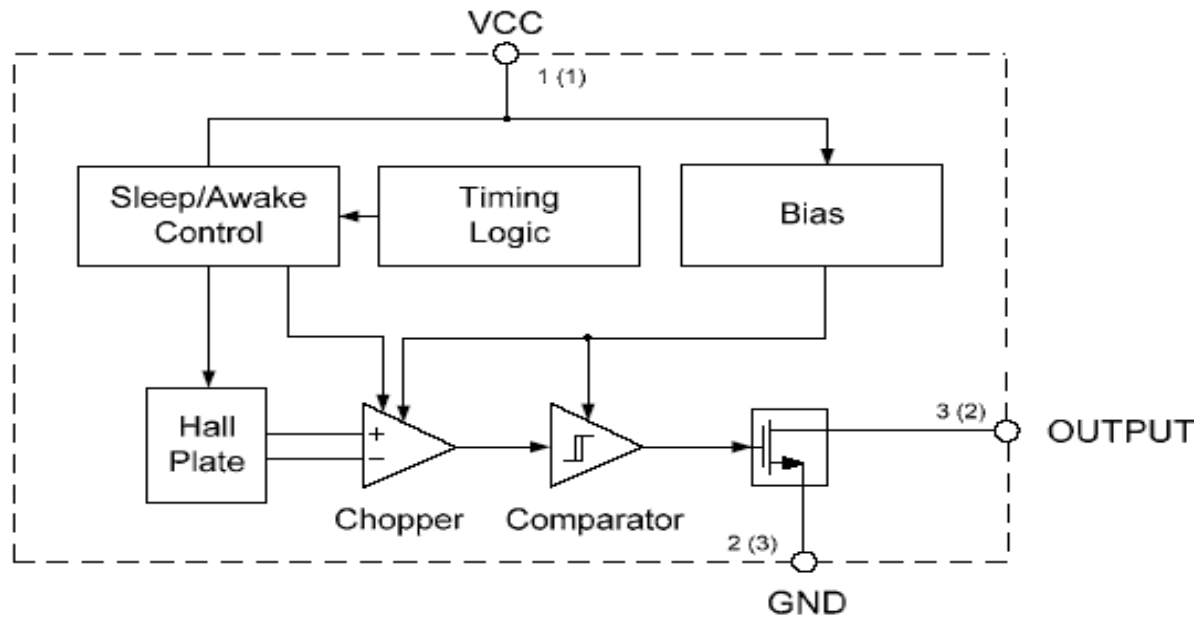
[BCD Solution](#)

w w w . b c d s e m i . c o m

Omnipolar Hall-Effect Switch

AP9248

Function Block



Competitor :

AH180

A3209/10/12/13/14

TLE4913

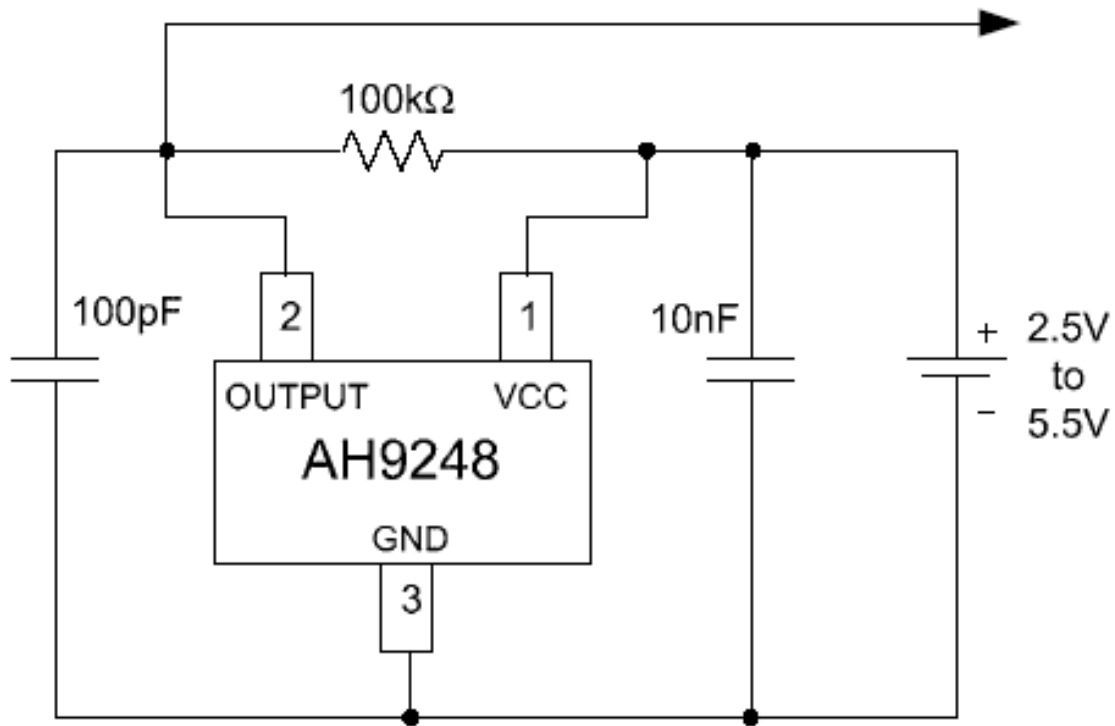
MLX90248

P/N	V _{IN} (V)	Bop(Gauss)	Brp(Gauss)	Package
AP9248	2.5~5.5	±35	±18	SOT23-3

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Omnipolar Hall-Effect Switch

Application



Application :

1. Mobile Phone
2. Notebook
3. P-DVD
4. Reed switch replacements



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White LED Driver

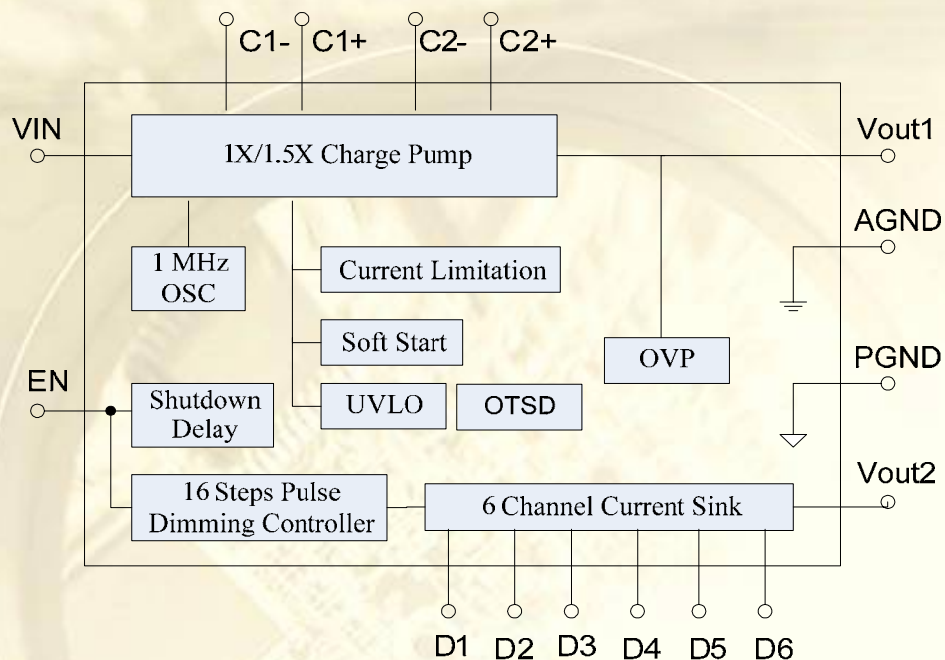
P/N	Circuit	Application
AP3602	Charge Pump	Less than 7 Inch LCD Panel
AP3605		
AP3606		
AP3607		
AP3019/A	Boost	7~10 Inch LCD Panel
AP3030		
AP3031		
AP3039		
AP3012		
		More than 10 Inch LCD Panel
		LCD Gate Driver & Bias Voltage

w w w . b c d s e m i . c o m

White LED Driver

AP3606/AP3607

Function Block



1X/1.5X Charge Pump
+
Current Sink

Competitor:
RT9364

Application :
1. Mobile Phone
2. MP3,MP4

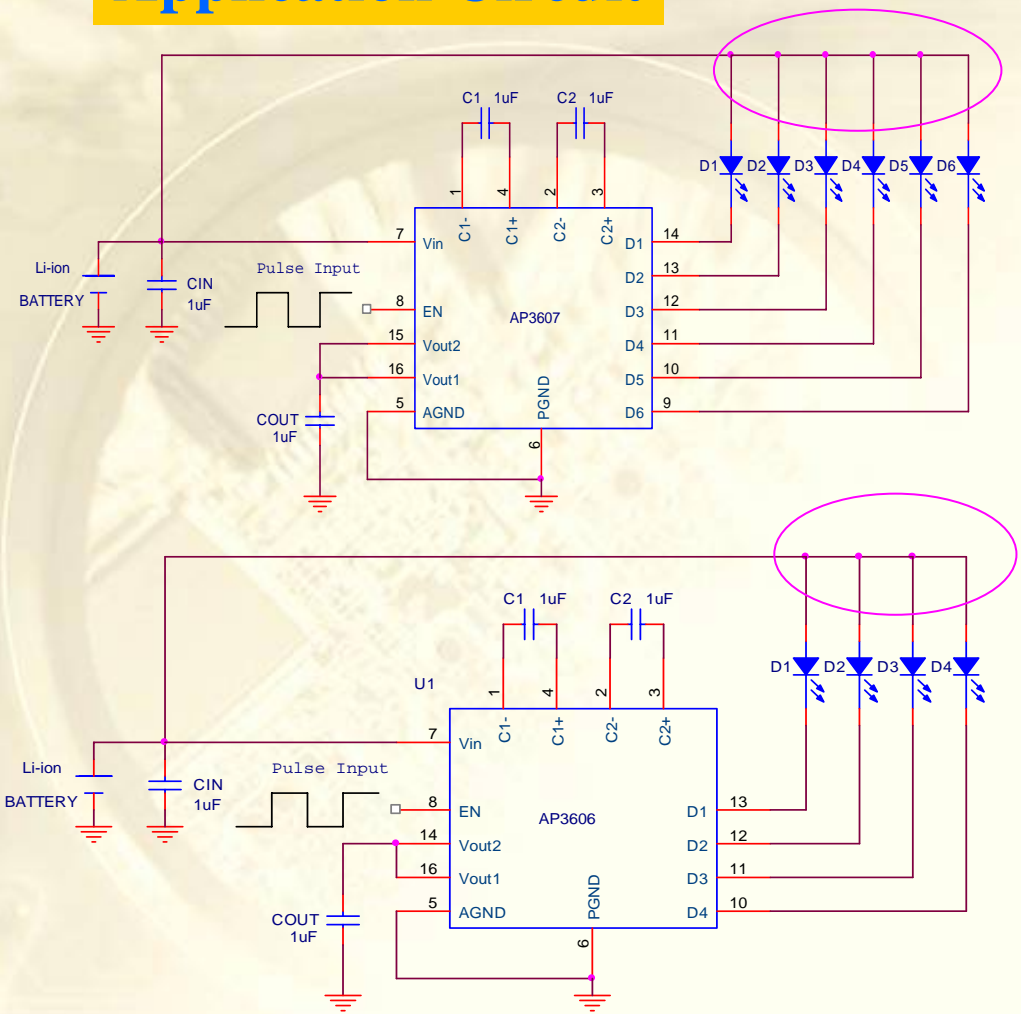
P/N	V _{IN} (V)	Channel Number	Current Match (%)	Frequency (MHz)	Efficiency (%)	Package
AP3606	2.7~5.5	4	±3	1.0	Up to 93	QFN3*3-16
AP3607	2.7~5.5	6	±3	1.0	Up to 93	QFN3*3-16

White LED Driver

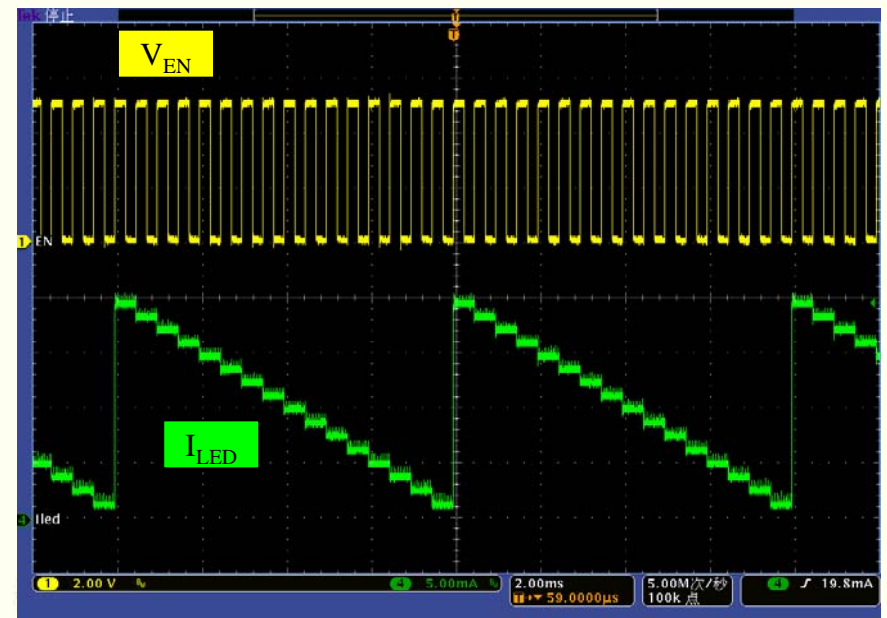
Charge Pump

AP3606/3607

Application Circuit



- ★ Common-cathode drive
- ★ Connect the channel to V_{IN} if not used
- ★ 16 Steps Pulse Signal Dimming

