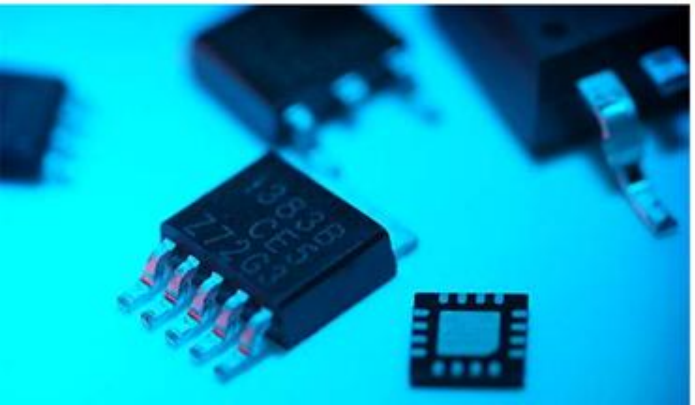
AIC Power Solutions
for
MFP(Multi-Function Printer)



2017 AIC REGIONAL SALES MEETING

Agenda

- Market Status & Trend
- Market Forecast
- Supply Chain (Core chip, IDH, Key player)
- New Product Feature
- Application Power Block
- Power Solutions
- Product Roadmap
- Promotion Strategy

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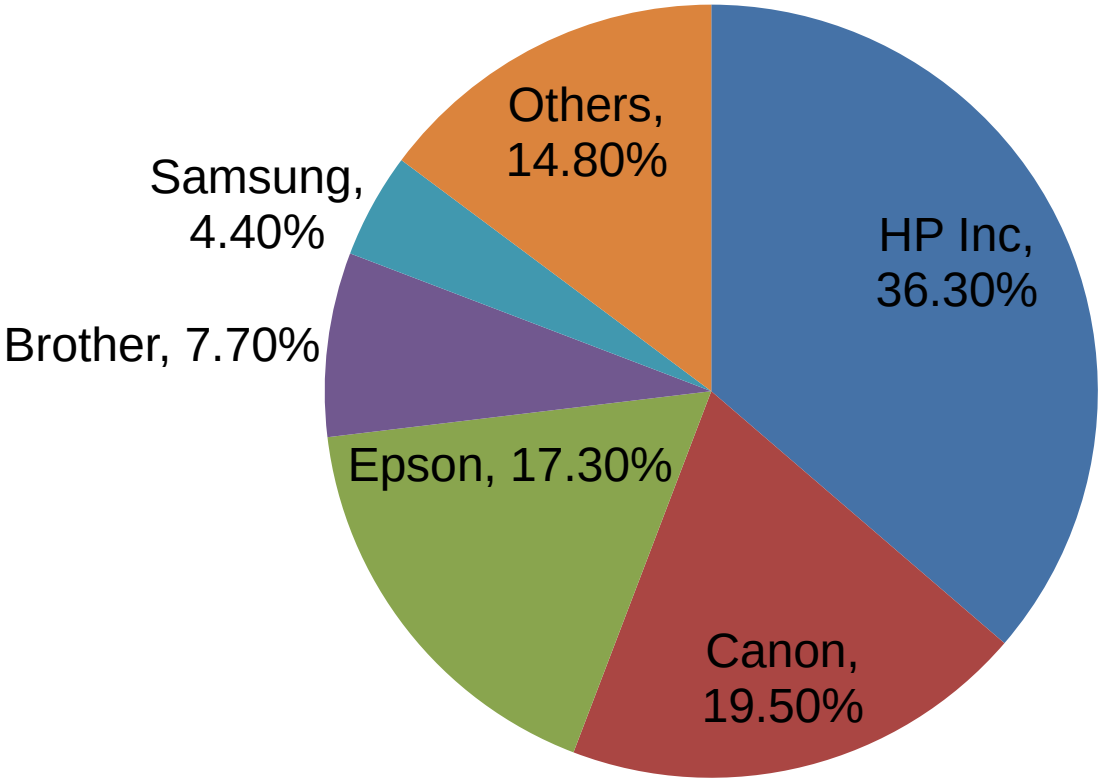
Worldwide Hardcopy Peripherals Q1 2016

- Worldwide hardcopy peripherals (HCP) market decreased 10.6% year over year on shipments of 23.11 million units in the first quarter of 2016 (1Q16). Inkjet printers experienced a year-over-year decline of 11.1% while the laser market declined 10.5% year over year.

Vendors	1Q16 Unit Shipments	1Q16 Market Share	1Q15 Unit Shipmentd	1Q15 Market Share	1Q16/1Q15 Growth
1. HP Inc	8,385,014	36.3%	10,304,907	39.9%	-18.6%
2. Canon	4,517,713	19.5%	4,609,897	17.8%	-2.0%
3. Epson	4,000,229	17.3%	4,036,143	15.6%	-0.9%
4. Brother	1,777,332	7.7%	1,988,793	7.7%	-10.6%
5. Samsung	1,015,240	4.4%	1,348,007	5.2%	-24.7%
Others	3,419,390	14.8%	3,560,334	13.8%	-4.0%
Total	23,114,918	100.0%	25,848,081	100.0%	-10.6%

IDC Worldwide Quarterly Hardcopy Peripherals Tracker, May 2016

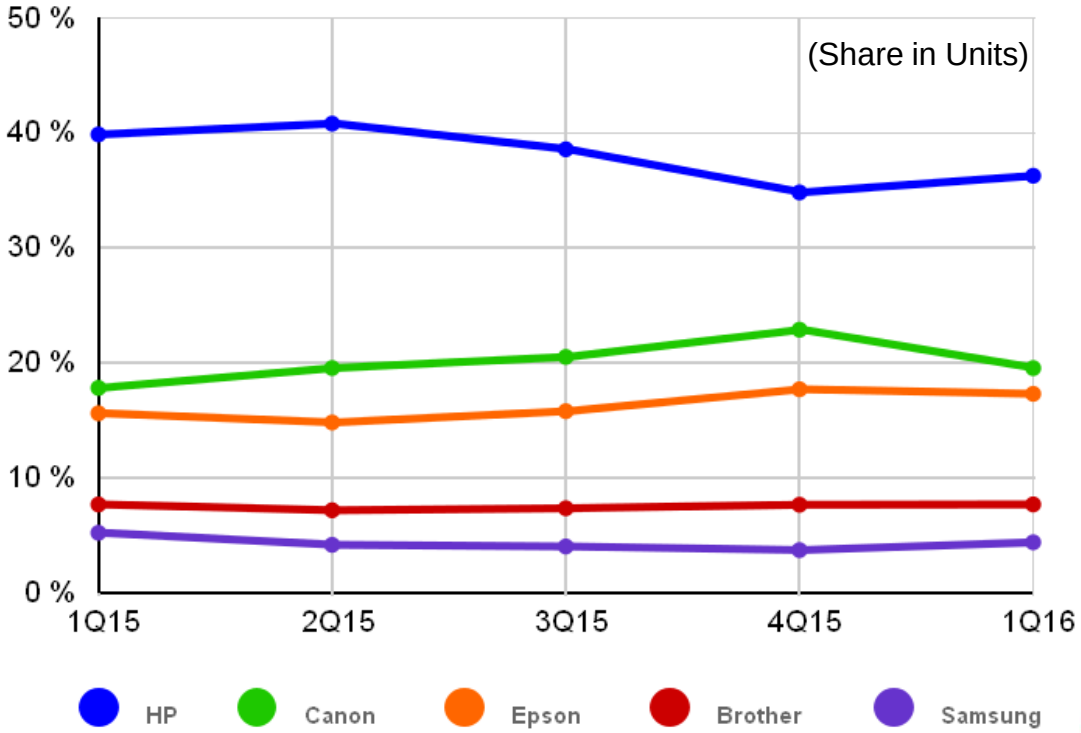
Worldwide Hardcopy Peripherals Market Share Q1 2016



IDC Worldwide Quarterly Hardcopy Peripherals Tracker, May 2016

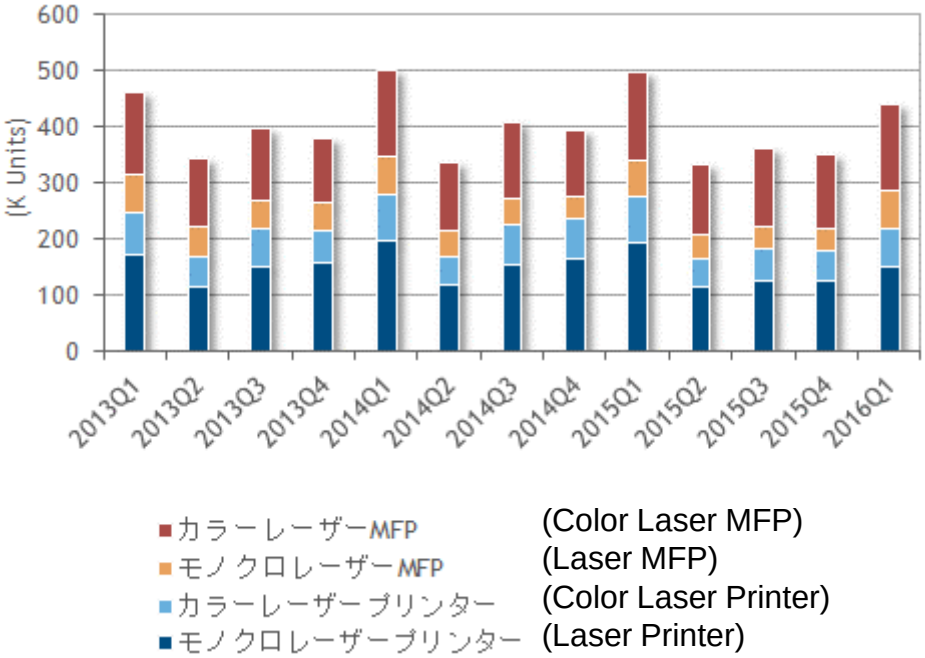
Top 5 Worldwide HCP Vendors Q1 2016

- Epson maintained its year-over-year growth streak, albeit at a more conservative rate of 6.7% this quarter versus an average of about 19% in 2015. The China market was largely responsible for pulling down Epson's growth rate after the vendor and its channels effectively reached their fiscal year targets during the last three quarters of 2015.



