DEMO MANUAL

AWK6943
EVM User's Guide

FEATURES

Input voltage Range: 3V to 36V

Output Current: 3A

Output Voltage: 5V

Oscillator Frequency: 410kHz

Operating Quiescent Current: 30μA (Typ.)

Low Dropout Voltage: 220mV at 1A Load

High Efficiency: ＞95% (Typ.)

Full-featured evaluation board for AWK6943

- Shutdown Function
- OCP
- Thermal Shutdown

EQUIPMENT NEEDED

Power supply up to 36 V

Oscilloscope

Multimeter

GENERAL DESCRIPTION

The AWK6943 EVM (Shown in Fig.1) is designed for the evaluation of high-performance synchronous step-down regulator AWK6943. The AWK6943 can operate over a wide input voltage range from 3V to 36V with low operating current.

Standard features, such as enable/shutdown control, UVLO, power good (PG) indicator, line and load regulation, dropout voltage and over current protection can be demonstrated by this evaluation board.

For full details on the AWK6943 BUCK regulator, see the AWK6943 data sheets.

Fig.1 Evaluation Board Picture

ELECTRICAL SPECIFICATION

Table1. AWK6943 EVM Electrical Specifications

Name	Pin	Description	Min.	Typ.	Max.	Unit
VIN	P1	Input Voltage Supply	3		36	V
VOUT	P2	Output Voltage		5		V
EN	TP4	Enable Input	0	2	36	V

TEST POINTS and JUMPER DEFINITION

Table 2. Test Points Definition

Pin	Description
TP1	Input Voltage Sense Pin
TP2	Output Voltage Sense Pin
TP3	Power Good Pin
TP4	Enable Voltage Pin
TP5-TP8	GND PIN

BENCH SETUP

In order to prepare the evaluation board for operation, several steps should be completed before the initial use:

1. Connect power supply which is capable of 36V/3A to the input terminals P1 and P4, **DO NOT** turn on the power supply.
2. Connect an electronic load which is capable of sinking more than 3A to the output terminals P2 and P3, and set load current to 0A.
3. Turn on the input power supply, make sure the input voltage never exceeds 36V.
4. It is highly recommended that an ammeter should be put in series with the input power supply and the electronic load to measure supply and load current, a voltmeter should be place on the input and output voltage sense pins to get an accurate input and output voltage (See Fig.2).

Fig.2 Series with the power supply and the electronic load

5. Once a proper output voltage is established, gradually adjust the load current or the input voltage within operating range to observe regulation, efficiency, dropout voltage and other parameters.

TEST PROCEDURE AND RESULT

Soft Start

1. Follow the procedures in BENCH SETUP session.
2. Set electronic load to 0A.

3. Set V_{EN}=2V and turn on enable power supply.

4. Set V_{IN}=12V and turn on input power supply, use oscilloscope to observe input voltage, output voltage, SW voltage and Inductor current.

5. Turn off input power supply, set electronic load to 3A, repeat step 4.

6. Set electronic load to 0A, V_{EN}=0V and V_{IN}=12V and turn on power supply.

7. Transient V_{EN} from 0V to 2V, use oscilloscope to observe enable voltage, output voltage, SW voltage and Inductor current.

8. Set electronic load to 3A, repeat step 6. and step 7.

The measured soft start waveforms at no load condition are shown in Fig.3 and Fig.4. The measured soft start waveforms at full load condition are shown in Fig.5 and Fig.6.

