AP3015K-EVM

1.5MHz, STEP-UP DC/DC CONVERTER

DESCRIPTION

The AP3015 is a Pulse Frequency Modulation (PFM) DC/DC converter. The device is functionally equivalent except for the switching current limit. The AP3015 is designed for higher power systems with 350mA current limit.

The AP3015 features a wide input voltage. The operation voltage ranges from 1.2V to 12V. A current-limited, fixed off-time control scheme conserves operating current, resulting in high efficiency over a broad range of load current. It also features low quiescent current, switching current limiting, low temperature coefficient, etc.

Fewer tiny external components are required in the applications to save space and lower cost. Furthermore, to ease its use in different systems, a disable terminal is designed to turn on or turn off the chip.

The AP3015 is available in the standard SOT-23-5 package.

FEATURES

- Low Quiescent Current
  - In Active Mode: 17μA Typical
  - In Shutdown Mode: <1μA
- Low Operating V_{IN}
  - 1.2V Typical for AP3015
- Low V_{CESAT} Switch
  - 200mV Typical at 300mA for AP3015
- High Output Voltage: up to 34V
- Fixed Off-Time Control
- Switching Current Limiting
  - 350mA Typical for AP3015
- Operating Temperature Range: -40°C to +85°C

APPLICATIONS

- MP3, MP4
- Battery power supply systems
- LCD/OLED bias supplies
- Handheld devices
- Portable communication devices

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
VIN	Input Voltage	1.2	12	V
T_{OP}	Operating Temperature	-40	85	°C

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	15	V
—	SW Voltage	38	V
—	FB Voltage	V_{IN}	V
—	$\overline{SHDN}$ Voltage	15	V
θ_{JA}	Thermal Resistance (Junction to Ambient, no Heat Sink)	265	°C/W
—	Operating Junction Temperature	150	°C
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	260	°C
—	ESD (Human Body Model)	3000	V