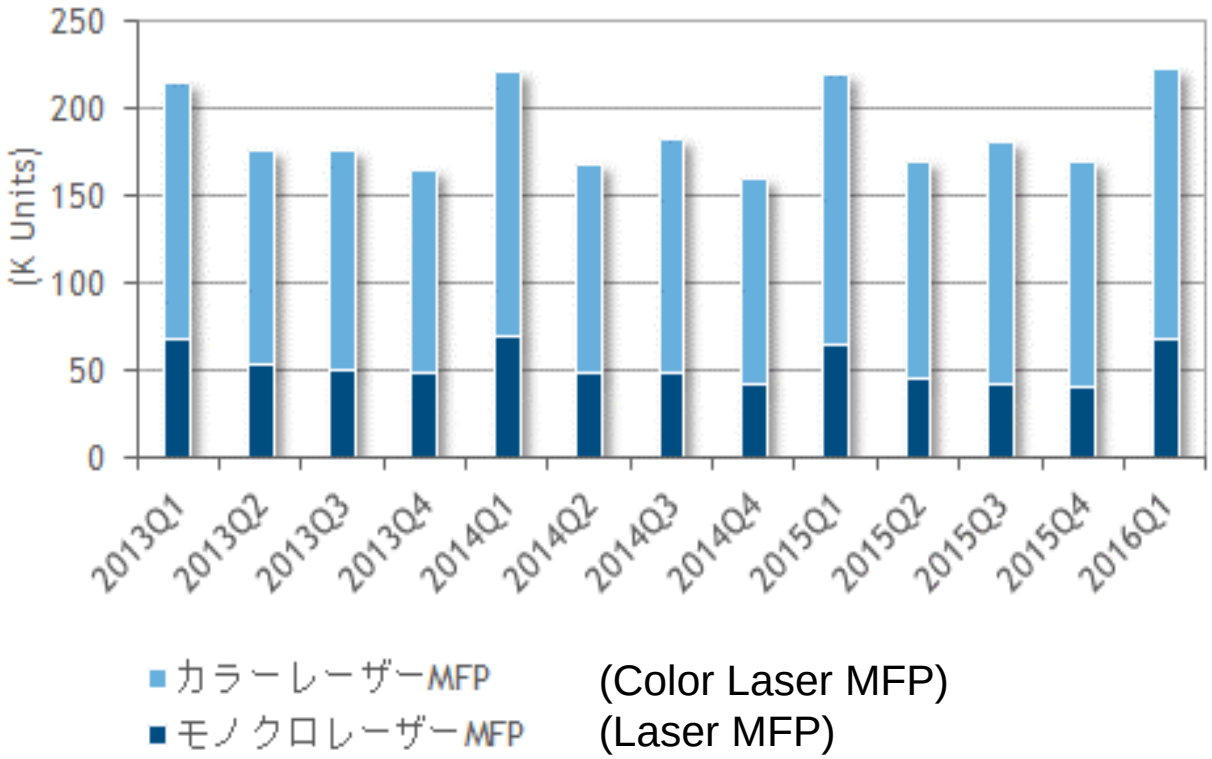
Japan Laser MFP／Printer Shipment

- 彩色雷射MFPが、前年同期比0.3%増の15万4,000台
- 黒白MFPが4.6%増の6万8,000台となりました
- 雷射MFP全体では前年同期比1.5%増の22万2,000台となりました



IDC Japan, 6/2016

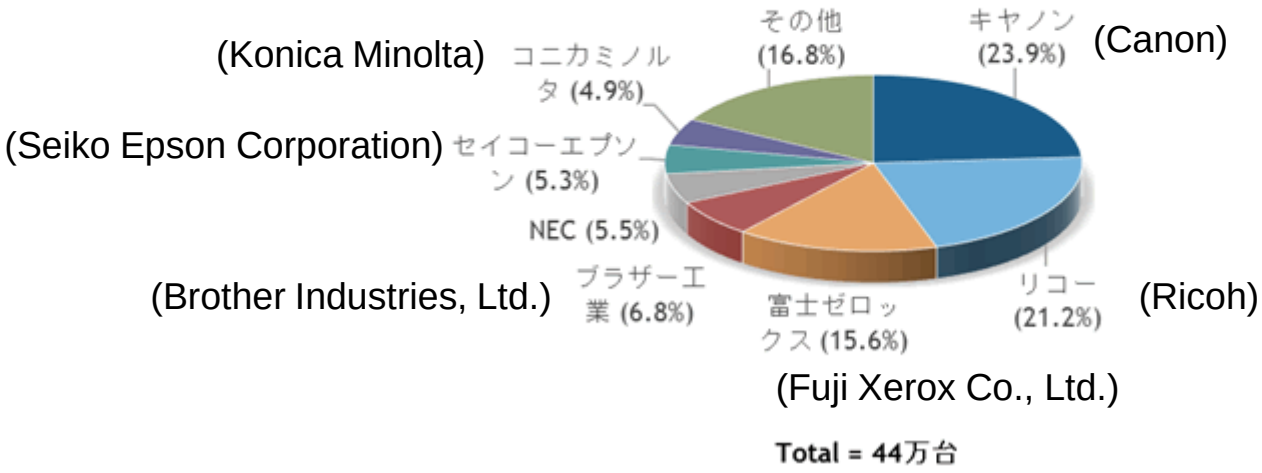
Japan Laser MFP Shipment



(Color Laser MFP)
(Laser MFP)

IDC Japan, 6/2016

Japan MFP／Printer 2016 Q1Shipment Vender Market Share Percentage (%)



IDC Japan, 6/2016

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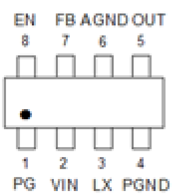
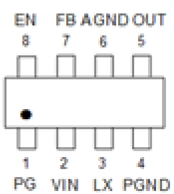
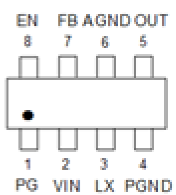
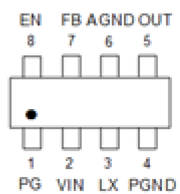
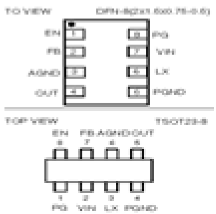
New Product Feature

Part Number	AIC2253	AIC2256	AIC2259	AIC2258	AIC2262
Vin(Min)(V)	2.5	2.5	2.5	2.5	2.5
Vin(Max)(V)	6	6	6	6	6
Iout(Max)(A)	1	1	1	1	2
Switching Frequency(Min)(kHz)	1500	3000	1500	1500	1500
Switching Frequency(Max)(kHz)	1500	3000	1500	1500	1500
Iq(Typ)(uA)	8	17	17	17	17
Control Mode	AOT	AOT	AOT	AOT	AOT
Operating Temperature Range(C)	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85
Process	W/B	W/B	W/B	F/C	F/C
Package	TSOT-23-8	TSOT-23-8	TSOT-23-8	TSOT-23-8	DFN-8 TSOT-23-8
Remark	P2P MP2159 Sampling in Nov. 16'	P2P MP2159	P2P MP2159 Sampling now		参阅MP2162 Sampling now
Outline					

New Product Feature

- **AOT**

  Adaptive **O**n **T**ime control that provides a fast transient response without external compensation component.

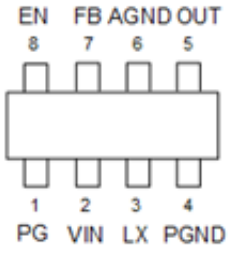
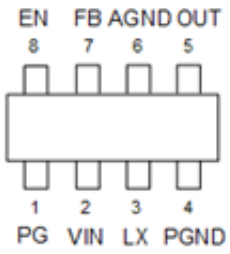
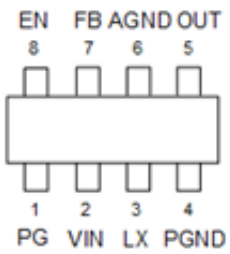
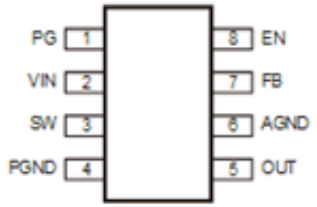
- **Sync.**

  The device features an internal synchronous rectifier for high efficiency, it requires no external Schottky diode.