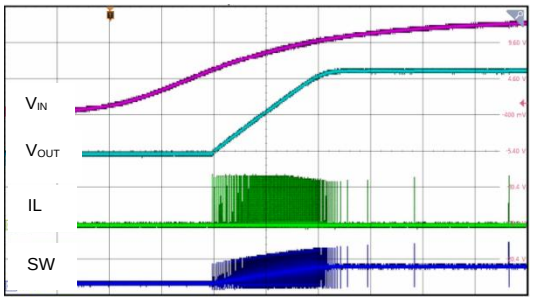

Fig.3 Soft Start by Input Voltage

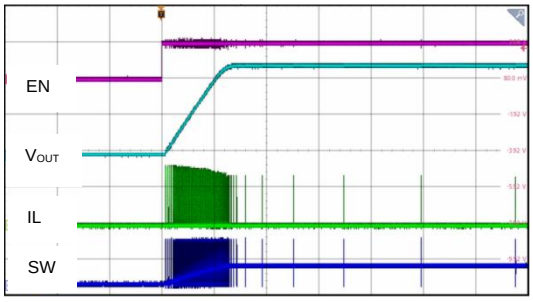

Fig.4 Soft Start by Enable Voltage

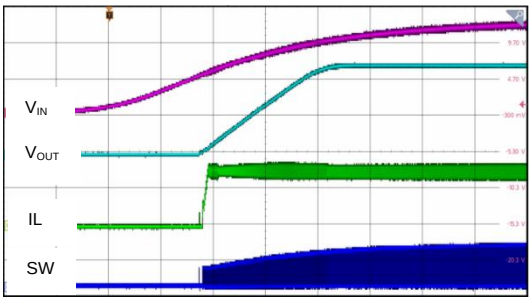

Fig.5 Soft Start by Input Voltage

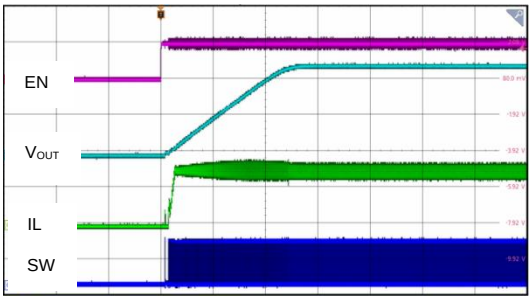

Fig.6 Soft Start by Enable Voltage

Dropout Voltage

1. Follow the procedures in BENCH SETUP session.

2. Set VIN=4.9V and turn on input power supply.

3. Turn on the electronic load, gradually increase the load current from 0A to 3A, measure output voltage and calculate dropout voltage with load current.

The measured dropout voltage is shown in Fig 7.

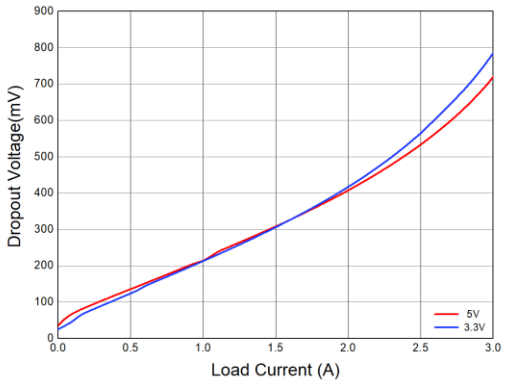

Fig.7 Dropout Voltage with Load Current

Load Transient

1. Follow the procedures in BENCH SETUP session.

2. Set VIN=12V and turn on input power supply.

3. Set electronic load to dynamic mode and set load step from 0.3A to 2.7A with a slew rate of 1.6A/us, use oscilloscope to observe output voltage and load current.

The measured load transient is shown in Fig.8, it recommended to use minimized measurement loop (shown in Fig.9) to evaluate the load transient performance.