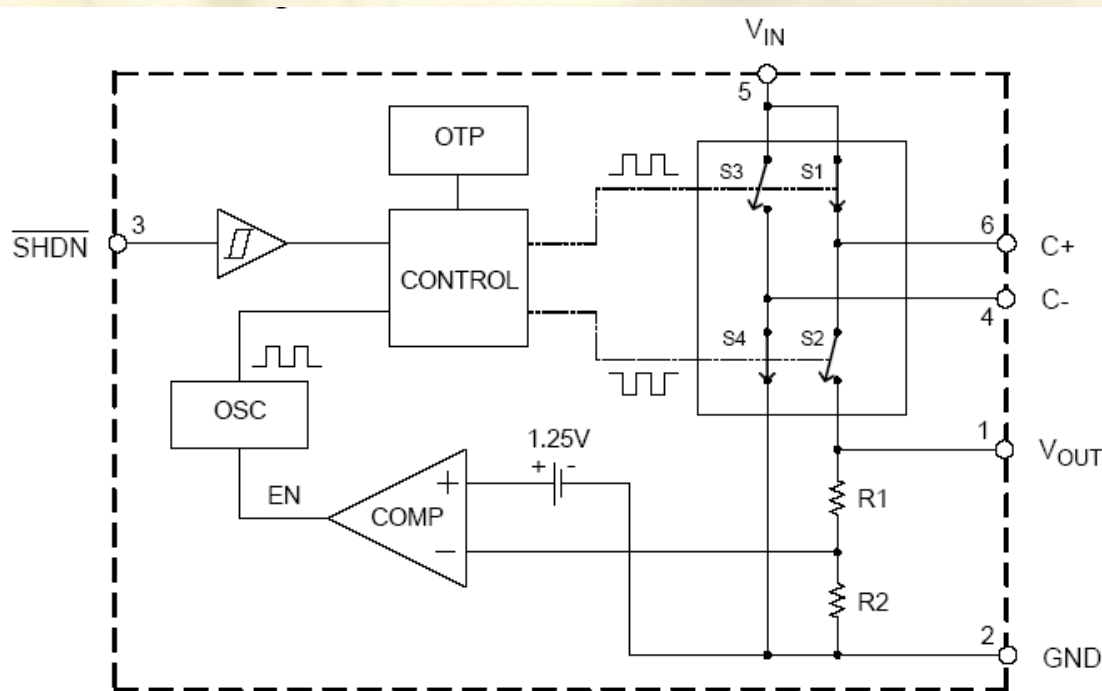


White LED Driver

Charge Pump

AP3602

Function Block



2X Charge Pump

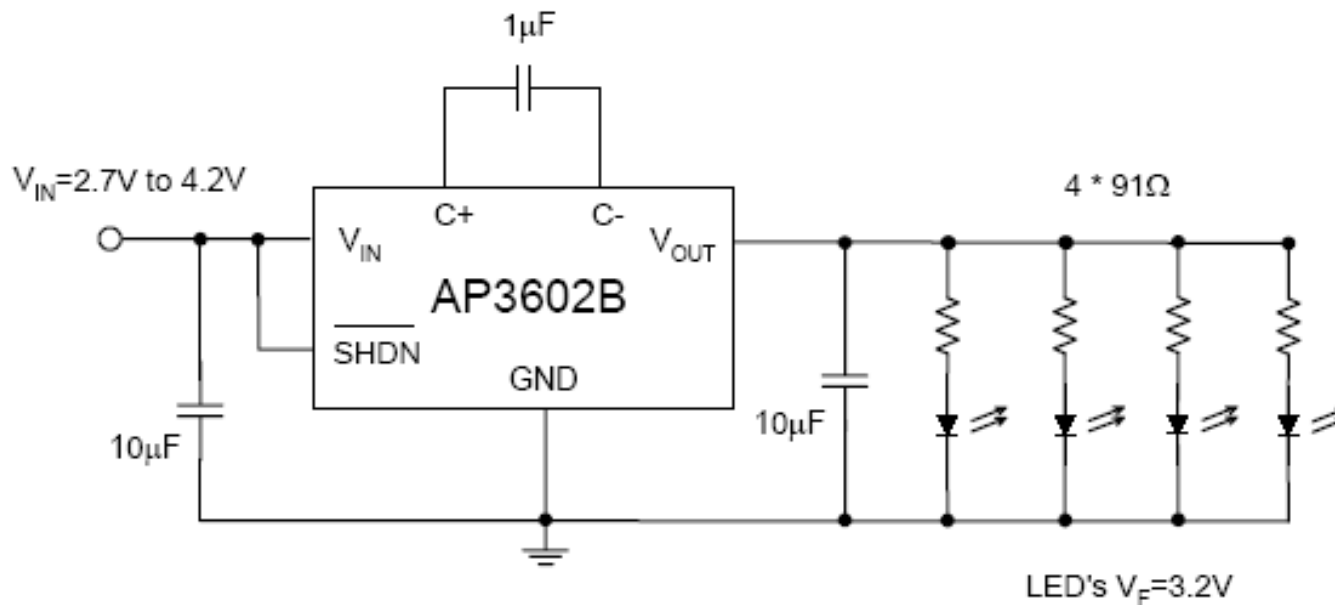
V_{IN} (V)	I_O (mA)	Frequency (MHz)	Efficiency (%)	Package
2.7~5	100 & $V_{IN}=3V$	1.2	Up to 92	SOT23-6 TSOT23-6

White LED Driver

Charge Pump

AP3602

Application Circuit



Application :
1. Mobile Phone
2. MP3,MP4

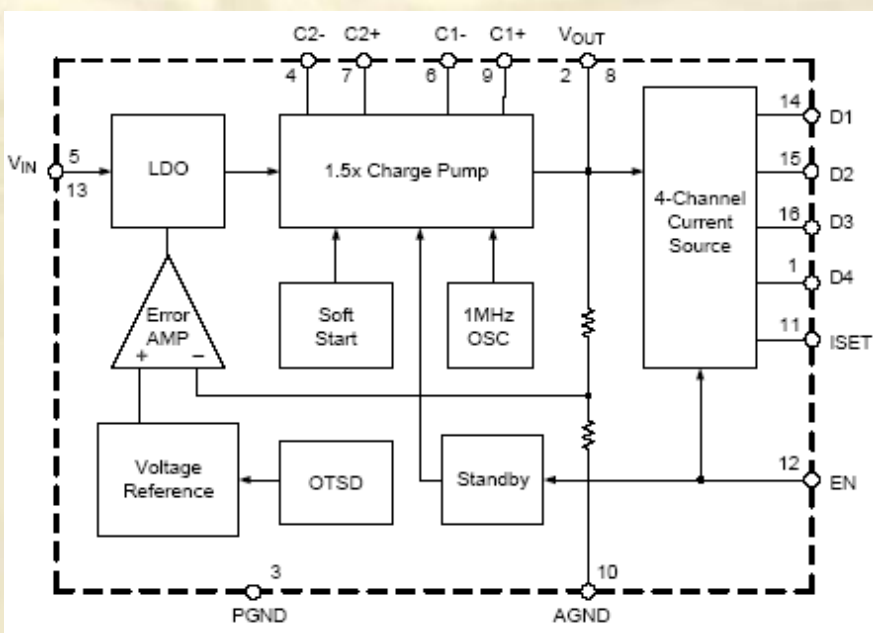
w w w . b c d s e m i . c o m

White LED Driver

Charge Pump

Function Block

AP3605



1.5X Charge Pump
+
Current Sink

P/N	V _{IN} (V)	Channel Number	Current Match (%)	Frequency (MHz)	Efficiency (%)	Package
AP3605	2.7~5.5	4	±3	1.0	Up to 93	QFN3*3-16

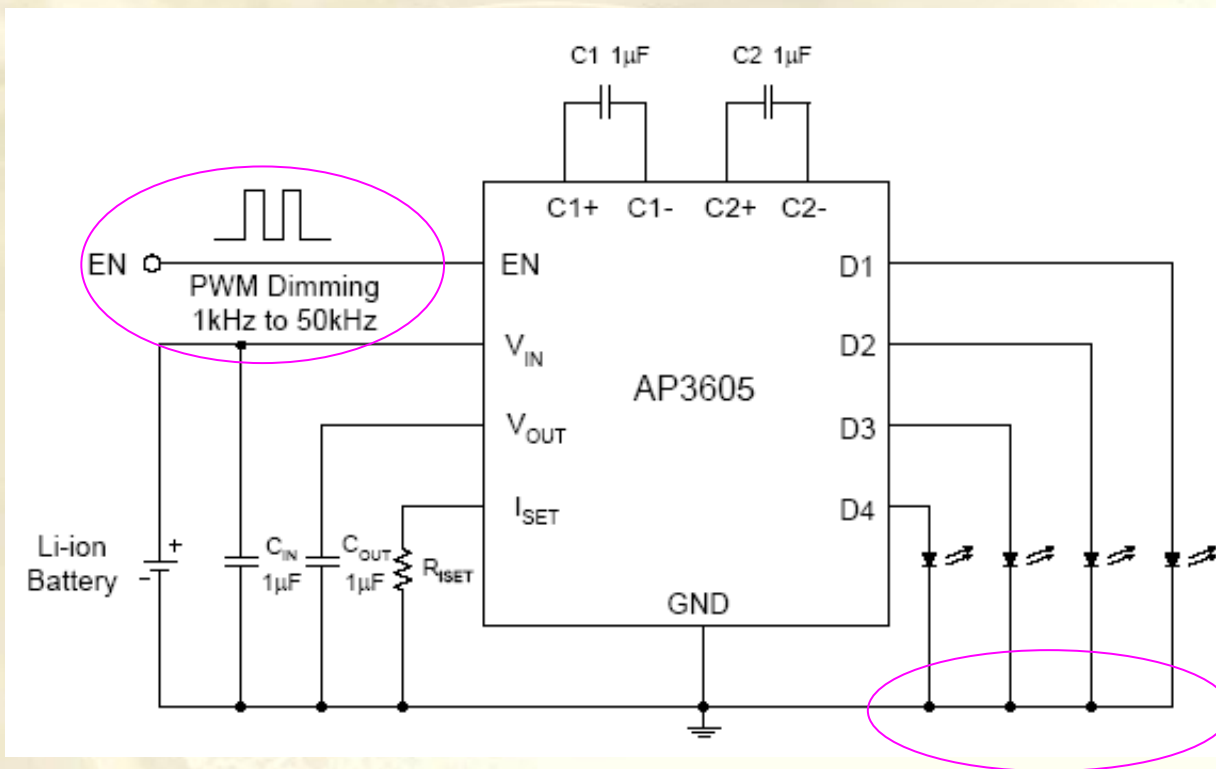
w w w . b c d s e m i . c o m

White LED Driver

Charge Pump

AP3605

Application Circuit



High frequency dimming



Common-cathode drive



Float the channel if not used

Application :
1. Mobile Phone
2. MP3,MP4

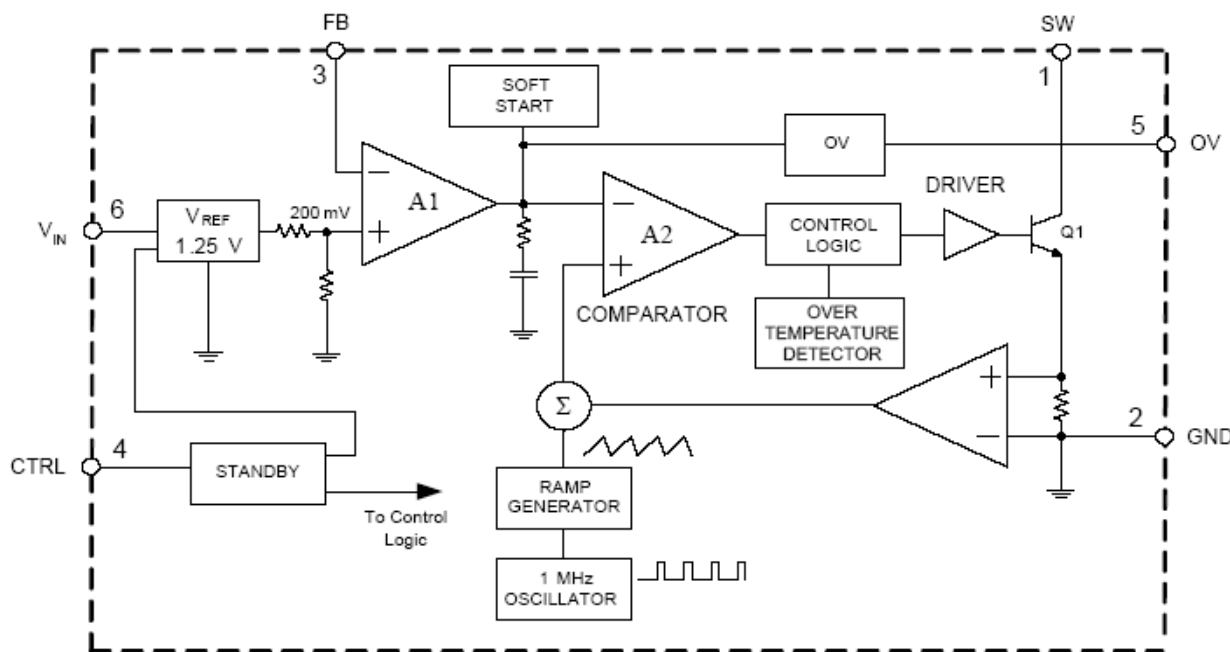
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White LED Driver