EVALUATION BOARD

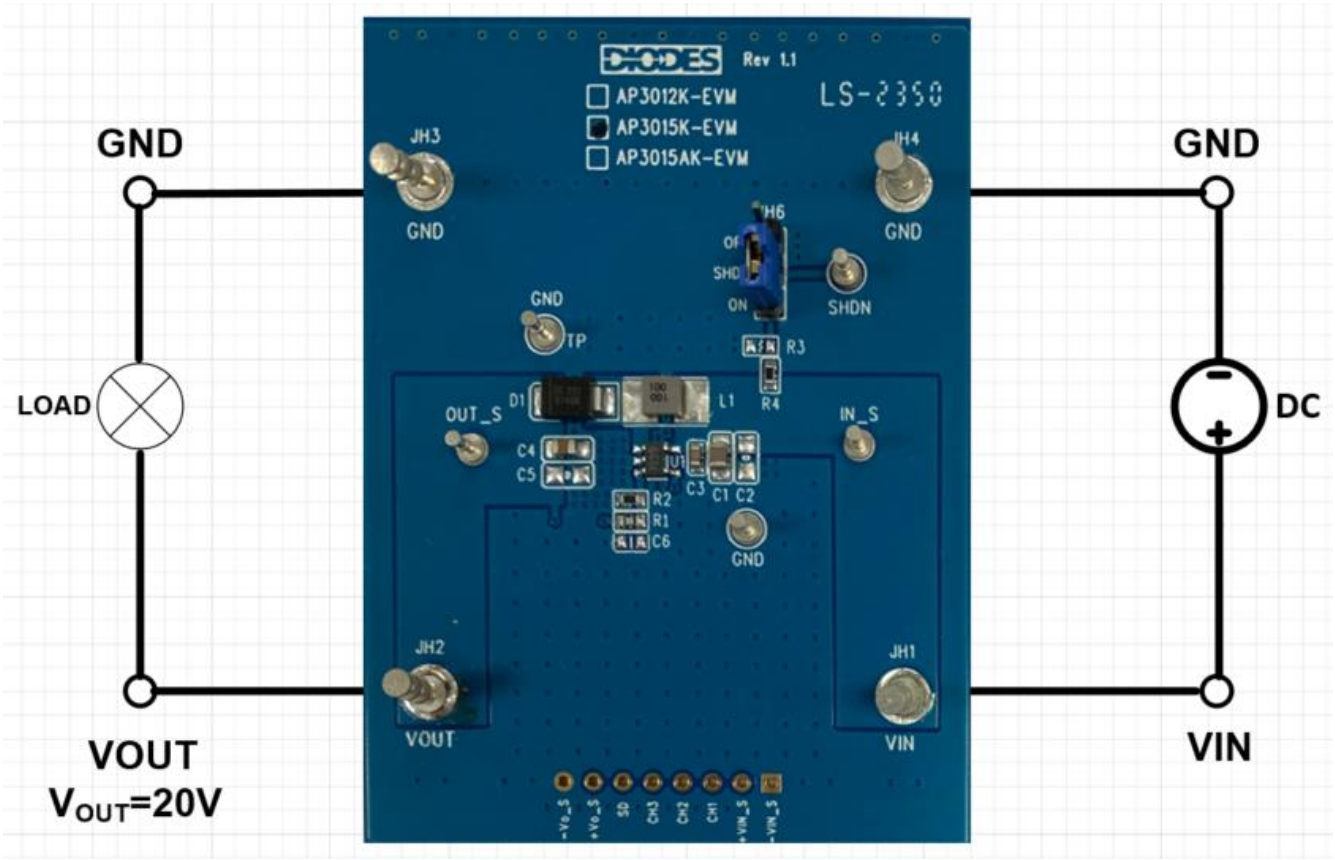

Figure 1. AP3015K-EVM

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QUICK START GUIDE

The AP3015K-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP3015KTR, follow the procedure below:

1. Connect a power supply to the input terminals VIN and GND. Set VIN to 4.2V.
2. Connect the positive terminal of the electronic load to VOUT and negative terminal to GND.
3. For Enable, to enable IC, place a jumper at JH6 to “ON” position to connect EN pin to VIN through 100KΩ resistor. Jump to “OFF” position to disable IC.
4. The evaluation board should now power up with a 20V output voltage.
5. Check for the proper output voltage of 20V at the output terminals VOUT and GND. Measurement can also be done with a multimeter with the positive and negative leads between VOUT_S and GND.
6. Set the load to 30mA through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency.

MEASUREMENT/PERFORMANCE GUIDELINES

1) When measuring the output voltage ripple, maintain the shortest possible ground lengths on the oscilloscope probe. Long ground leads can erroneously inject high frequency noise into the measured ripple.
2) For efficiency measurements, connect an ammeter in series with the input supply to measure the input current. Connect an electronic load to the output for output current.