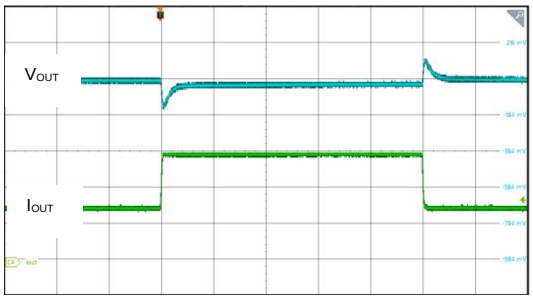

Fig.8 Load Transient

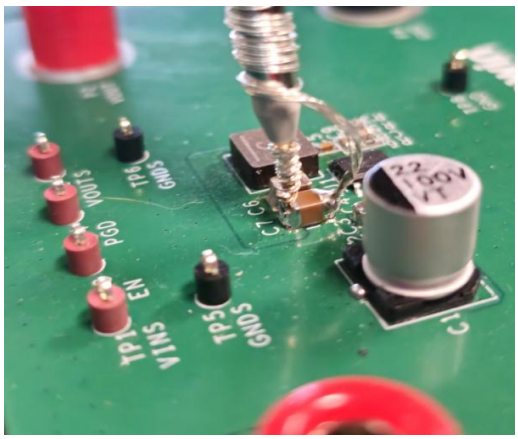

Fig.9 Measured Method

Short Circuit Protection

1. Follow the procedures in BENCH SETUP session.

2. Set VIN=12V and turn on input power supply

3. Set electronic load to 0A, then short the output to ground, use oscilloscope to observe output voltage, inductor current and SW voltage.

4. Remove short circuit condition, use oscilloscope to observe output voltage, inductor current and SW voltage.

5. Set electronic load to 3A, repeat step 3 and step 4.

The measured short circuit protection waveforms at full and no load condition are shown in Fig.10 and Fig.11. The measured short circuit protection recovery waveforms at full and no load condition are shown in Fig.12 and Fig.13.