Boost

Function Block

AP3031



Features:

1. Over output voltage protection
2. Current Limit 1.4A
3. Current Mode
4. PWM Dimming (high frequency)

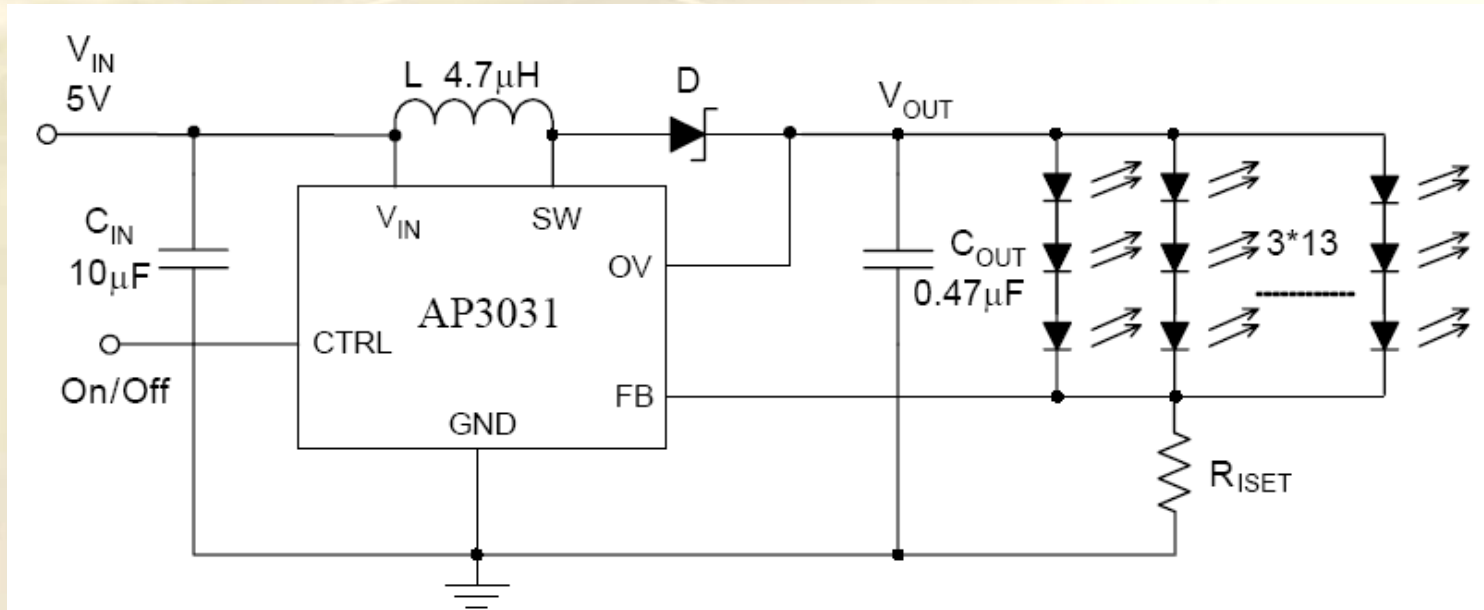
V_{IN} (V)	LED Number	OVP (V)	Frequency (MHz)	Efficiency (%)	Package
2.7~16	3*13	17	1.0	Up to 92	SOT23-6 TSOT23-6

White LED Driver

Boost

Application Circuit

AP3031



Application :

1. DPF
2. GPS
3. PDVD
4. EPC

Competitor :

AT1313

MP3202

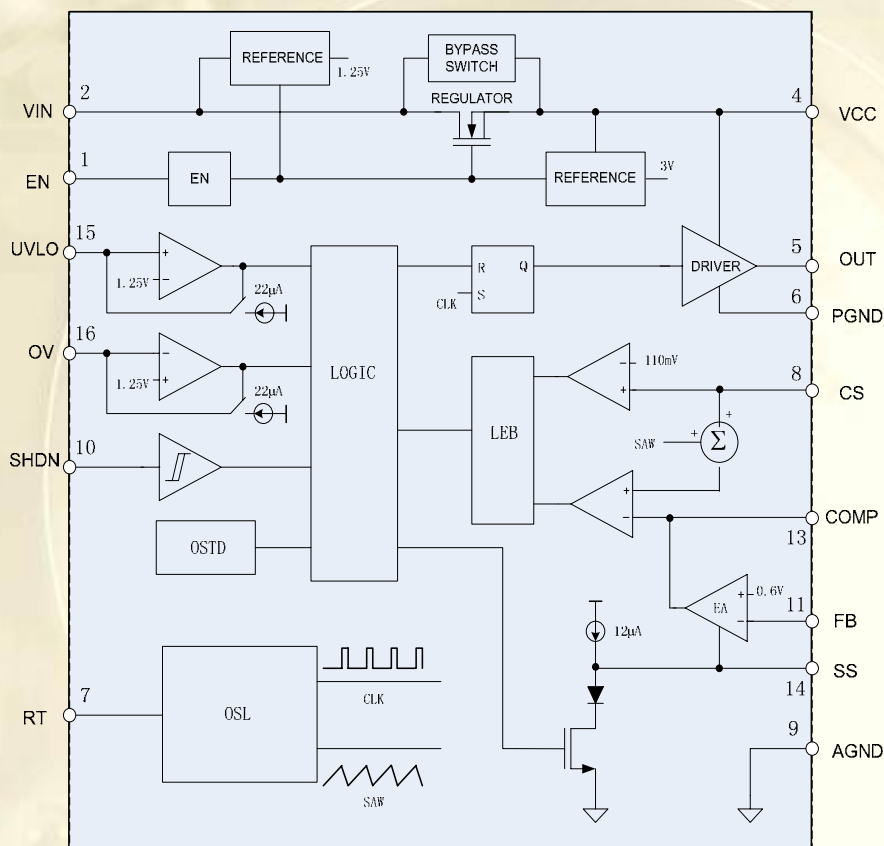
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White LED Driver

Boost

AP3039

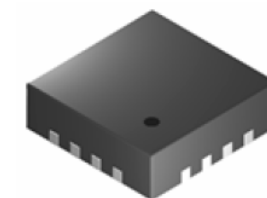
Function Block



AP3039 is a high voltage low-side N-channel MOSFET controller ideal for boost regulators.

Features

1. Input Voltage Range 6V to 27V
2. 0.6A Peak MOSFET Gate Driver
3. 20ns Quick MOSFET Gate Driver
4. Duty Cycle Limit of 93%
5. Programmable UVLO
6. Programmable Over Voltage Protection
7. Cycle by Cycle Current Limit
8. Adjustable Soft-start
9. Adjustable Operation Frequency from 400 KHz to 1 MHz



QFN-3x3-16



SOIC-14

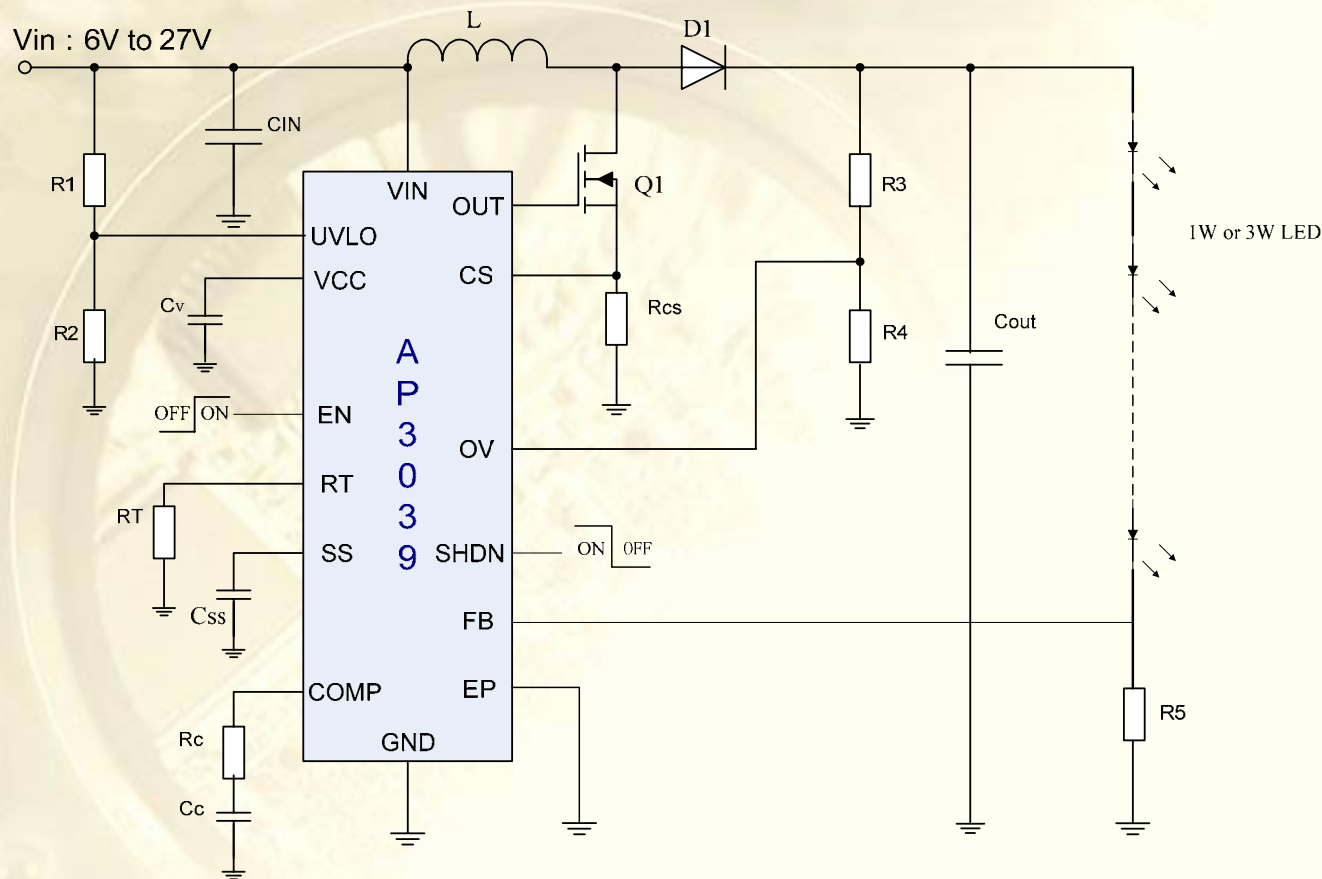
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White LED Driver