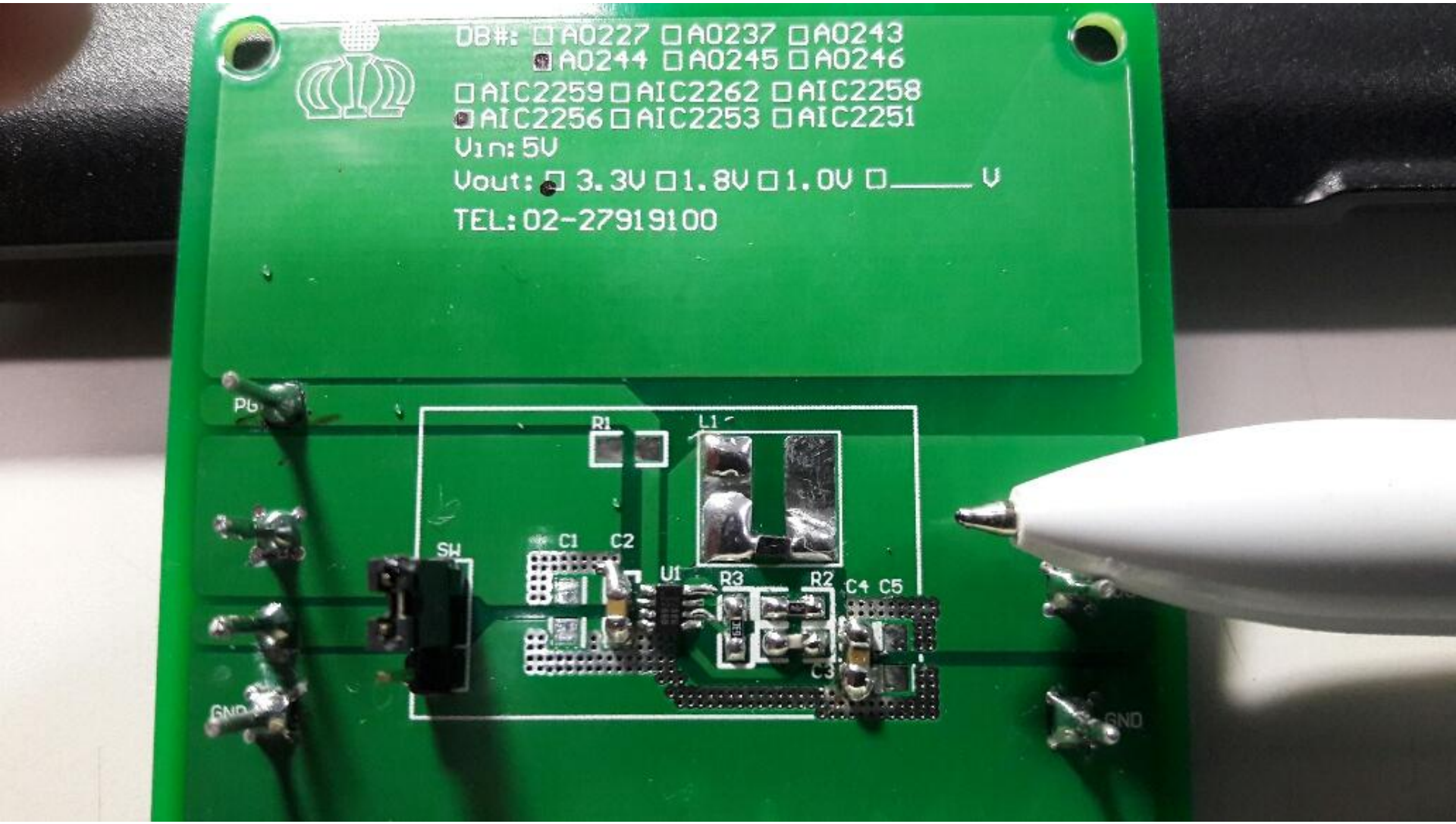
- **Small Package**

  TSOT-23-8

New Product Feature

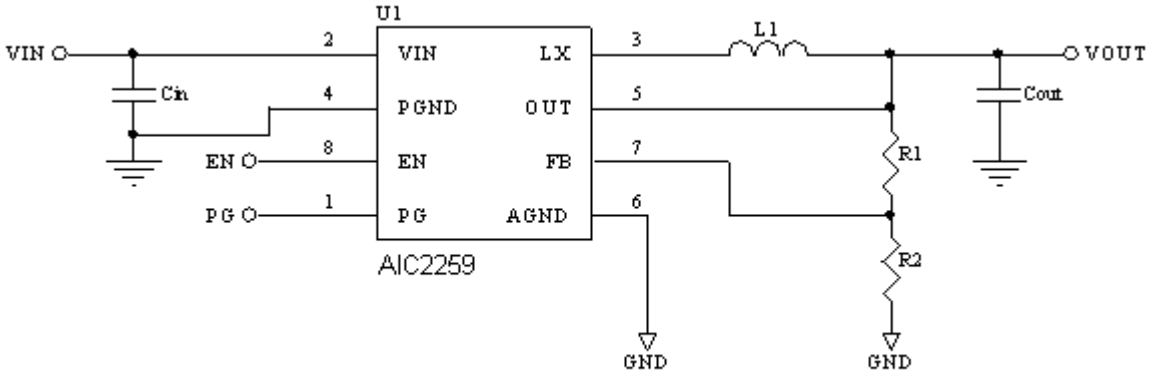
Part Number	AIC2259	AIC2256	AIC2253	MP2159
Vin(Min)(V)	2.5	2.5	2.5	2.5
Vin(Max)(V)	6	6	6	6
Iout(Max)(A)	1	1	1	1
Switching Frequency(Min)(kHz)	1500	★ 3000	1500	1500
Switching Frequency(Max)(kHz)	1500	3000	1500	1500
Iq(Typ)(uA)	17	17	★ 8	17
Control Mode	AOT	AOT	AOT	COT
Operating Temperature Range(C)	-40 to 85	-40 to 85	-40 to 85	-40 to 85
Package	TSOT-23-8	TSOT-23-8	TSOT-23-8	TSOT-23-8
Remark	P2P with MP2159 Sampling now	P2P with MP2159	P2P with MP2159 Sampling now	
Outline				

New Product Feature

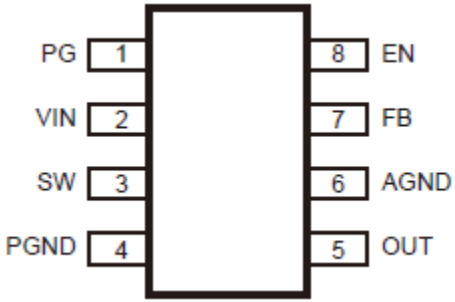


New Product Feature

Typical application circuit



PIN configuration



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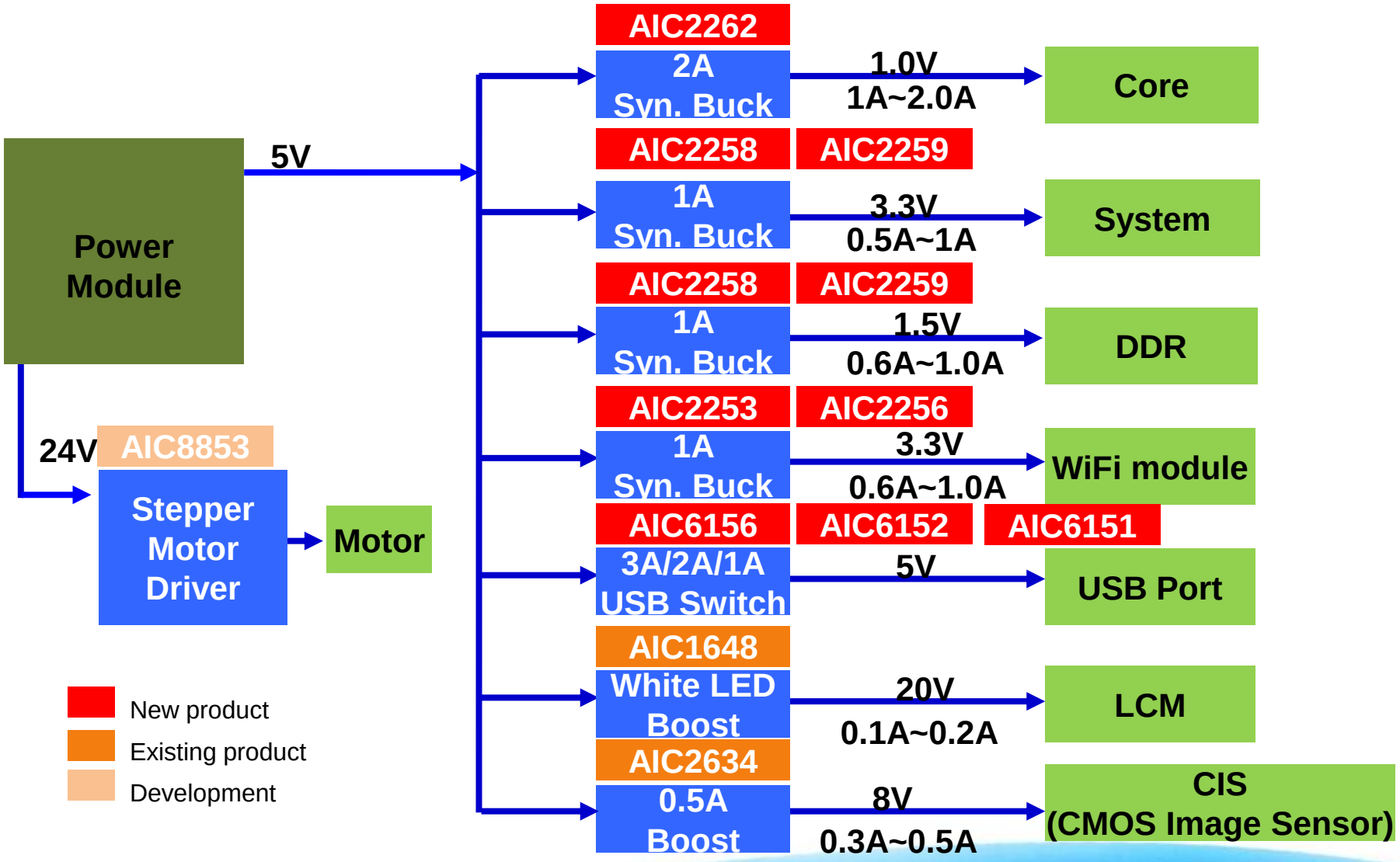
AIC Power Solutions