EVALUATION BOARD SCHEMATIC

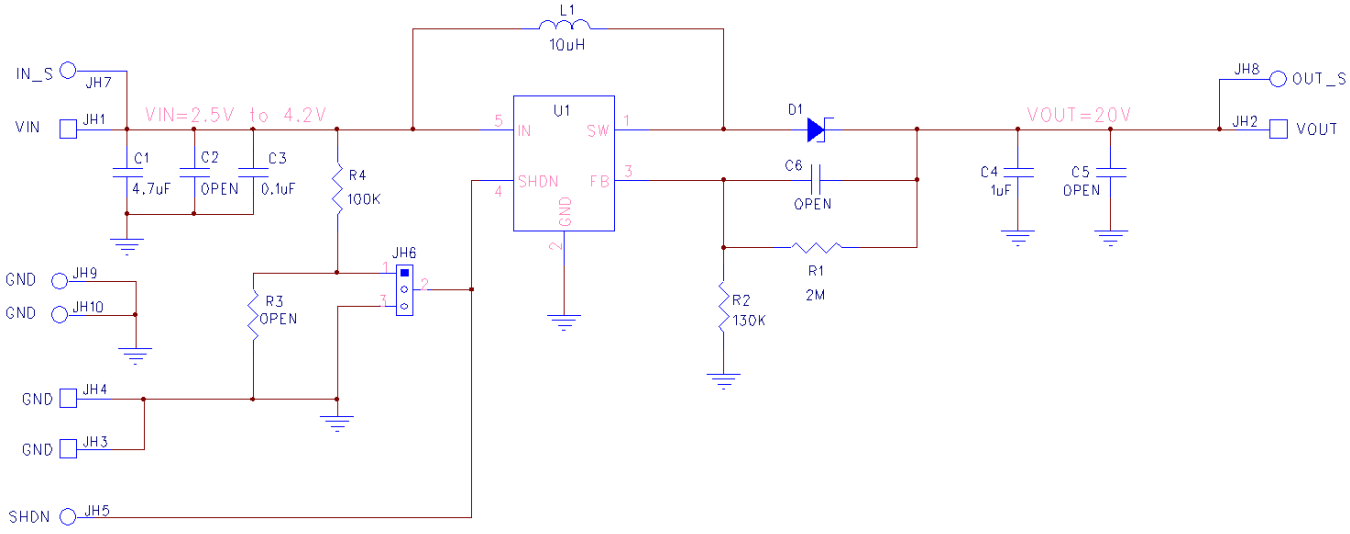

Figure 2. AP3015K-EVM Schematic

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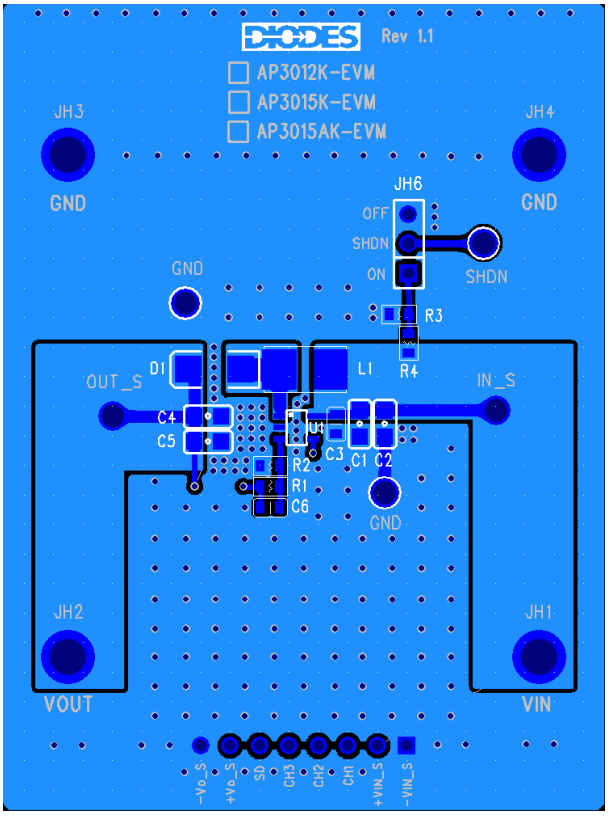
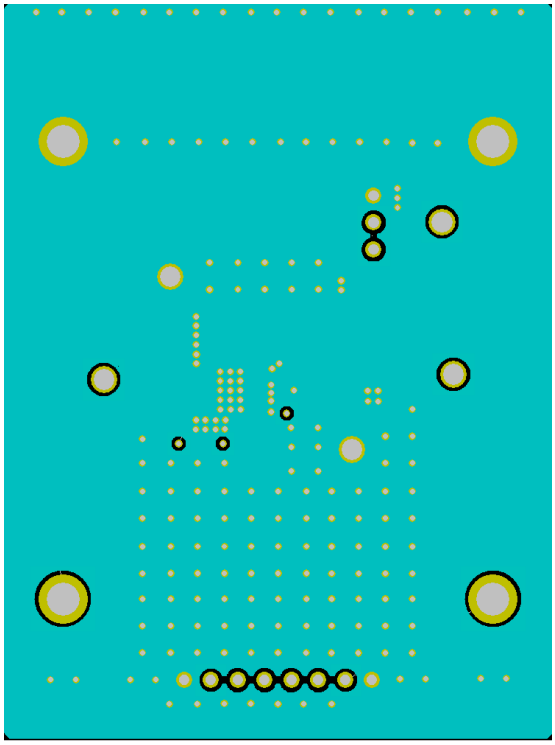
TOP LAYOUT