Boost

Application Circuit

AP3039



- Application :**
1. Note Book
 2. LCD TV
 3. LCD Display Module

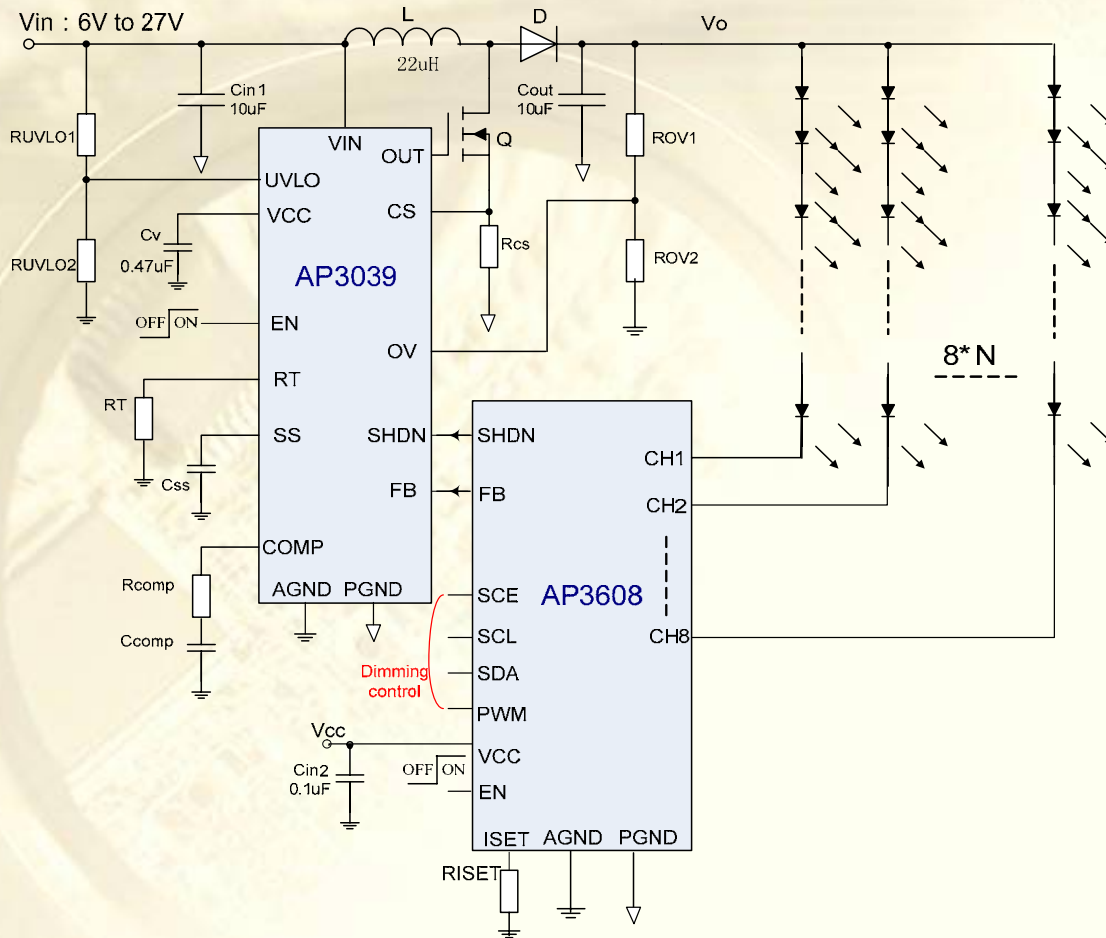
w w w . b c d s e m i . c o m

White LED Driver

Boost

Application Circuit

AP3039+AP3608



Boost Converter
+
Current Sink

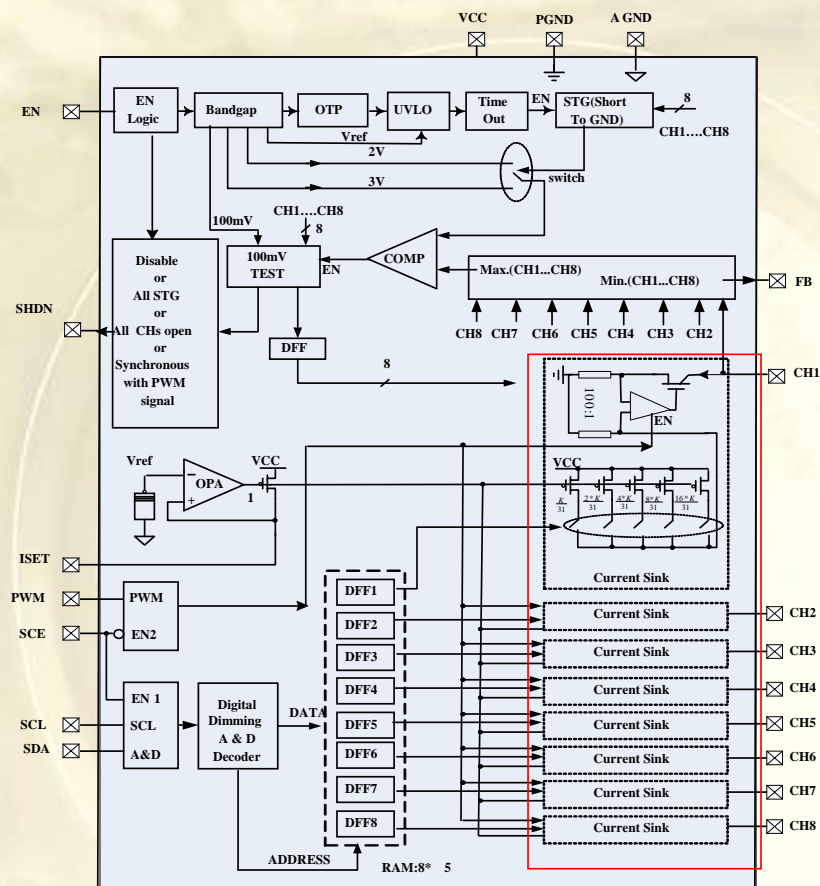
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White LED Driver

Boost

Function Block

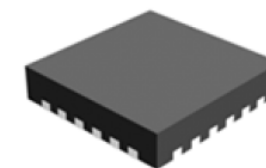
AP3608



The AP3608 is an eight-channel constant current sink with current match used for LED driver.

Features

1. Input Voltage Range: 4.2V to 5.5V
2. Maximum Output Current: Typical 200mA (25mA per Channel)
3. $\pm 1.5\%$ Current Match Accuracy
4. 31 Steps Programmable Digital Dimming (Per Channel)
5. PWM Dimming Control (All Channel)
6. Open LED Self-Check & Protection
7. Under Voltage Lockout Protection
8. Over Temperature Protection



QFN-4x4-24

w w w . b c d s e m i . c o m

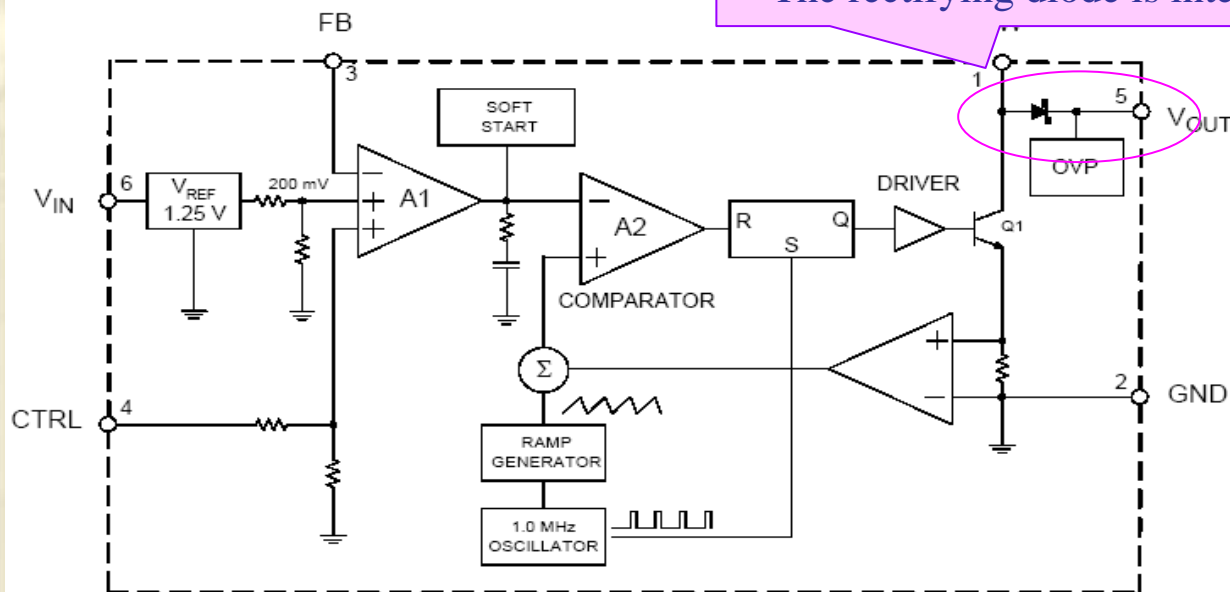
White LED Driver

Boost

Function Block

AP3019/AP3019A/AP3030

The rectifying diode is integrated



Features:

1. Over output voltage protection
2. Current Limit
3. Current Mode
4. No Need for External Diode
5. PWM and Analog Dimming

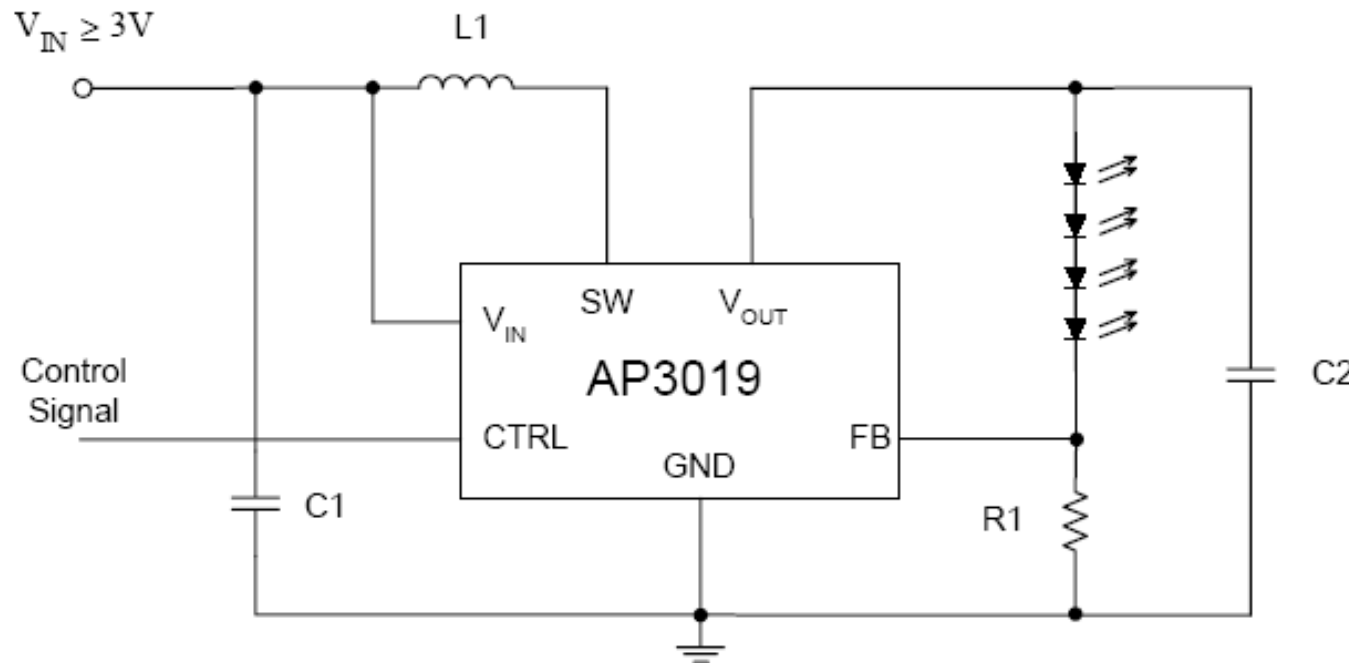
P/N	VIN (V)	LED Number	OVP (V)	Frequency (MHz)	Efficiency (%)	Package
AP3019	2.5~16	2~5	27	1	Up to 84	SOT23-6
AP3019A	2.5~16	2~5	30	1.2	Up to 84	SOT23-6
AP3030	2.5~16	2~8	30	1.2	Up to 84	SOT23-6

White LED Driver

Boost

AP3019/A

Application Circuit



Application :

1. Mobile Phone
2. P-DVD
3. DPF
4. GPS
5. MP3/4

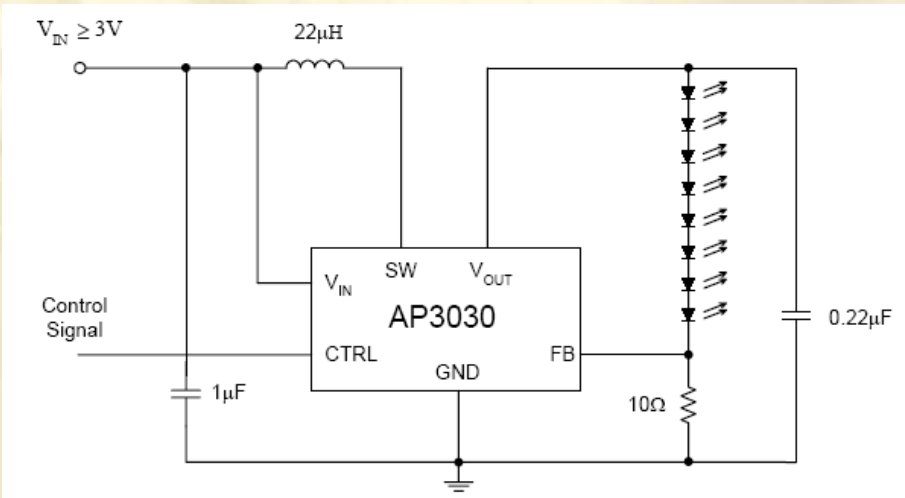
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White LED Driver

Boost

Application Circuit

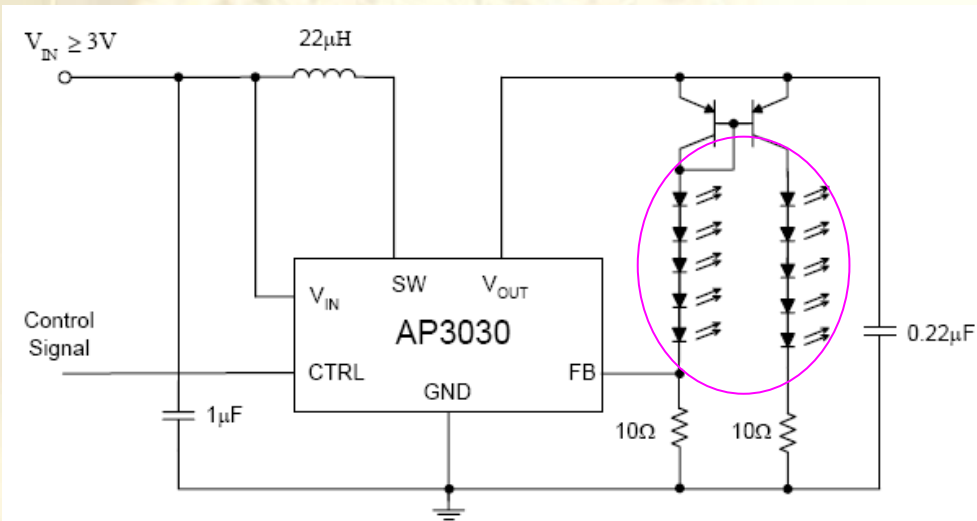
AP3030



Application 1

Application :