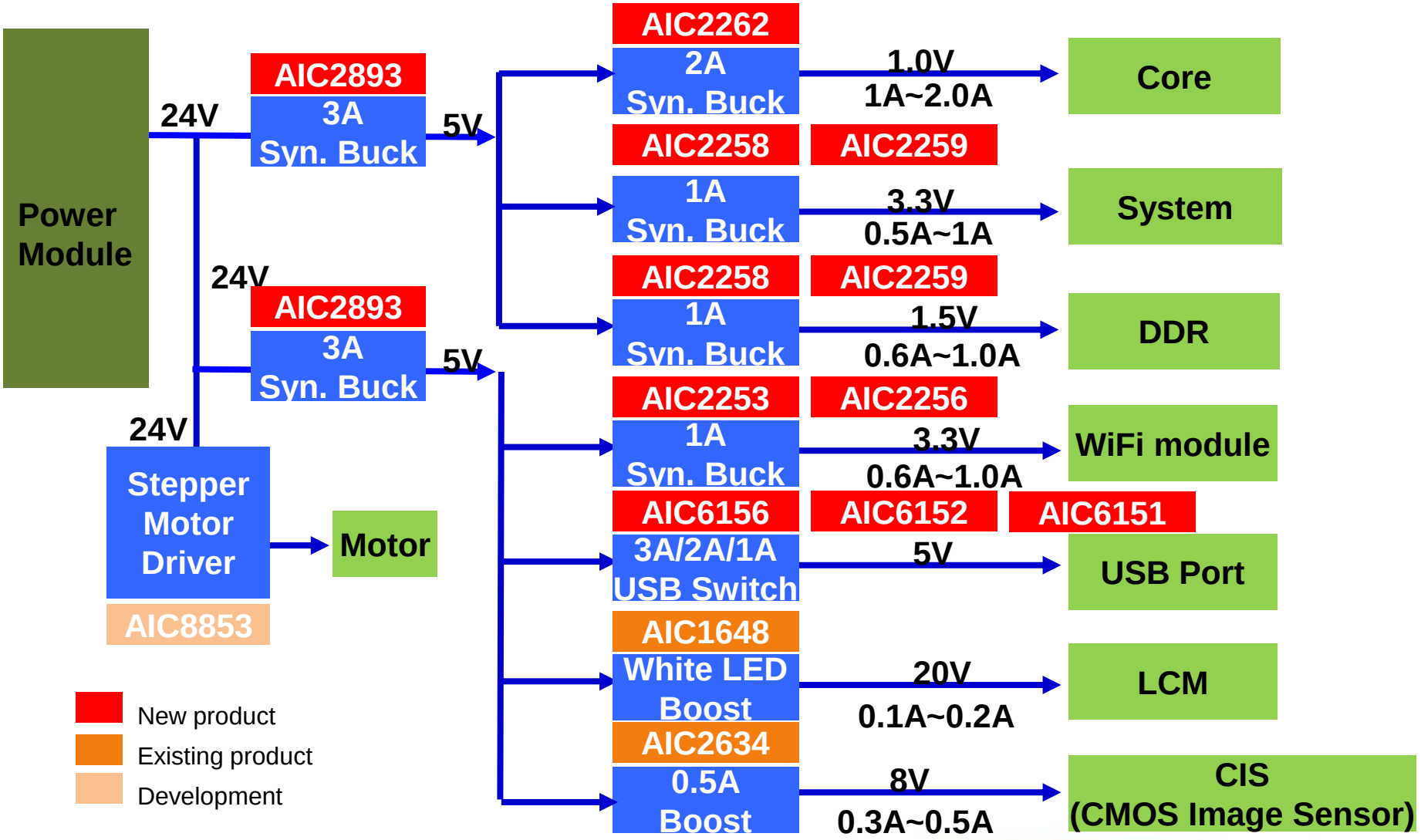
MFP

- AIC2253/AIC2258/AIC2259/AIC2256
  - 1A AOT Synchronous 6V Buck Converter TSOT23-8
- AIC2262
  - 2A AOT Synchronous 6V Buck Converter TSOT23-8
- AIC6156/AIC6152/AIC6151
  - 3A/2A/1A Fast SCP USB Switch SOP-8EP/SOT23-6
- AIC2893
  - 3A Synchronous 36V Buck Converter SOP-8EP
- AIC2832/AIC2833
  - 2A/3A Synchronous 16V Buck Converter SOT23-6

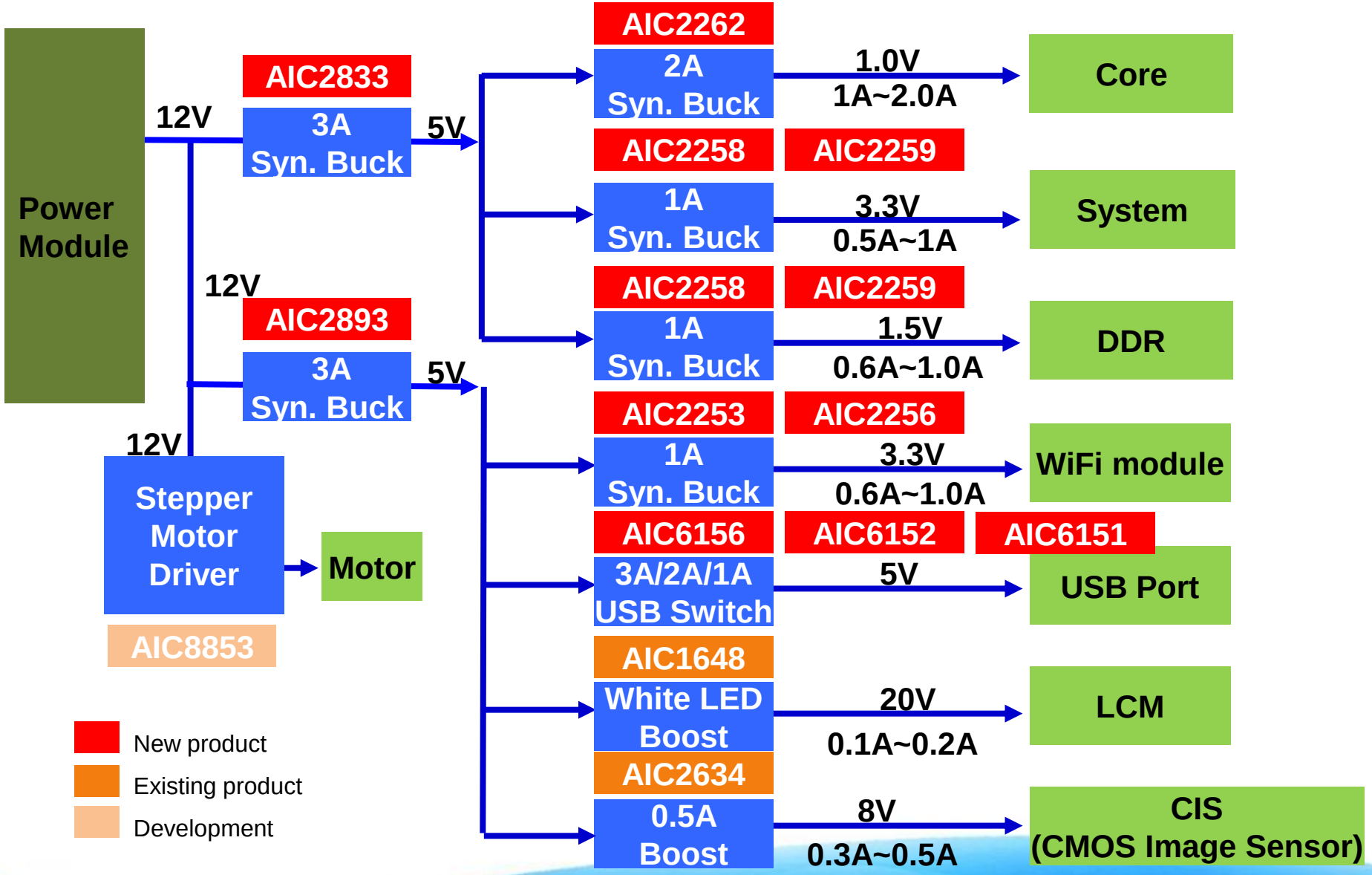
5Vin MFP/Printer Power Block



24Vin MFP Power Block



12Vin MFP Power Block



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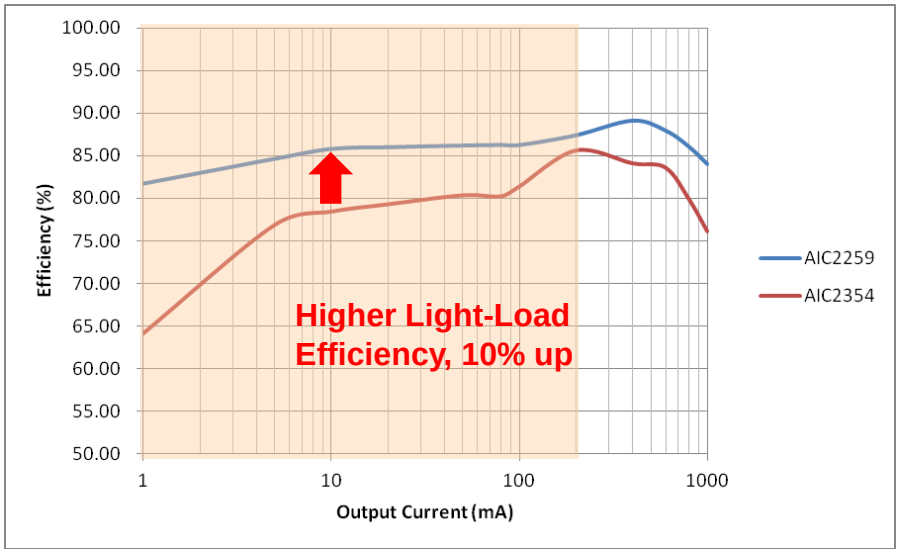
Highlights

- **Focused Products**
  - AIC2865 – 5A HVB in SOP8-EP, HLLη, pin-compatible with TPS54528
  - AIC2832 – 2A HVB in SOT23-6, HLLη, pin-compatible with MP1470/TPS56220x
  - AIC2833 – 3A HVB in SOT23-6, HLLη, pin-compatible with MP1471/TPS56320x
  - AIC2259 – 1A LVB in SOT23-8, HLLη, AOT, pin-comp. with MP2159
  - AIC2256 – 1A LVB in SOT23-8, HLLη, AOT, 3MHz Frequency, pin-comp. with MP2159
  - AIC2253 – 1A LVB in SOT23-8, HLLη, AOT, 8uA Low Iq, pin-comp. with MP2159
  - AIC2262 – 2A LVB in SOT23-8/DFN8, HLLη, AOT, pin-comp. with MP2161
  - AIC6156/52/51 – 3A/2A/1A UPS in SOP8-EP and SOT23-6, 1.3uS Fast SCP, ±7~15% current accuracy
- **Advanced Technology**
  - AOT (Adaptive On-Time Control) –
    - ***H**igher* light-load eff., ***S**maller* ripple V., ***F**aster* transient
  - Low Iq – Power-saving, extending battery life, 30uA -> 3uA -> 0.3uA (Q2 '17)
  - Fast Short-Circuit Response Time – 1.3uS