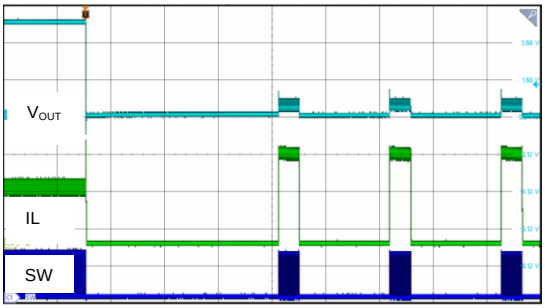

Fig.10 Short Circuit with full load

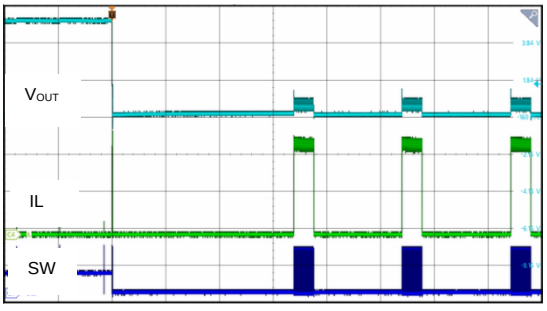

Fig.11 Short Circuit with no load

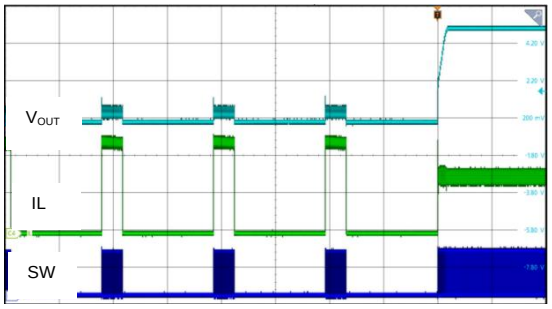

Fig.12 Short Circuit recovery with full load

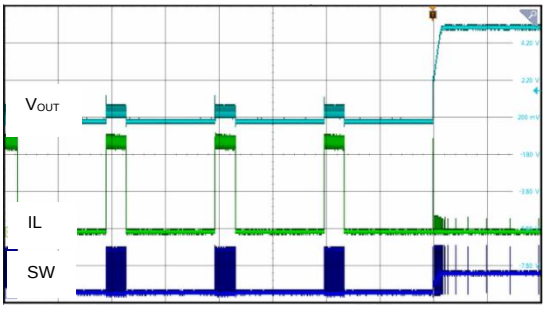

Fig.13 Short Circuit recovery with no load

SCHEMATIC

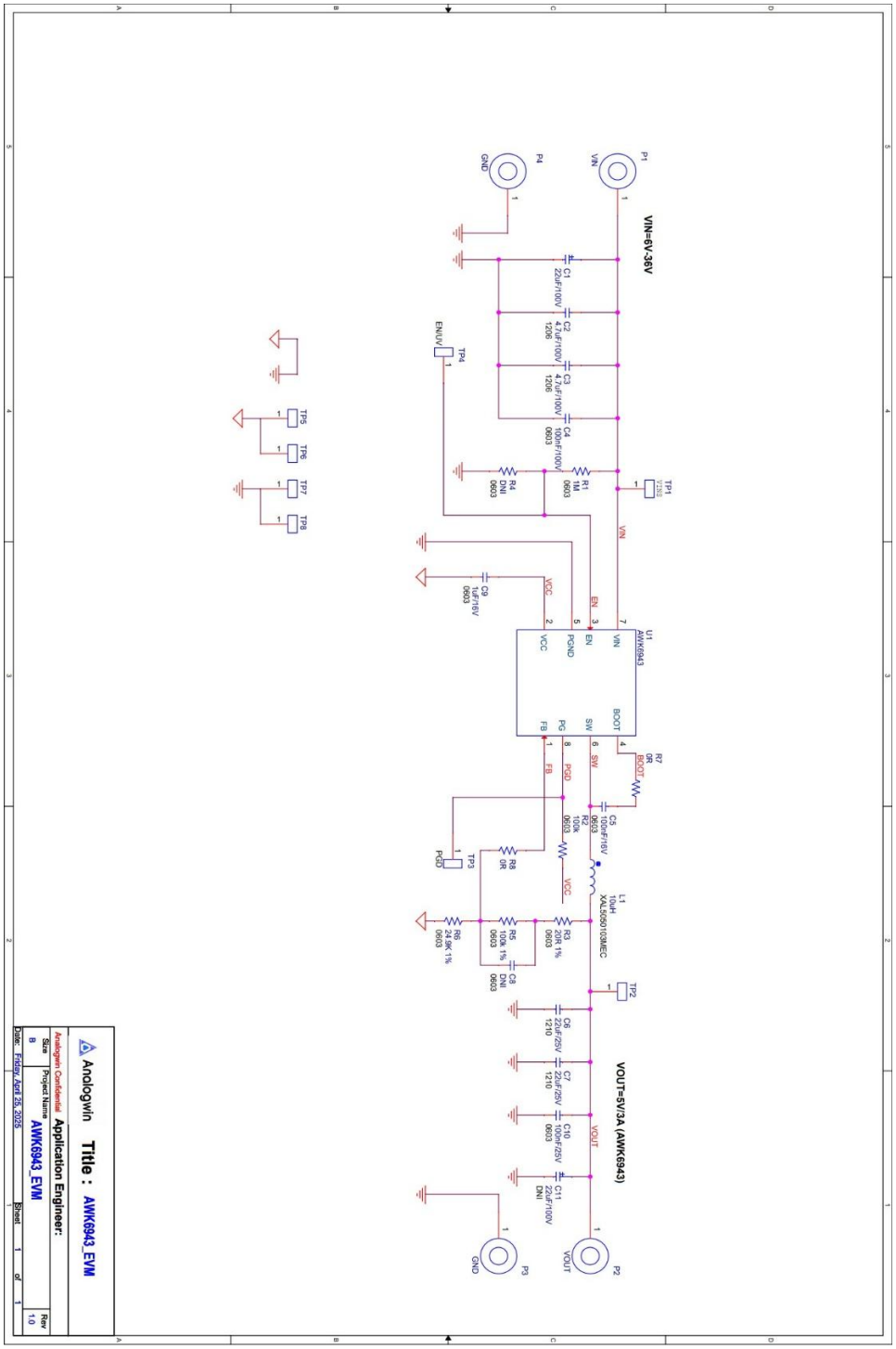

Fig.14 AWK6943_EVM Schematic

LAYOUT DIAGRAMS

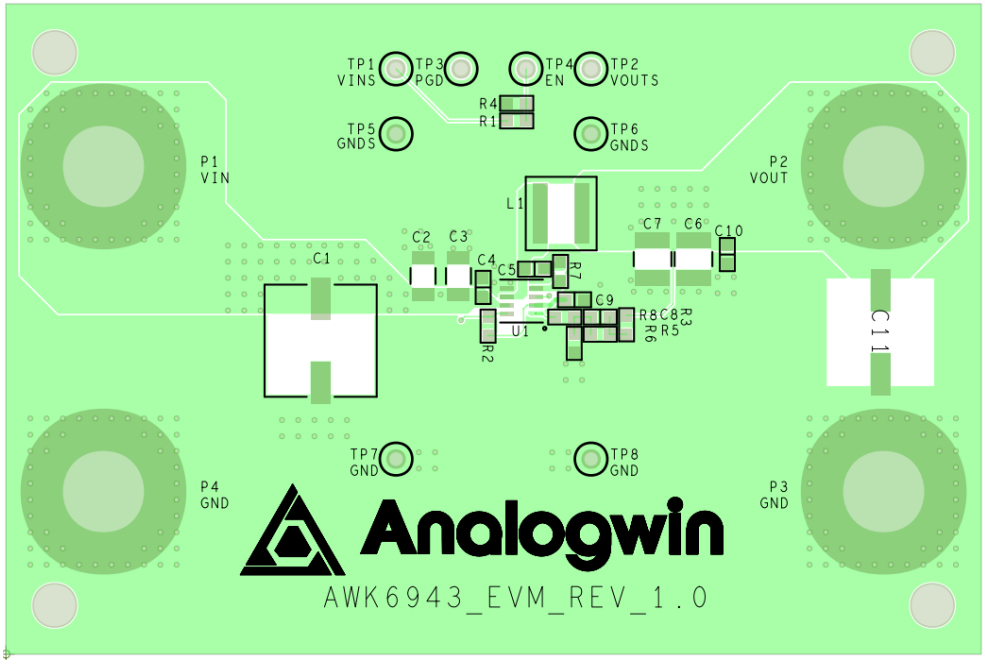

Fig.15 Top Layer

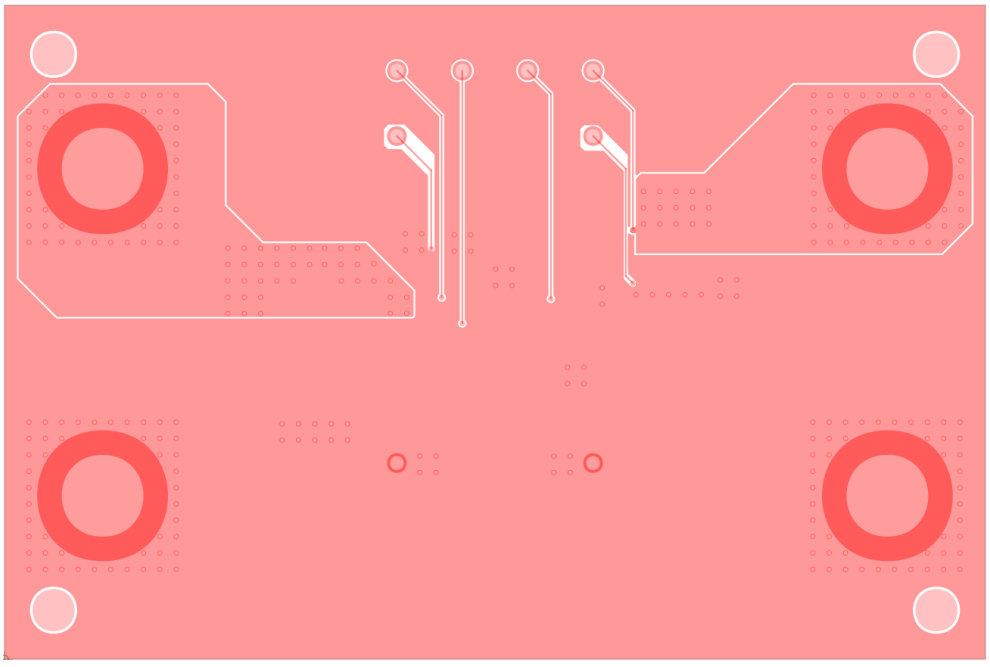

Fig.16 Bottom Layer

BILL OF MATERIALS

Table 3. BOM for AWK6943EVM

Designator	Description	Part Number	Quantity
P1, P2	Terminal Red - Banana Connectors	24.247.1	2
P3, P4	Terminal Black- Banana Connectors	24.247.2	2