1. Mobile Phone
2. P-DVD
3. DPF
4. GPS
5. MP3/4



Application 2

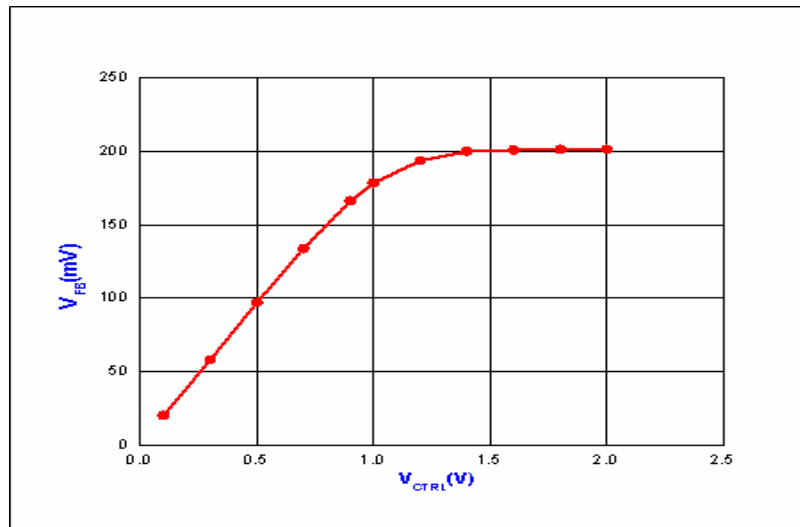
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White LED Driver

AP3019/AP3019A/AP3030

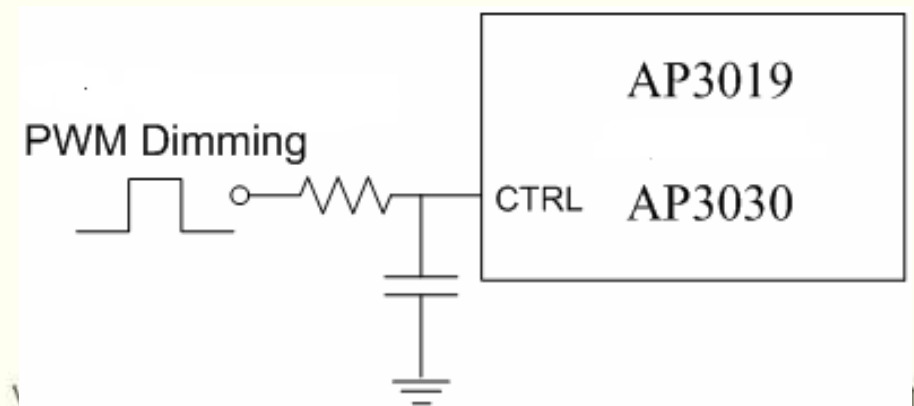
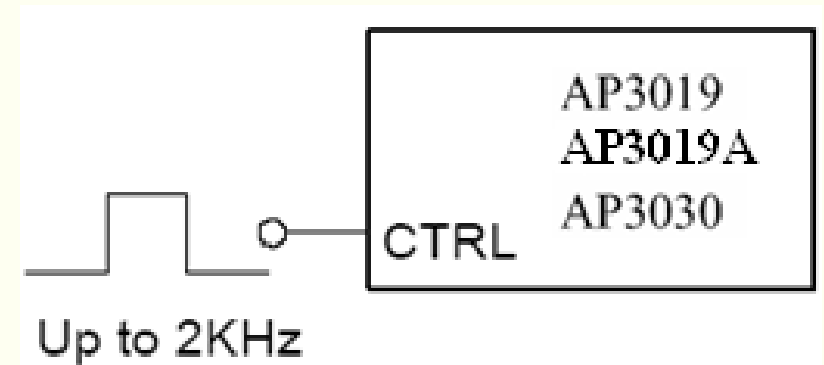
Analog Dimming

- Support the Analog Dimming



- V_{CTRL} between 50mV and 1.5V, V_{FB} linearly changes from 0 to 200mV. It's used for analog dimming..

PWM Dimming



White LED Driver

Boost

AP3019/AP3030

Vin=3.3V

	Max. Drive Capability (LED)		
AP3019	1*5	2*5	3*3
AP3019A/AP3030	1*8	2*6	3*4

Vin=5.0V

	Max. Drive Capability (LED)		
AP3019	1*6	2*9	3*5
AP3019A/AP3030	1*9	2*9	3*7

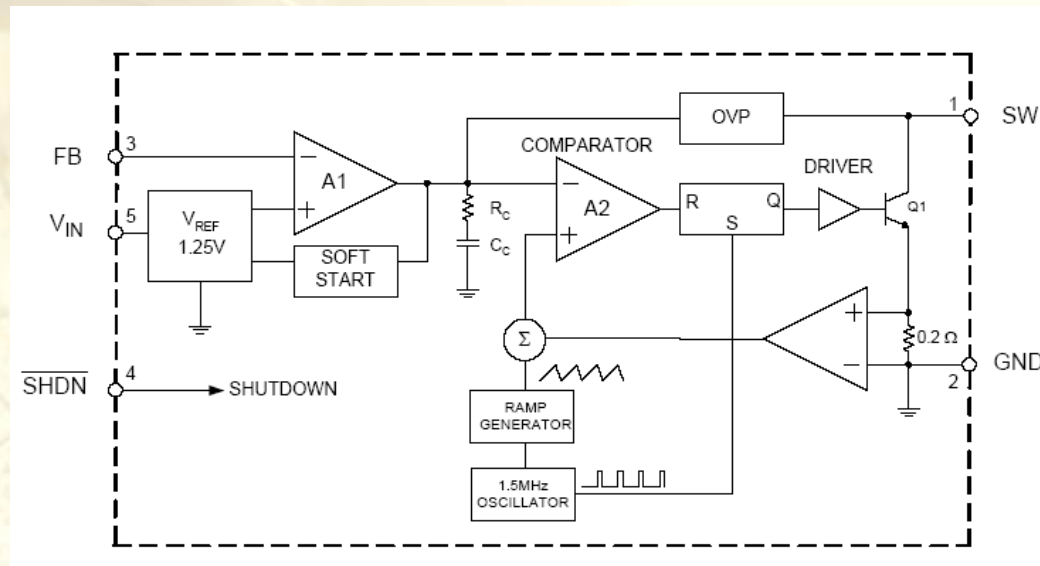
w w w . b c d s e m i . c o m

Boost Converter

Boost

AP3012

Function Block



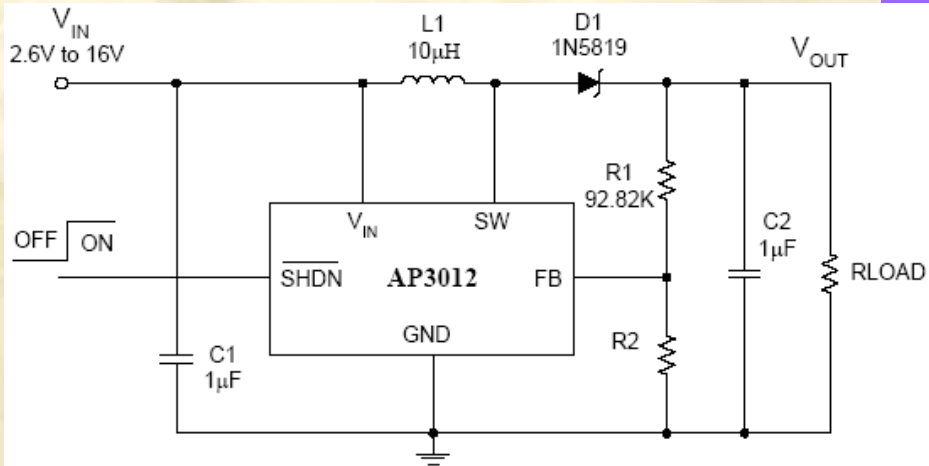
V_{IN} (V)	OVP (V)	Frequency (MHz)	Efficiency (%)	Package
2.6~16	29	1.0	Up to 81	SOT23-5

w w w . b c d s e m i . c o m

Boost Converter

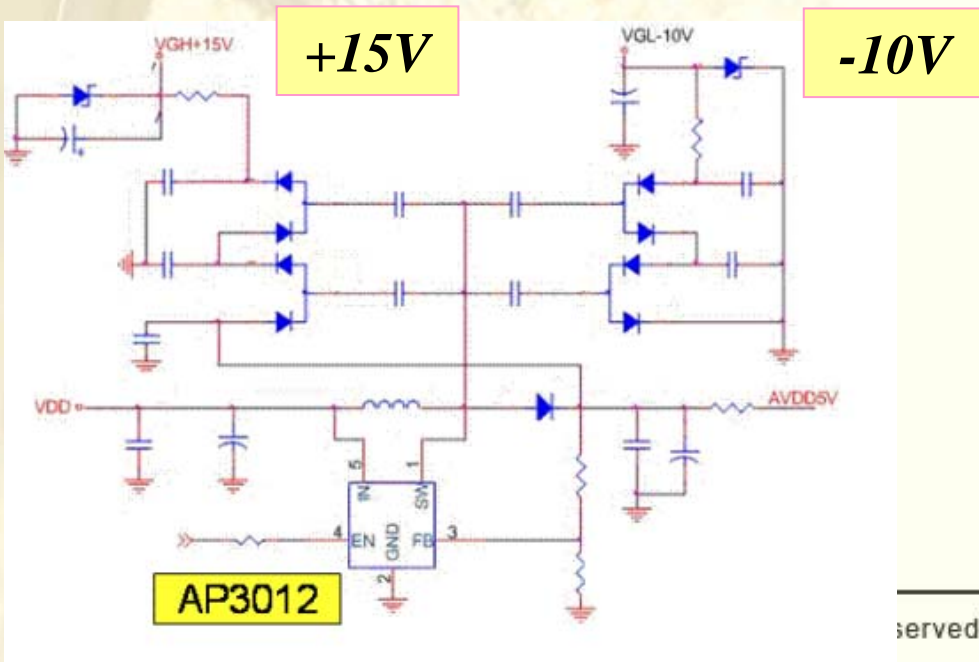
Boost

AP3012



Application 1

- Application :**
1. LCD Gate Driver & Bias Voltage
 2. OLED Bias Voltage



Application 2

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reserved

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MANUFACTURING LIMITED

Buck Converter

Buck converter

P/N	Circuit
AP3406/AP3405	Synchronous Buck
AP3003	Asynchronous Buck
AP3005	Asynchronous Buck