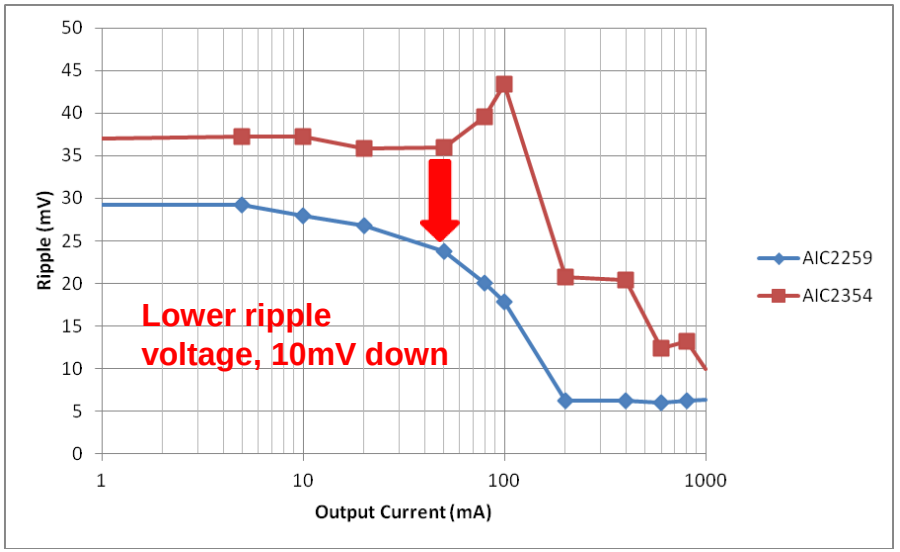
Sampling Now!!

AIC2259

1A, 1.5MHz AOT Synchronous Step-Down DC/DC Converter

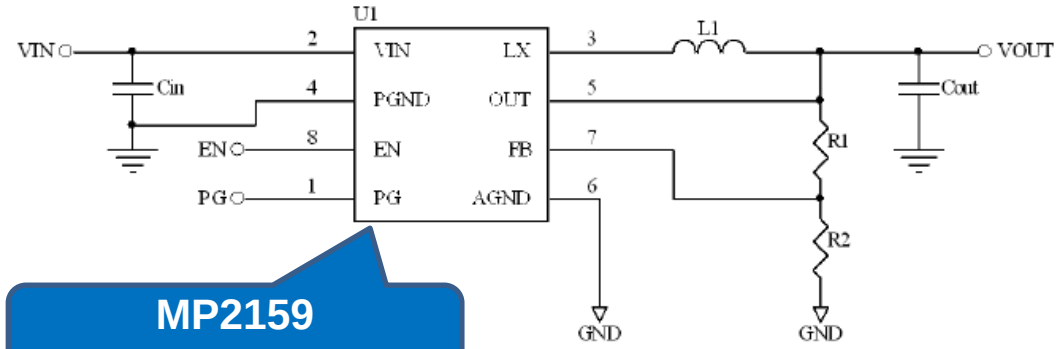


V_{OUT}=1.0V Efficiency at V_{IN}=5V



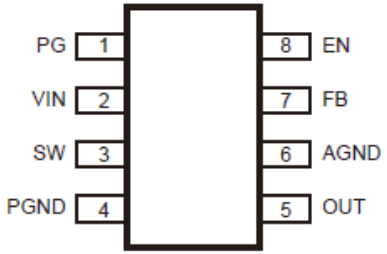
V_{OUT}=1.0V Ripple at V_{IN}=5V

Application Circuit



MP2159 Compatible

Package

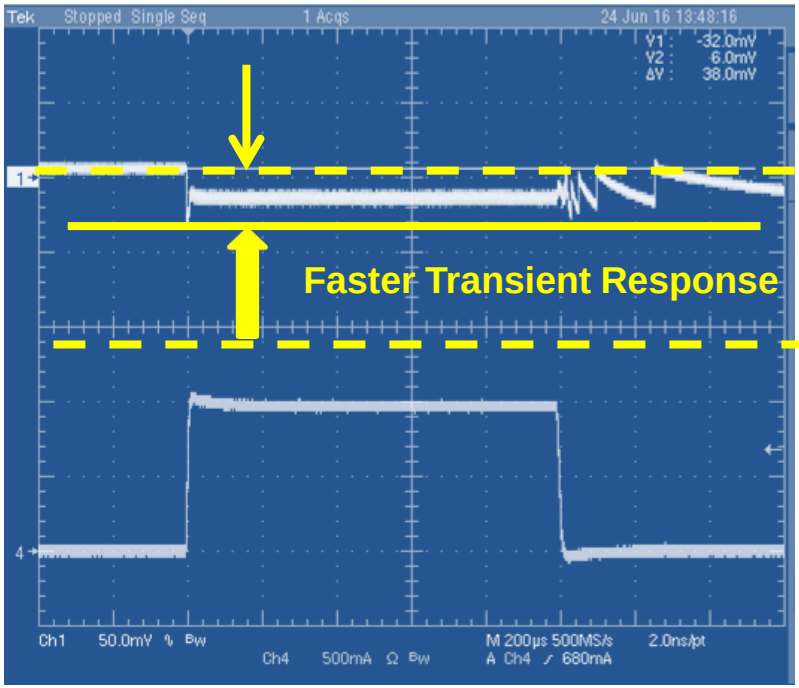


TSOT-23-8

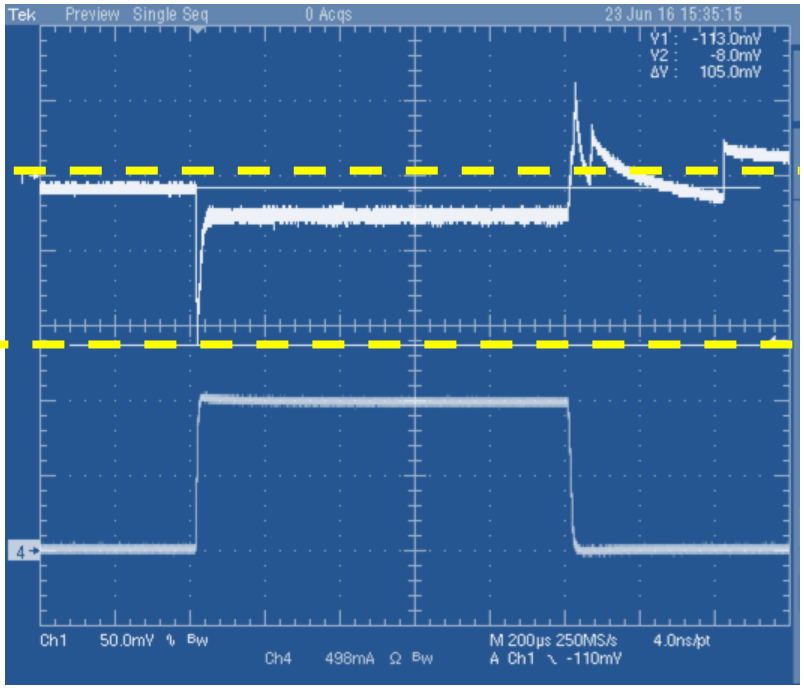
Sampling Now!!

AIC2259

1A, 1.5MHz AOT Synchronous Step-Down DC/DC Converter



AIC2259 V_{IN}=5V, V_{OUT}=1.0V, I_O=0 ~ 1A, drop=38mV
(CH1: Output Voltage, CH4: Output Current)

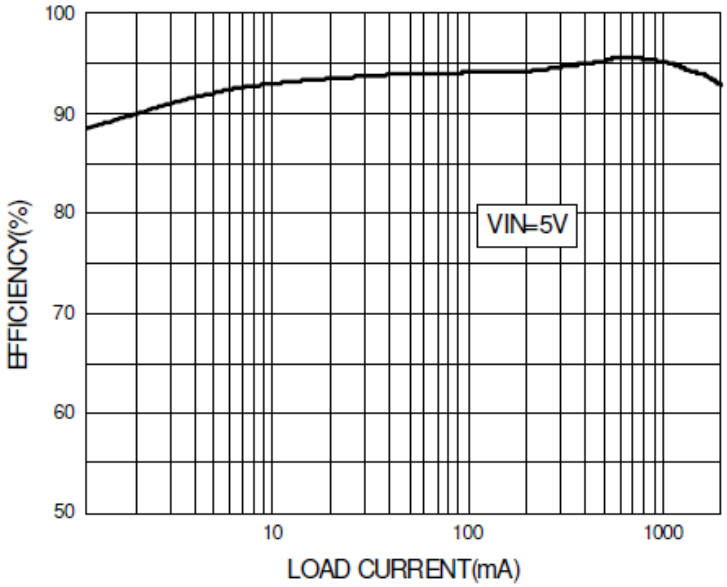


AIC2354 V_{IN}=5V, V_{OUT}=1.0V, I_O=0 ~ 1A, drop=105mV
(CH1: Output Voltage, CH4: Output Current)

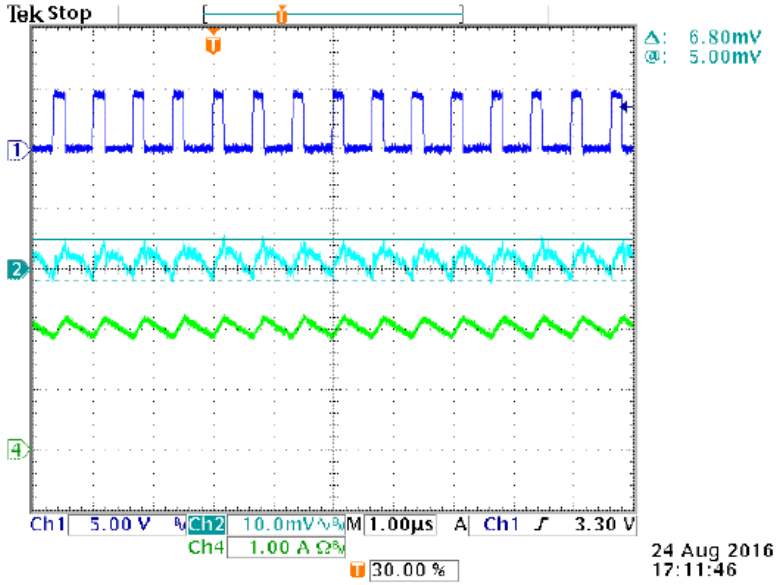
Sampling Now!!