INNER LAYER 2 LAYOUT



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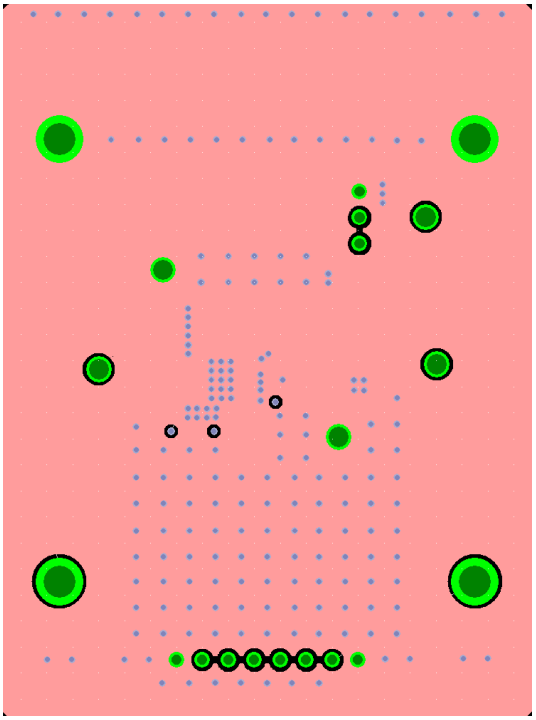
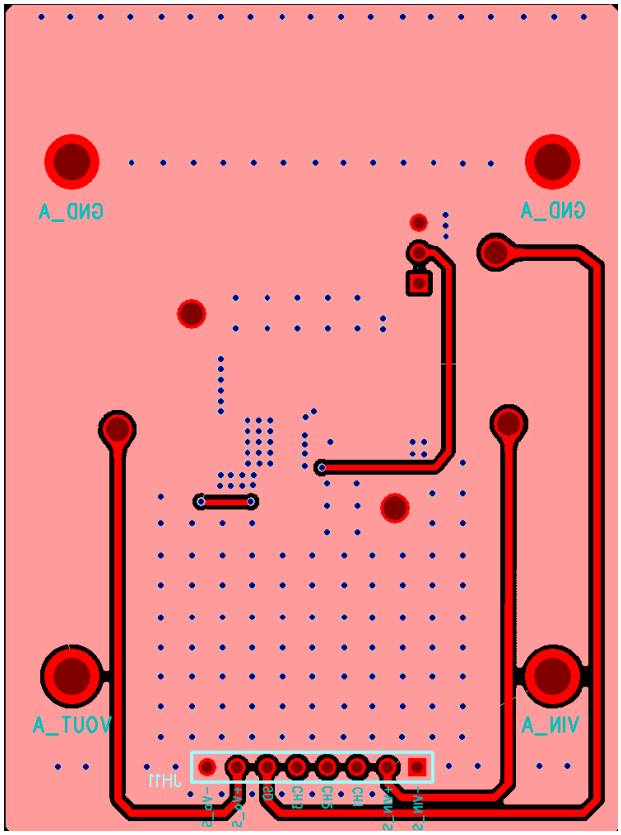
INNER LAYER 3 LAYOUT



BOTTOM LAYOUT



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BILL OF MATERIALS for AP3015K EVM

Ref	Value	Description	Qty	Size	Vendor Name	Manufacturer PN
C1	4.7µF	Ceramic Capacitor, 25V, X7R, 10%	1	0805	Murata	GRM21BZ71E475KE15L
C3	0.1µF	Ceramic Capacitor, 25V, X7R, 10%	1	0603	Murata	GCJ188R71E104KA12D
C4	1µF	Ceramic Capacitor, 35V, X7R, 10%	1	0805	Murata	GCM21BR7YA105KA55L
R4	100KΩ	RES SMD 1%, 1/10W	1	0603	Panasonic	ERJ-3EKF1003V
R1	2MΩ	RES SMD 1%, 1/10W	1	0603	Panasonic	ERJ-3EKF2004V
R2	130KΩ	RES SMD 1%, 1/10W	1	0603	Panasonic	ERJ-3EKF1303V
L1	10µH	DCR=322mΩ, Ir=1.65A	1	3.0x3.0x2.0mm	Wurth Electronics	74438336100
D1		Diode Schottky 40V, 1A	1	SMB	Diodes Inc	B140B-13-F
JH6		PCB Header, 40 POS	1	1X3	Wurth Electronics	61304011121
IN_S, OUT_S, SHDN, GNDx2	1573	Terminal Turret 0.082" L (Test Points)	5	Through-Hole	Keystone Electronics	1573-2
JH1, JH2, JH3, JH4	1598	Terminal Turret Triple 0.094" L (Test Points)	4	Through-Hole	Keystone Electronics	1598-2
U1	AP3015	Sync DC/DC Converter	1	SOT-23-5	Diodes Inc	AP3015KTR