C1	CAP, AL, 22μF ±10% 100V, SMD, D8xL10.5mm	RVT2A220M0810	1
C2, C3	CAP, MLCC, 4.7μF ±10% 100V, 1206	GRM31CC72A475KE11L	2
C4	CAP, MLCC, 100nF ±10% 100V, 0603	CL10B104KC8NNNC	1
C5	CAP, MLCC, 100nF ±10% 16V, 0603	CL10B104KO8NNNC	1
C6, C7	CAP, MLCC, 22μF ±10% 25V, 1210	CL32B226KAJNNNE	2
C8	CAP, MLCC, 10pF ±5% 50V, 0603	DNI	0
C9	CAP, MLCC, 1μF ±10% 16V, 0603	CL10A105KO8NNNC	1
C10	CAP, MLCC, 100nF ±10% 25V, 0603	CL10B104KA8NNNC	1
C11	CAP, AL, 22μF ±20% 100V, SMD, D8xL10.5mm	DNI	0
TP1	VINS, Test Point, Multipurpose, Red, TH	RH-5010	1
TP2	VOUTS, Test Point, Multipurpose, Red, TH	RH-5010	1
TP3	PGD, Test Point, Multipurpose, Red, TH	RH-5010	1
TP4	EN, Test Point, Multipurpose, Red, TH	RH-5010	1
TP5, TP6	GNDS, Test Point, Multipurpose, Black, TH	RH-5011	2
TP7, TP8	GND, Test Point, Multipurpose, Black, TH	RH-5011	2
L1	Inductor, 10μH, SMD,5.2x5.4mm	XAL5050103MEC	1

Designator	Description	Part Number	Quantity
U1	36V, 3A Synchronous Step-Down Regulator, QFN-8	AWK6943TER	1
R1	RES, 1MΩ ±1% 100mW, 0603	0603WAF1004T5E	1
R2, R5	RES, 100kΩ ±1% 100mW, 0603	0603WAF1003T5E	2
R3	RES, 20Ω ±1% 100mW, 0603	0603WAF200JT5E	1
R4	RES, 0603	DNI	0
R6	RES, 24.9kΩ ±1% 100mW, 0603	RC0603FR-0724K9L	1
R7, R8	RES, 0Ω ±1% 100mW, 0603	0603WAF0000T5E	2

Table 4. Device and Package Configurations

EVM	DEVICE	Frequency/ Output Current
AWK6943EVM	AWK6943	410kHz / 3A

Revision History

DATE	REVISION	NOTES
Sep. 2024	1.0	Initial release
Apr. 2025	1.1	1. Update the content of C8 in the schematic (Page. 6) 2. Update Material BOM, Do not install the capacitor C8. (Page. 8)