AIC2262

2A 1.5MHz AOT Synchronous Step-Down Converter

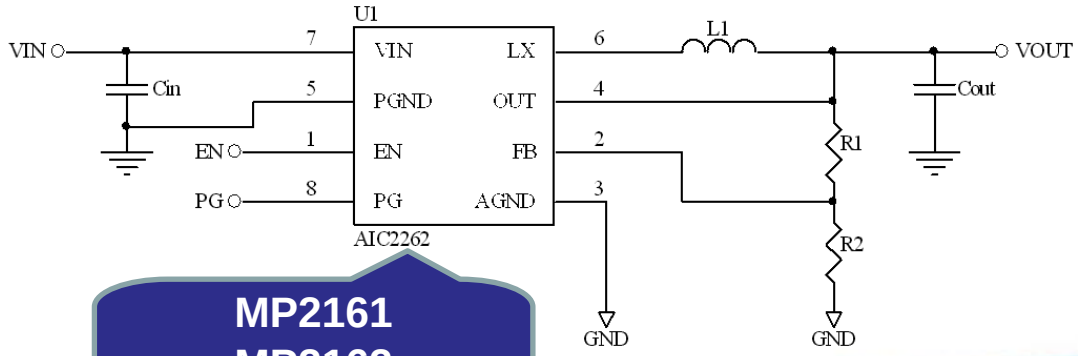


V_{OUT}=3.3V, V_{IN}=5V



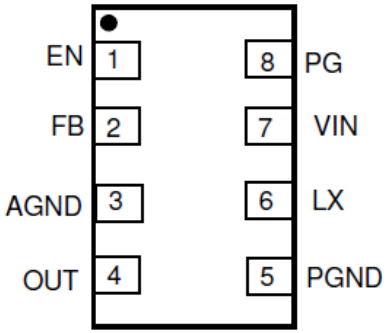
V_{OUT}=1.2V, I_{OUT}=2A Ripple at V_{IN}=5V

Application Circuit

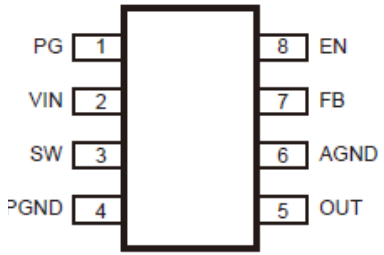


MP2161
MP2162
Compatible

Package



8-pin DFN 2mm x 1.5mm



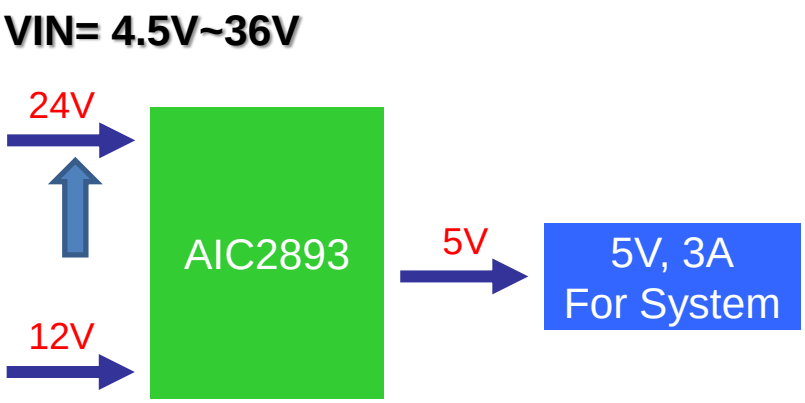
TSOT-23-8

Sampling in Jun. 2017

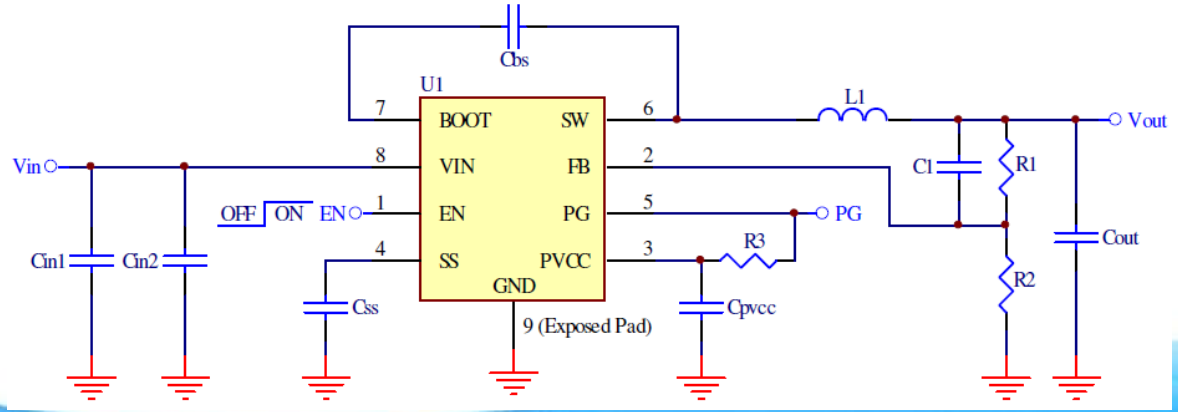
AIC2893

3A 36V 650kHz Synchronous Step-Down Converter

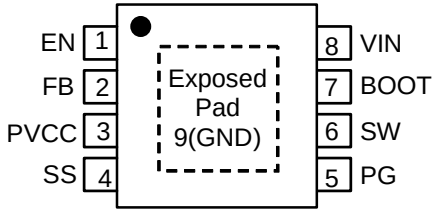
- 3A Continuous Output Current
- Wide 4.5V to 36V Operating Input Range
- Output Adjustable from 0.8V to 6V
- Up to 91% efficiency
- Low Rds(on) Internal Switch
- Adaptive On Time Control
- Fast Transient Response
- 650kHz Switching Frequency
- Programmable Soft Start
- Thermal Shutdown
- Cycle by Cycle Over Current Protection
- Short Circuit Protection
- Thermal Shutdown
- Available in SOP-8 exposed pad (Heat Sink) package



Application Circuit



Package

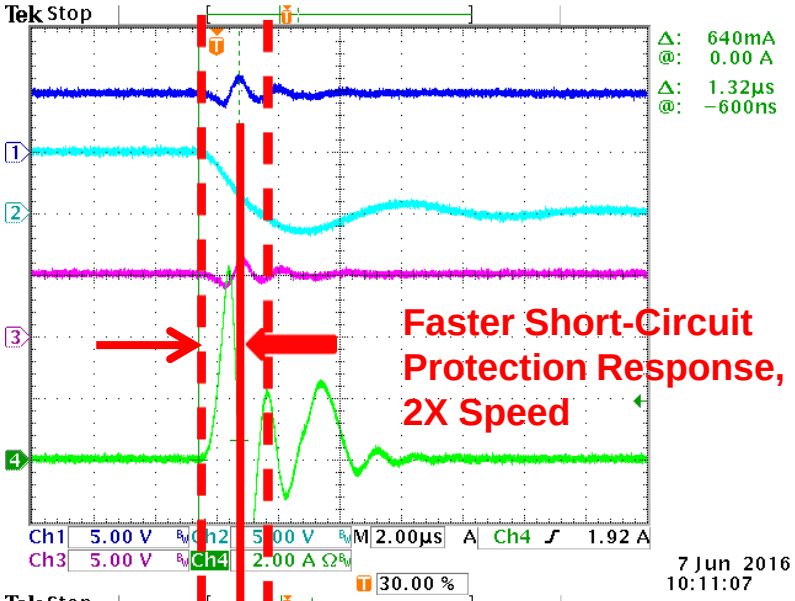


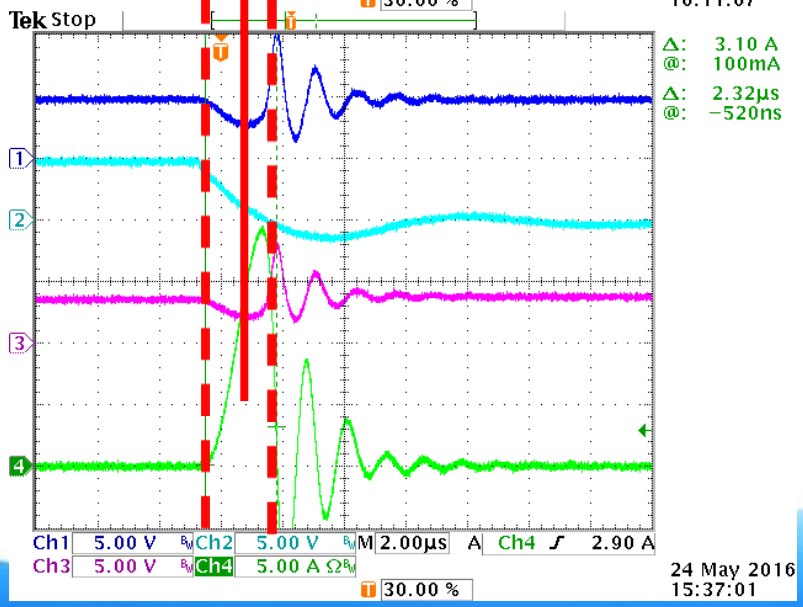
SOP-8 exposed pad

Sampling Now!!