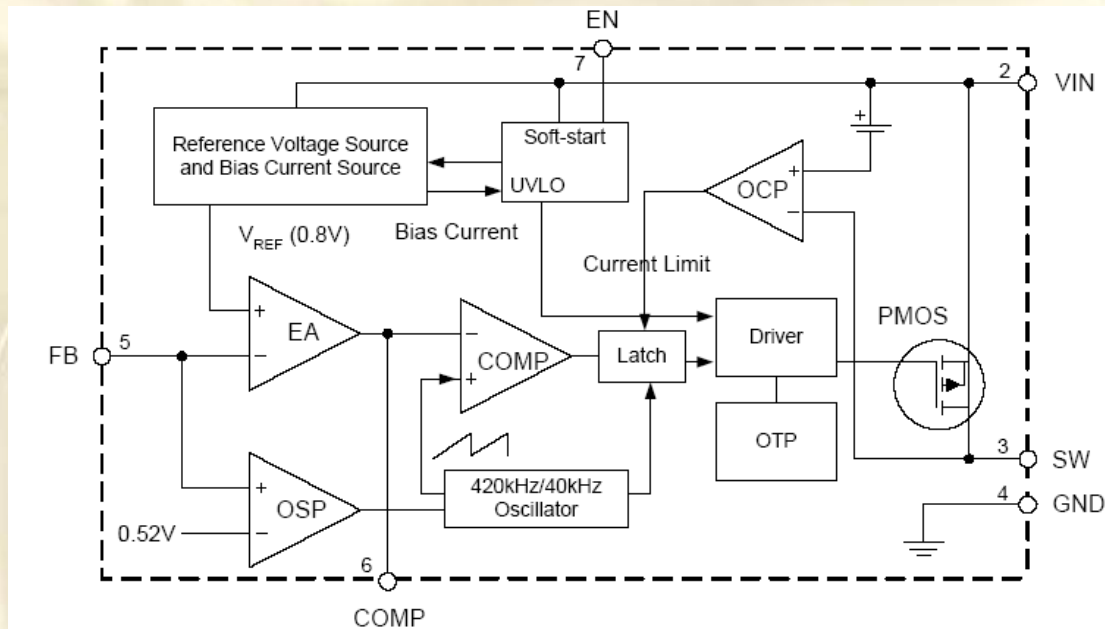
w w w . b c d s e m i . c o m

Buck Converter

Asynchronous Buck

AP3005

Function Block



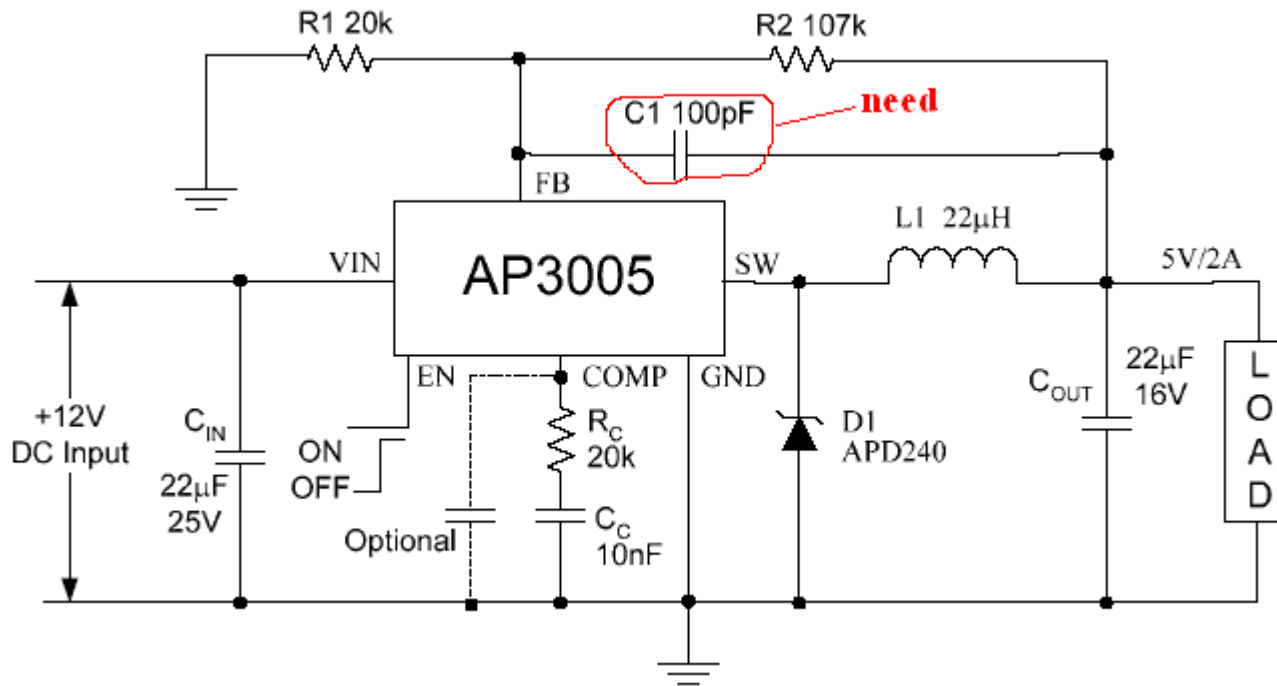
Asynchronous Buck Converter

Competitor :
 MP1410/9141
 TD1410
 ACT4060

P/N	V _{IN} (V)	I _o (A)	Frequency (KHz)	Efficiency (%)	OTP/OCP/OSP SS	Short Frequency (KHz)	Package
AP3005	4.75~25	2	420	Up to 94	Yes	40	SOIC-8

Buck Converter

Application



Application :

1. LCD Monitor and LCD TV
2. P-DVD/Car DVD
3. DVB



w w w . b c d s e m i . c o m

Buck Converter

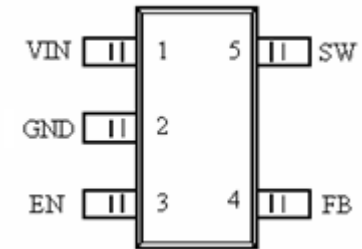
Synchronous Buck

Function Block

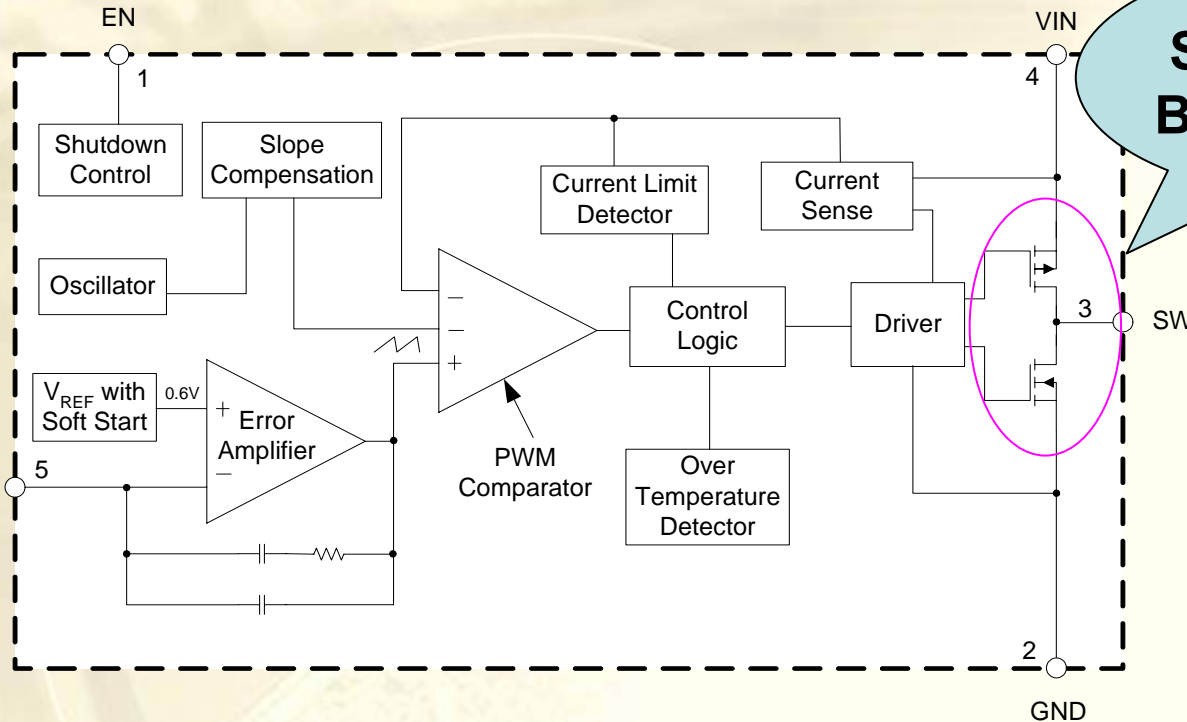
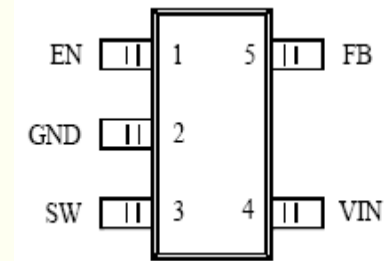
AP3406/AP3405

Synchronous Buck Converter

AP3405 Pin Out



AP3406 Pin Out



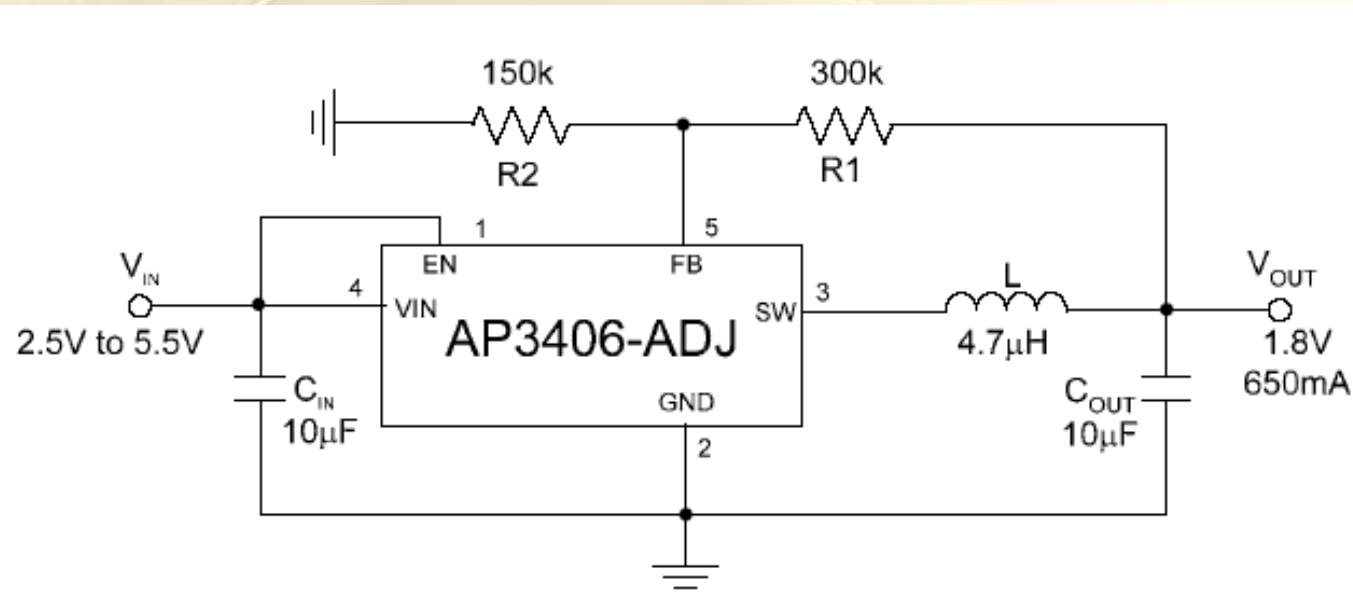
P/N	V _{IN} (V)	I _o (mA)	Frequency (MHz)	Efficiency (%)	OTP/UVLO/SS	Switch Frequency (KHz)	Package
AP3406/05	2.5~5.5	650	1.0	Up to 95	Yes	600	SOT23-5 TSOT233-5

Buck Converter

Synchronous Buck

AP3406/AP3405

Function Block



Application :

1. GPS
2. Portable Media Player
3. Digital still and Video Cameras

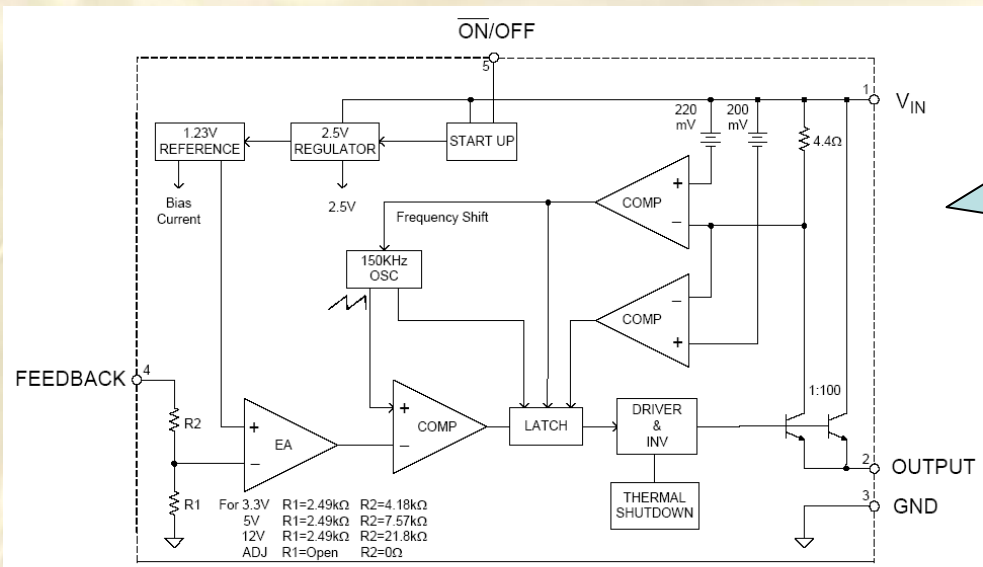
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Buck Converter

Asynchronous Buck

AP3003

Function Block



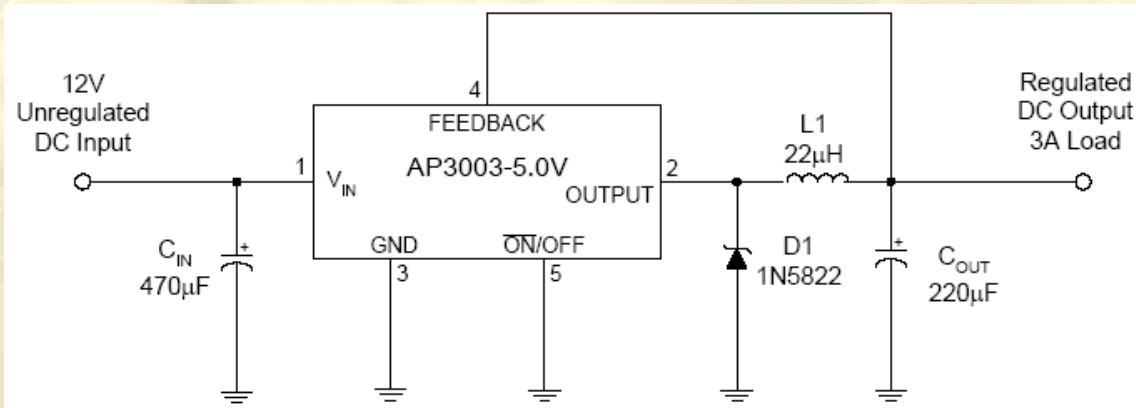
Asynchronous Buck Converter

Figure 3. Functional Block Diagram of AP3003

	V_{IN} (V)	I_o (A)	V_o (V)	Frequency (KHz)	Efficiency (%)	Package	Protection
AP3003-3.3	4.75-32	3A	3.3	150kHz	Up to 90%	TO220-5 TO263-5	OCP&OTP
AP3003-5.0	7-32		5.0				
AP3003-12	15-32		12				
AP3003-ADJ	V_{out} Related		1.23-28				