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TYPICAL PERFORMANCE CHARACTERISTICS

Fig 3. Efficiency vs Output Current

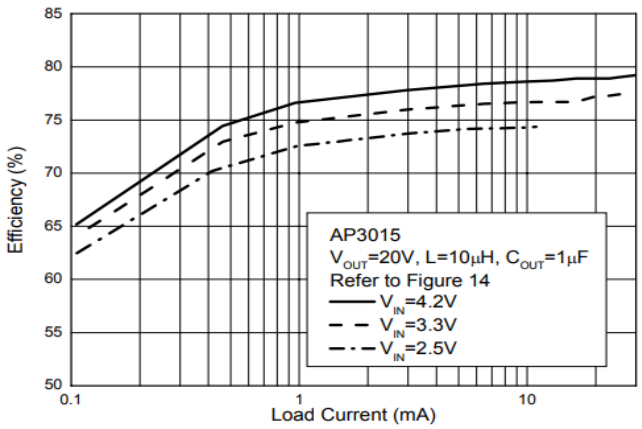


Fig 4. Switch Current Limit vs Junction Temp

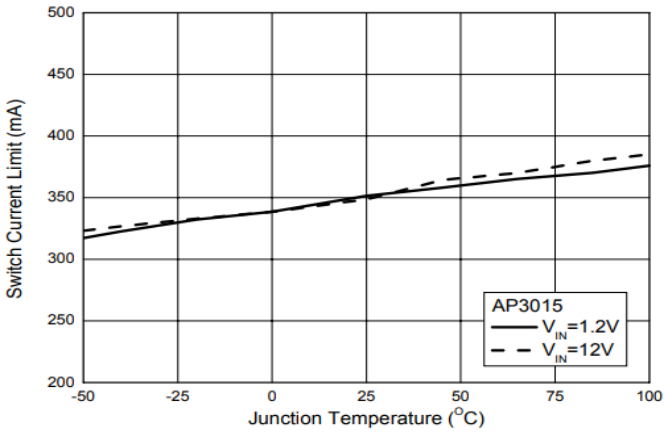


Fig 5. Quiescent Current vs Junction Temp

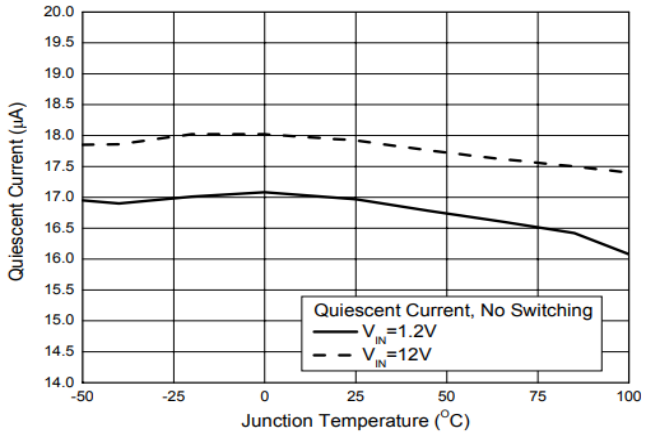
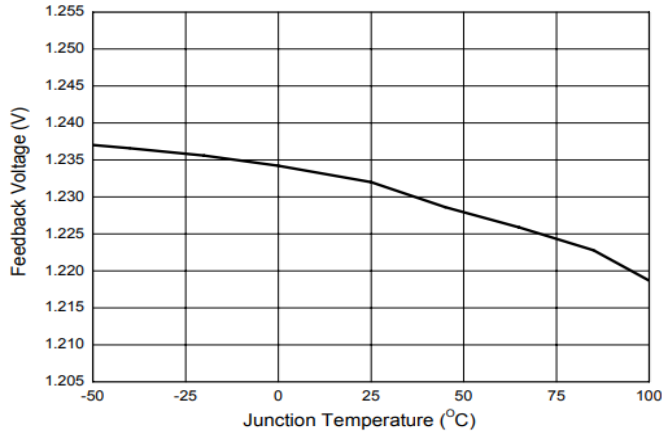


Fig 6. Feedback Voltage vs Junction Temp



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