AIC6156

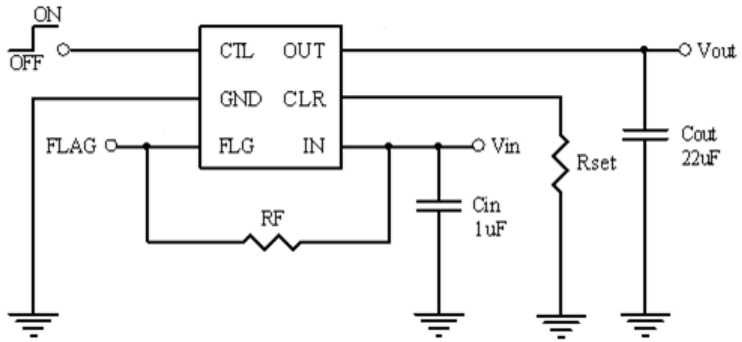
Single Channel USB Switch with Adjustable Current Limit





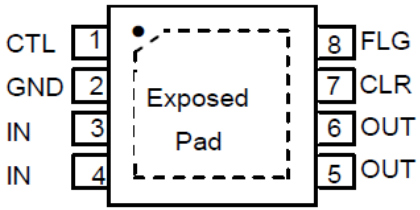
AIC6156 V_{IN}=5V, I_{CL}=0.5A, **Res. Time=1.32uS**
(CH1: Input Voltage, CH2: Output Voltage, CH3: FLG, CH4: Input Current)

Application Circuit

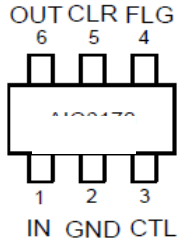


TPS2554 V_{IN}=5V, I_{CL}=0.5A, **Res. Time=2.32uS**
(CH1: Input Voltage, CH2: Output Voltage, CH3: FLG, CH4: Input Current)

Package



SOP-8 EP



SOT-23-6

USB Power Switch at 3A

	AIC	TI	Rohm	On-Semi
Part Number	AIC6156	TPS2554 TPS2555	BD82024 BD82025	NCP383
Short Circuit Response Time(uS)	**1.3**	1.5	5	2
Continuous Load Current (A)	0.5~3 (Adj.)	0.5~2.5 (Adj.)	2.5 (Adj.)	0.5~2.1 (Adj.)
MOS R-DS-ON (mohm)	**60**	73	90	45
Supply current (μA)	85	90	95	99
Input Voltage Range (V)	3.5~5.5	4.5~5.5	2.8~5.5	2.7~5.5
Current Limit Threshold (mA)	3060/ 3600/ 4140 1700/ 2000/ 2300 425/ 500/ 575	2550/ 2840 / 3100 2150/ 2430/ 2650 420/ 480/ 530 185/ 230/ 265	2100/2500/3300	2580/2800/3010 900/1000/1100 500/600/700
Current Limit Accuracy (%)	±15	±12	±15	±8
High Side Switch	NMOS	NMOS	NMOS	NMOS
Flag Delay Time (mS)	9	8.5	12	7
Output discharge	**Yes**	Yes	Yes	No
Package	SOP-8/SOT23-6	VSON	SOP8	UDFN10

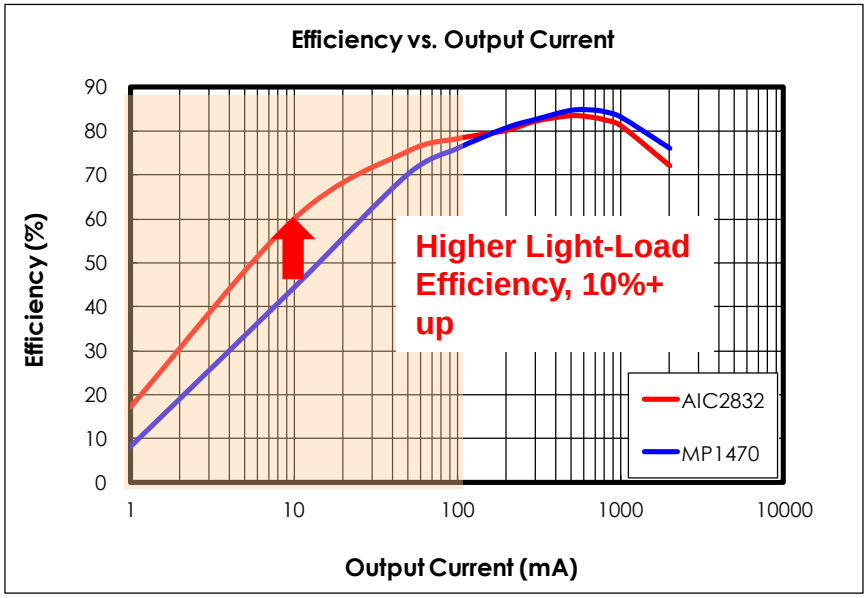
USB Power Switch at 2A

	AIC	TI	Rohm	On-Semi
Part Number	AIC6152	TPS2553	BD2222G BD2242G BD2243G	NCP380 NCV380
Short Circuit Response Time(uS)	1.3	2	5	2
Continuous Load Current (A)	0.5~2 (Adj.)	0.75~1.7 (Adj.)	0.2~1.7 (Adj.)	0.5~2.1 (Adj.)
MOS R-DS-ON (mohm)	60	85	89	70
Supply current (μA)	85	100	120	90
Input Voltage Range (V)	3.5~5.5	2.5~6.5	2.8~5.5	2.5~5.5
Current Limit Threshold (mA)	1700/ 2000/ 2300 425/ 500/ 575	1610/ 1700 / 1800 1215/ 1295/ 1375 490/ 520/ 550 100/ 130/ 150	1566/1696/1826 911/1028/1145 112/212/313	2100/2250/2500 1000/1150/1300 500/580/650
Current Limit Accuracy (%)	±15	±6	±8	±12
High Side Switch	NMOS	NMOS	NMOS	PMOS
Flag Delay Time (mS)	9	8	7	8
Output discharge	Yes	No	BD2242/43	No
Package	SOT23-6	SOT23-6	SSOP6	TSOP-6

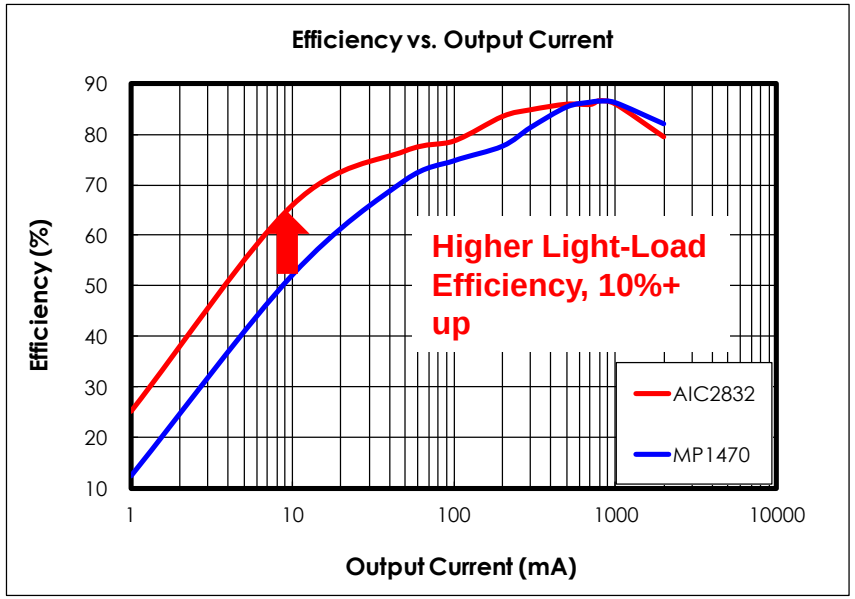
Mass Production!!