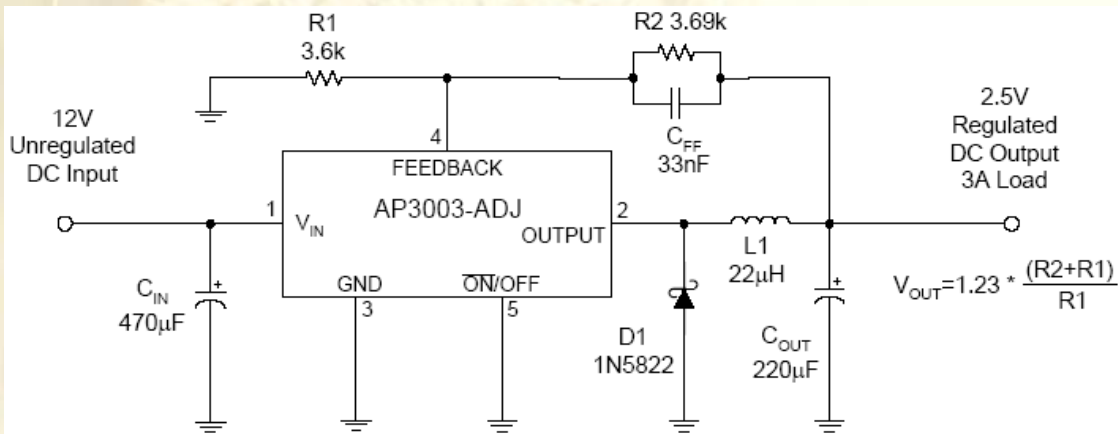
Buck Converter

Application 1



- Application :
1. LCD Monitor and LCD TV
 2. Car DVD/DVB

Application 2



w w w . b c d s e m i . c o m

Audio Power Amplifier

Part Number	Class	Supply Voltage (V)	Output Power at THD+N=1% (mW)		THD+D (BTL, Po=1W, RL=4Ω)	S/N (dB)	Channel Separation (dB)	Package
			SE(32Ω)	BTL(4Ω)				
AA4003	AB	2.7~5.5	0.08	2.0	0.1%	95	-80	TSSOP-20 SOIC-16
AA4005	AB	3.0~5.5	--	1.8	0.08%	100	-100	TSSOP-20

AA4003 application :

1. P-DVD
2. DPF
3. LCD Monitor

AA4005 application :

1. Notebook
2. EPC

w w w . b c d s e m i . c o m

BCD Solution

■ GPS

■ Mobile Phone

■ Digital Camera

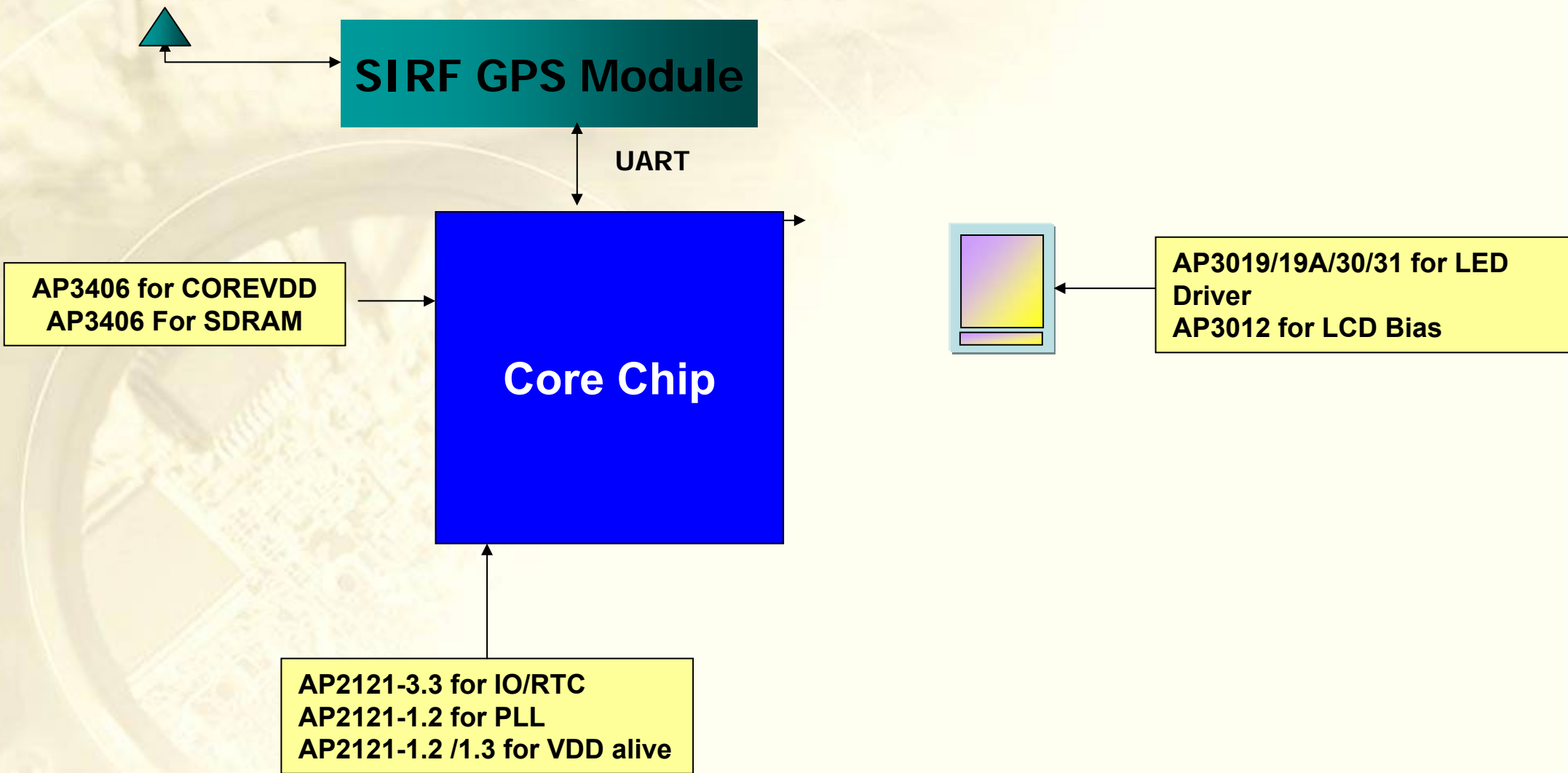
■ DPF/P-DVD

■ MP3/PMP

■ LCD-TV

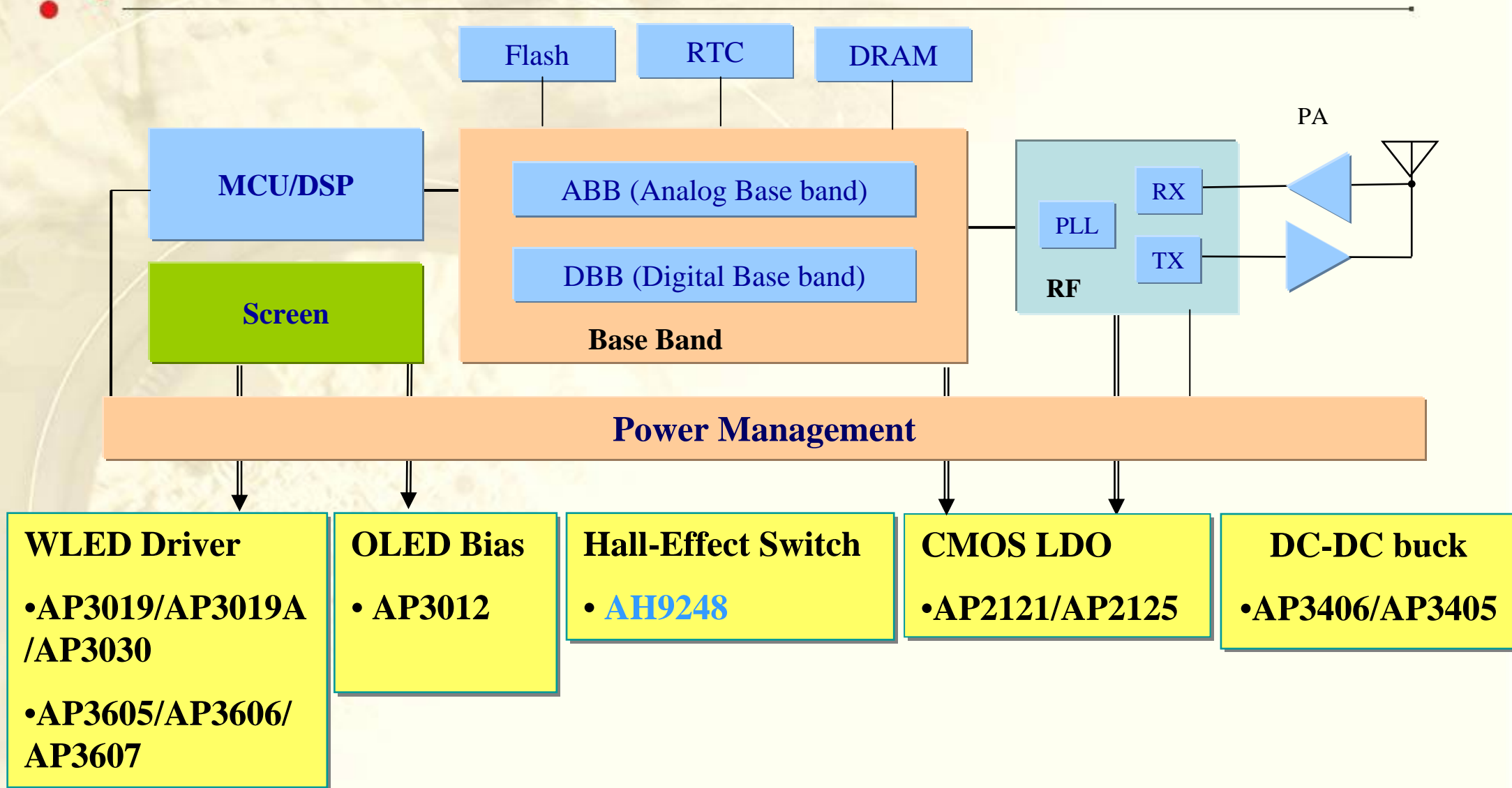
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GPS



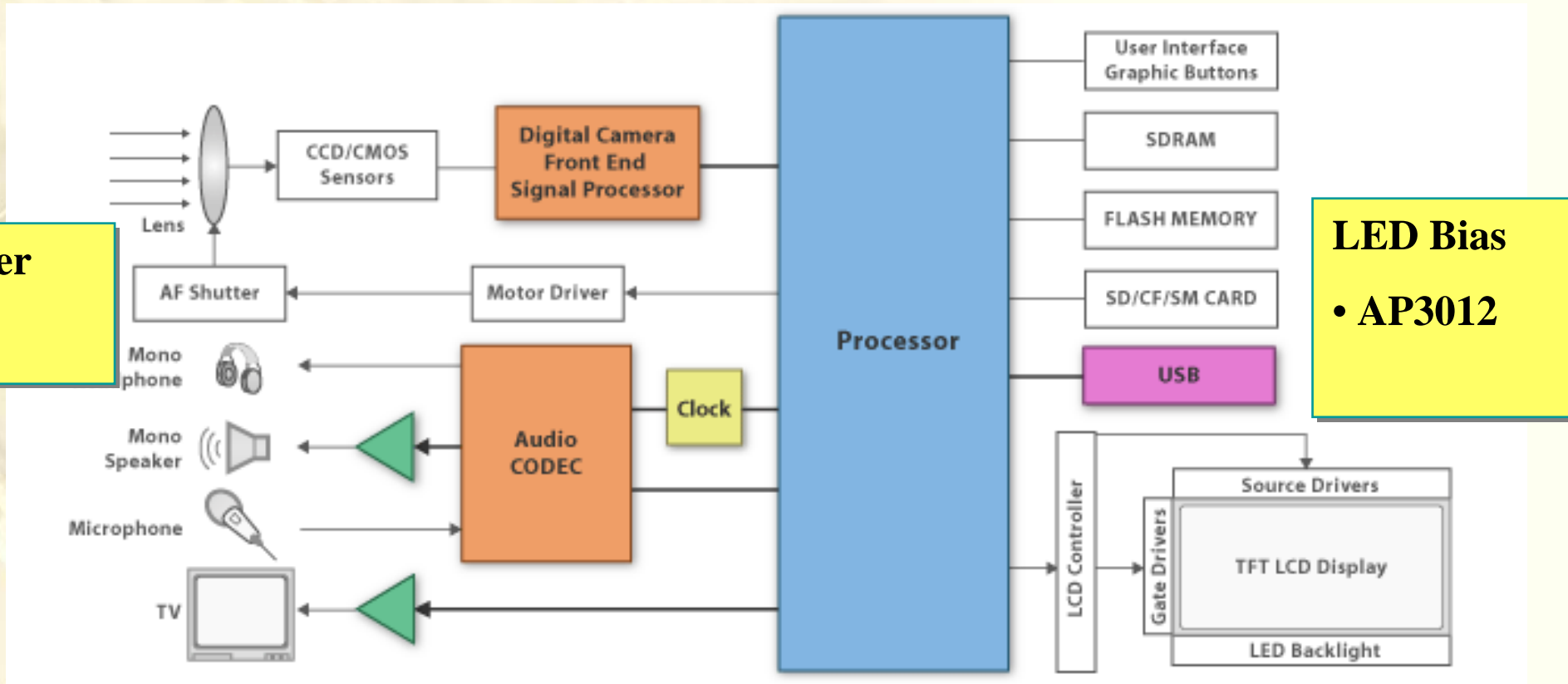
w w w . b c d s e m i . c o m

Mobile Phone



w w w . b c d s e m i . c o m

Digital Camera



Motor Driver
• AP3012

LED Bias
• AP3012

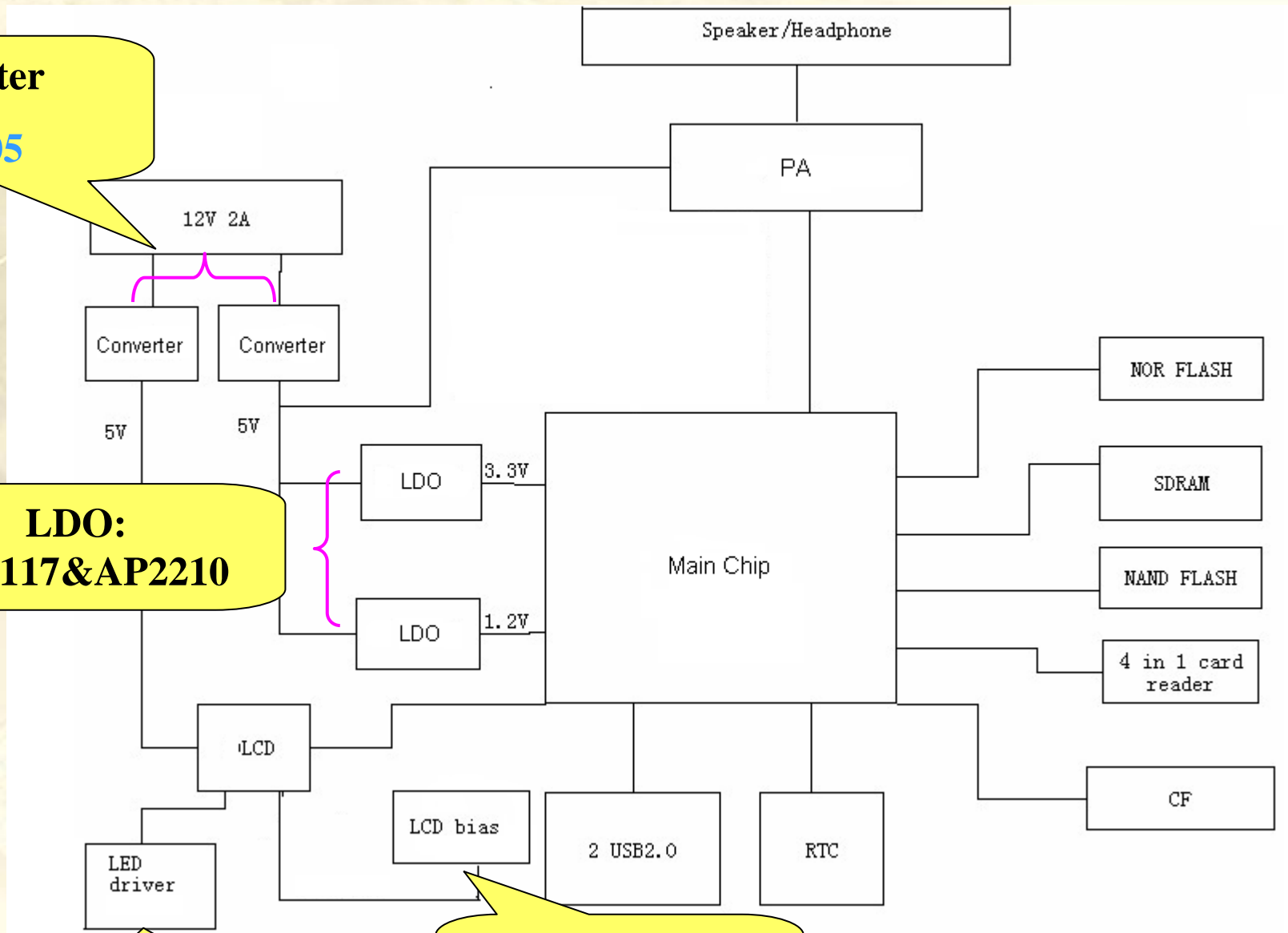
AP3406/AP3405 for Core/Processor/Memory/I/O

WLED Driver
• AP3008
• AP3019/29
• AP3602
• AP3605/AP3606

DPF/P-DVD

Converter

AP3005



LDO:

AZ1117&AP2210

LCD Bias:

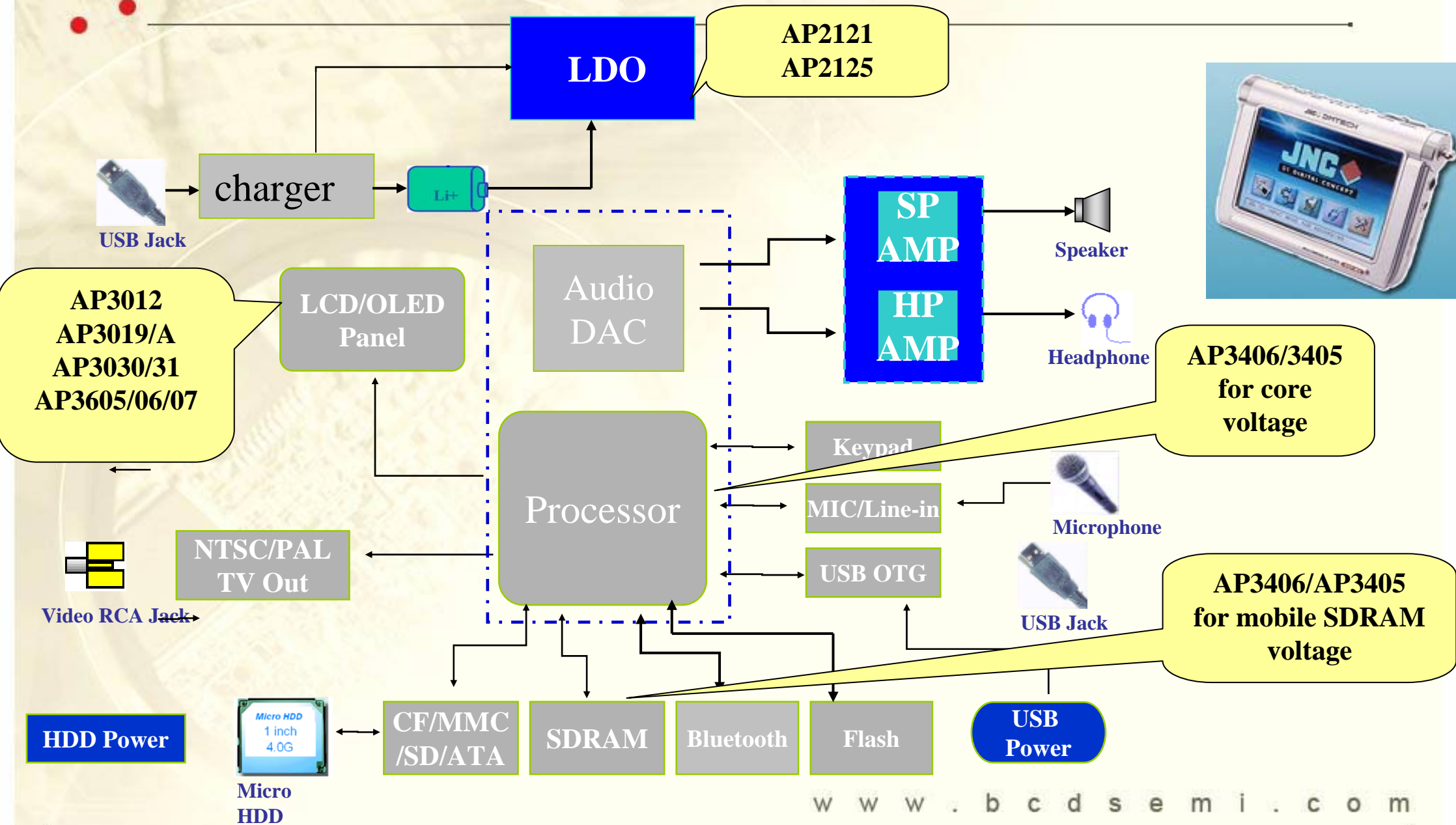
AP3012

WLED Backlight:

AP3019/30/31

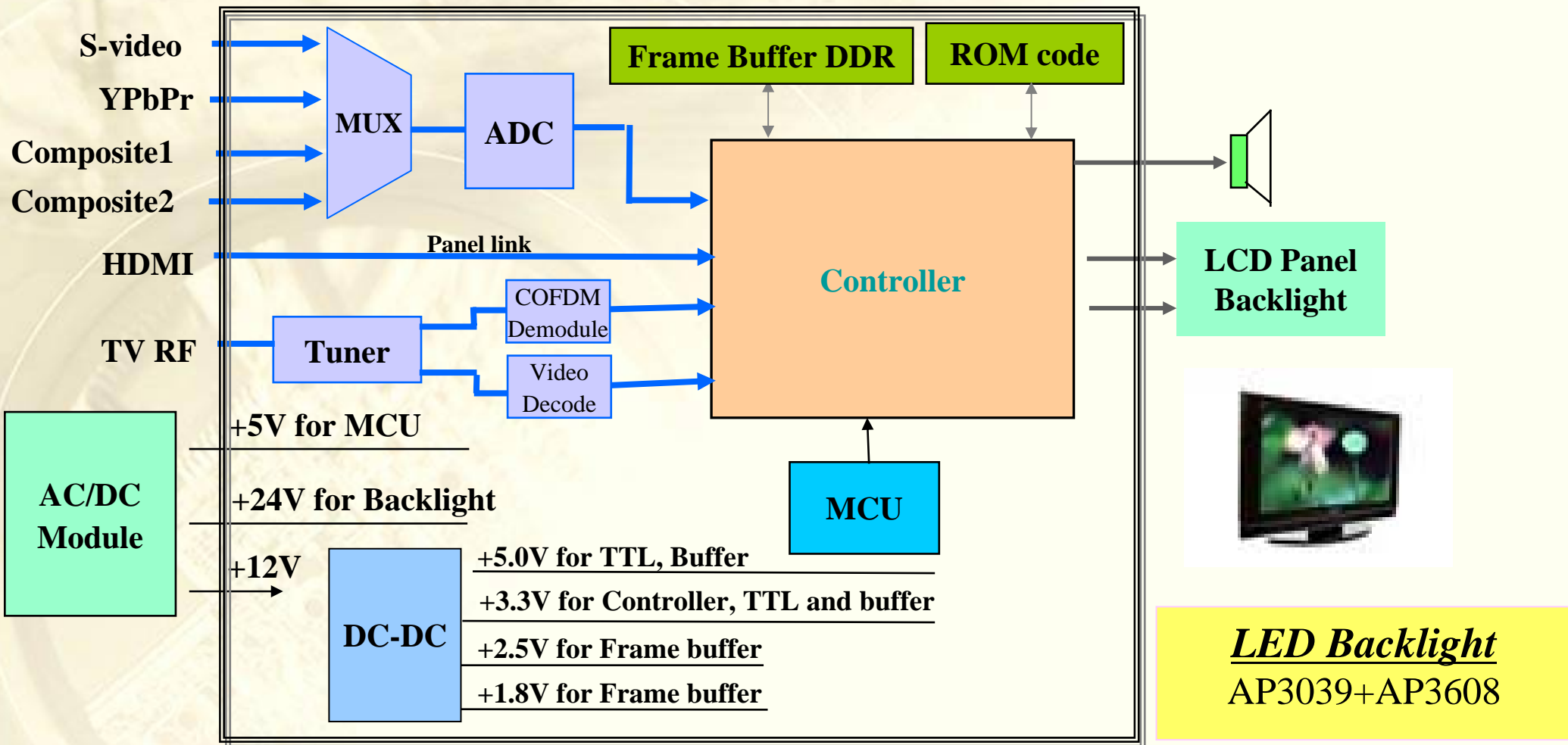
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MP3/PMP



w w w . b c d s e m i . c o m

LCD TV



DC/DC

AP3003/AP3005

LDO

AZ1117/AZ1084/AZ7805

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Q&A

Thanks!



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