AIC2832

2A 16V 490kHz PWM/PSM Synchronous Step-Down Converter

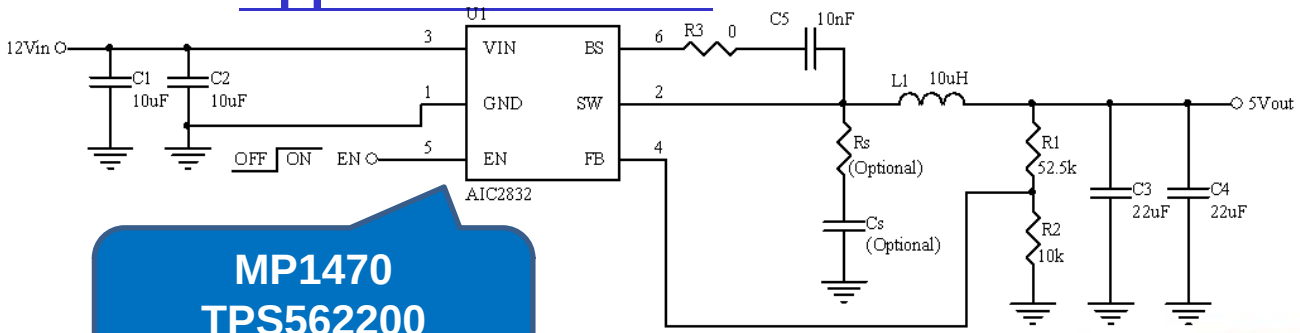


$1.05V_{OUT}$ Efficiency at V_{IN}=12V



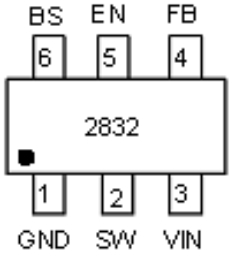
$1.8V_{OUT}$ Efficiency at V_{IN}=12V

Application Circuit



MP1470
TPS562200
Compatible

Package

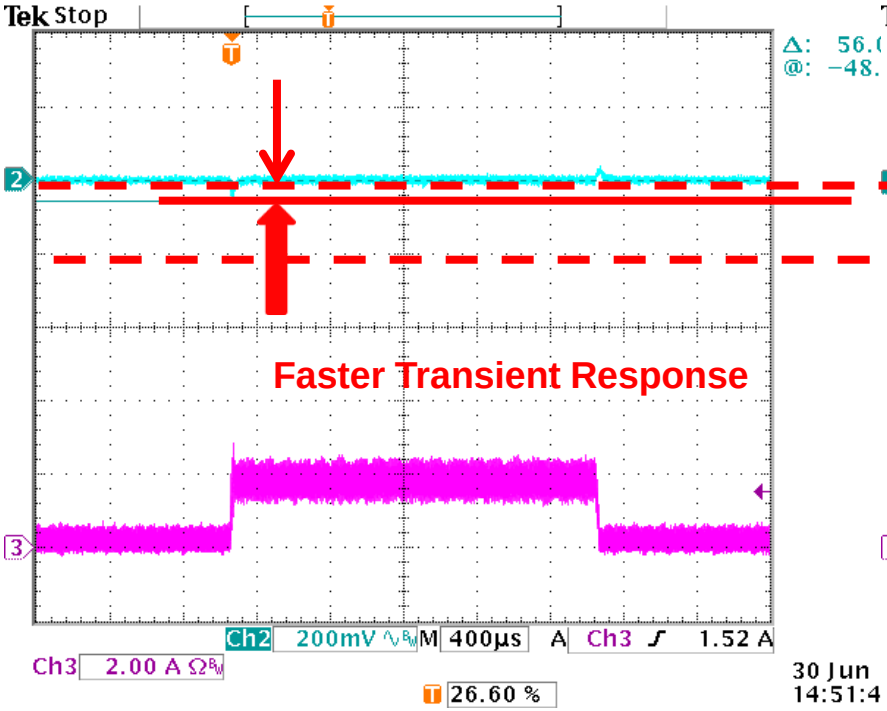


SOT-23-6

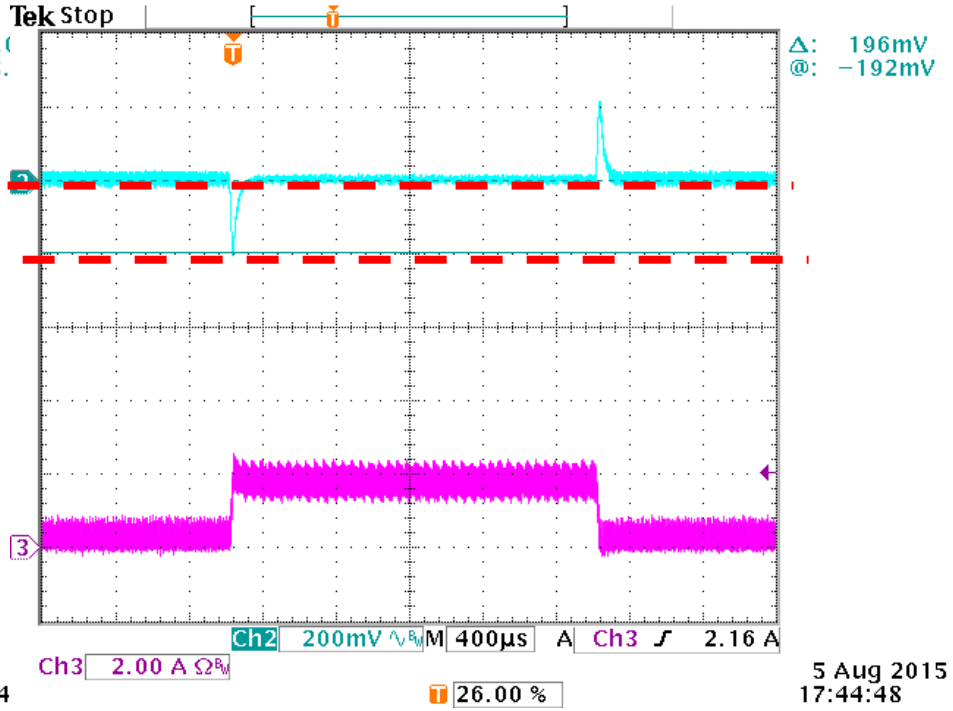
Mass Production!!

AIC2832

2A 16V 490kHz PWM/PSM Synchronous Step-Down Converter



AIC2832 V_{IN}=12V, V_{OUT}=1.05V, I_O=0.2 ~ 1.8A,
drop=59mV
CH2: Output Voltage, CH3: Inductor Current

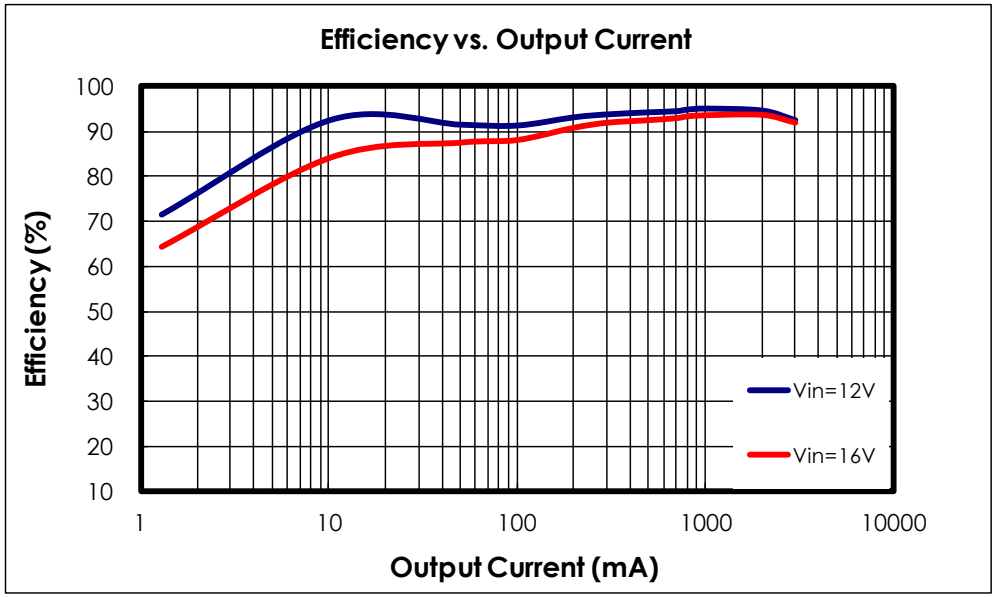


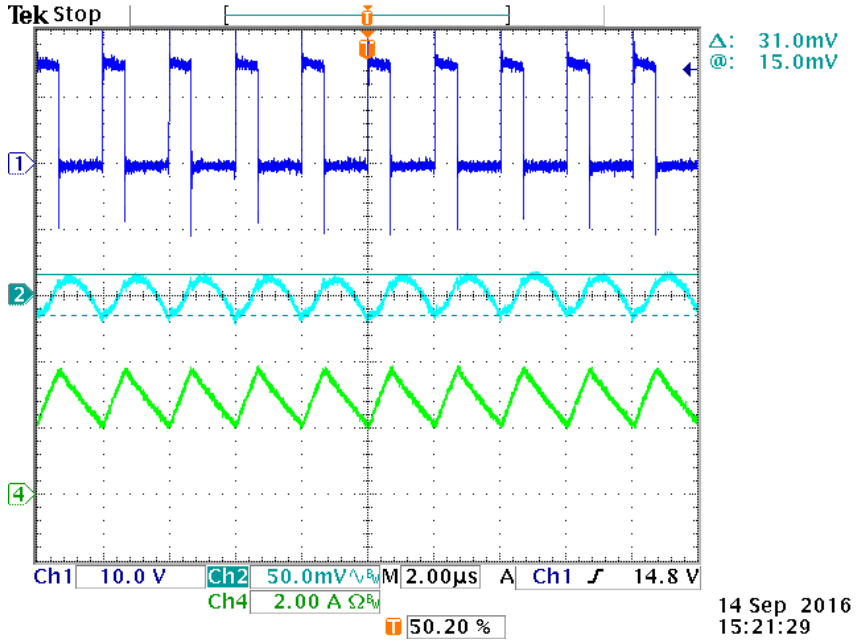
MP1470 V_{IN}=12V, V_{OUT}=1.05V, I_O=0.2 ~ 1.8A,
drop=196mV
CH2: Output Voltage, CH3: Inductor Current

Sampling in Apr.

AIC2833

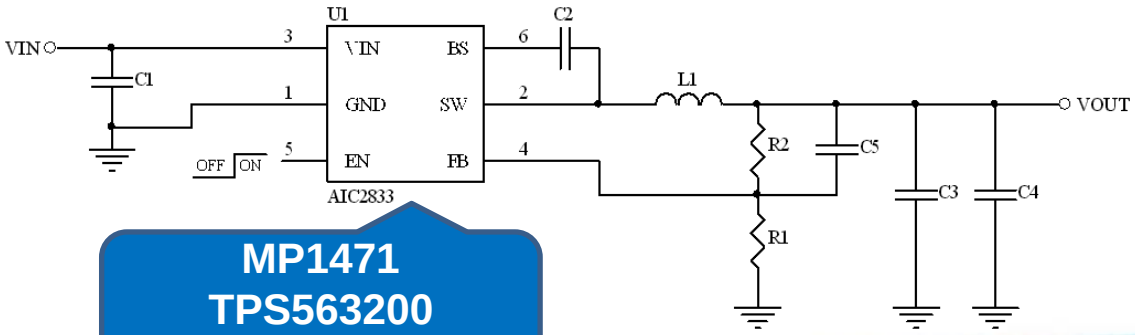
3A 16V 490kHz PWM/PSM Synchronous Step-Down Converter





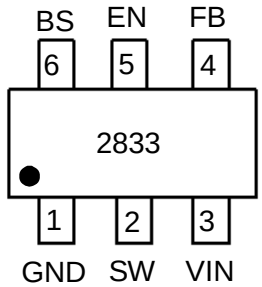
V_{OUT}=5V, I_{OUT}=3A Ripple at V_{IN}=12V

Application Circuit



MP1471
TPS563200
Compatible

Package



SOT-23-6

Q & A !