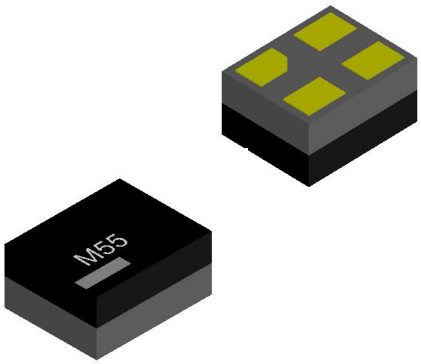
DC DC POWER MODULES

(0.7~5.5)V Input, 300mA Output, DC-DC Ceramic Substrate Adjustable Boost Module



1 Features

- Integrated Power Inductor on Ferrite Ceramic Substrate
- Ultra-small footprint (2.5mm×2.0mm)
- Shielded structure, low EMI noise
- Integrated capacitors in a single-package plastic encapsulation, providing high reliability for surface mount applications
- Synchronous rectification technology achieves high efficiency
- Automatic PFM/PWM Mode Switching Function
- Uses low-ripple PFM mode under light load conditions
- Achieves 2% voltage accuracy over the full load current range
- Wide input voltage range:0.7V~5.5V
- Adjustable Output Voltage: 1.8V~5.5V
- Maximum Load Current:

  Iout≥30mA (Vin≥0.7V , Vout=5V)

  Iout≥300mA (Vin≥2.7V , Vout=5V)
- Internal soft start, overcurrent protection, and overtemperature protection

2 Applications

- Wireless Microphone
- Portable Devices
- Battery-Powered Equipment

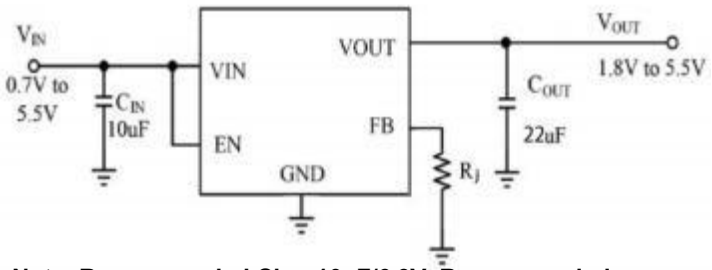
3 Description

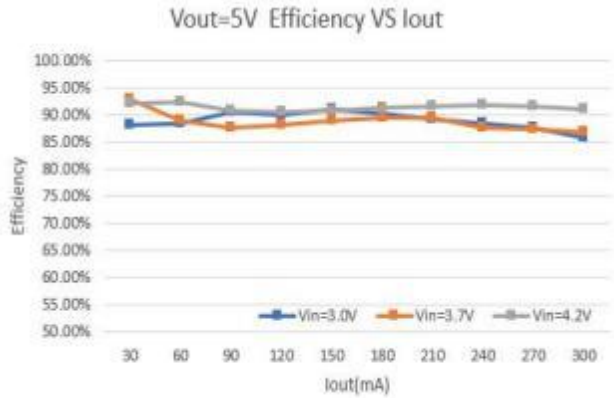
The UDM92403 is a low-power boost DC-DC module suitable for space-constrained or noise-sensitive applications. The device features an inductor-embedded ferrite substrate, which reduces both radiated EMI noise and conducted noise. It uses a plastic integrated package to provide high mounting reliability while achieving an extremely small size (2.5mm × 2.0mm × 1.35mm / 1.10mm).

The external circuit can be used by adding input and output capacitors. The device offers low noise, easy usage, and reliable performance. The device smoothly switches between PFM (Pulse Frequency Modulation) and PWM (Pulse Width Modulation) modes based on the load current. Under light load conditions, it automatically switches to PFM mode to ensure low power consumption. Under heavy load conditions, it automatically switches to PWM mode to ensure low ripple. The device maintains excellent output voltage accuracy even in PFM mode, keeping the output voltage accuracy within ±2% over the entire load current range.

When Vin > Vout, the switch duty cycle is 100%, and the device enters bypass mode.

Typical application

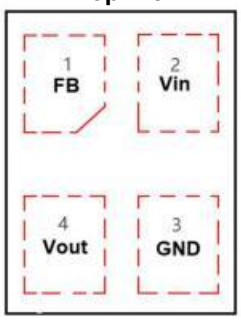




Note: Recommended Cin : 10μF/6.3V, Recommended Cout : 22μF/6.3V; Add more capacitance can decrease the ripple.

Pin Configuration

Top View



Pin	Symbol	Description
1	FB	Output voltage adjustment pin. Connect a voltage-setting resistor with a precision of 1% or better to GND.
2	Vin	Positive input voltage. Provides power input to the internal power circuits and control circuits. The operating voltage range is 0.7V to 5.5V. The capacitor should be placed as close as possible to the module's Vin pin, and wide traces and multiple vias should be used wherever possible.
3	GND	Ground Pin
4	Vout	Regulated output pin. Connect the output load between this pin and GND.

Ordering Information

Product Model	Input Voltage	Output Voltage	Output Current	Packaging	Product Grade
UDM92403 IV#PBF	0.7V~5.5V	1.8V~5.5V	Ioutmax=300mA	3000pcs/roll	Industrial Grade

Product Model	Input Voltage	Output Voltage	Output Current	Packaging	Product Grade
UDM92403 MV#PBF	0.7V~5.5V	1.8V~5.5V	Ioutmax=300mA	3000pcs/roll	Military Grade

Electrical Characteristics

Absolute Maximum Ratings	Conditions	Minimum Value	Nominal Value	Maximum Value	Units
V_{IN}, EN		-0.3		6	V
Vsw		-0.3		6	V
VFB Pin Voltage		-0.3		6	V
V_{OUT}		1.8		6	V
Storage Temperature		-65		+150	℃
Electrical characteristics	**Conditions**	**Minimum Value**	**Nominal Value**	**Maximum Value**	**Units**
Input Voltage Range		0.7		5.5	V
Input Undervoltage Lockout Threshold (Rising)			0.6	0.7	V
Minimum Start-Up Voltage		0.4			V
Quiescent current	V_{EN} =3.7V, V_{FB} =V_{REF} x 105%		4.5		μA
Shutdown current	V_{in}=3.7V,V_{EN}=GND		0.5	1.4	μA
Switching Frequency			3		MHz
Efficiency	V_{in} =3V , V_{out} =3.3V , I_{out}=0.05A		93.5		%
EN Threshold (On)		1.2			V
EN Threshold (Off)				0.4	V
Maximum Duty Cycle				100	%
Minimum On-Time			80		ns
Soft-Start Time			0.6		ms
FB Voltage		0.98	1	1.02	V
Line regulation	V_{out}=5V , 2.4V < V_{in}< 4.2V , I_{LOAD} = 0.3A			±2	%
Load regulation	V_{in}=3.7V , V_{out}=5V,0A < I_{LOAD} ≤ 0.3A			±2	%
Ripple and noise	V_{in} =3.7V , V_{out} =5V , I_{out}=0.15A, C_{out}=22uF, Bandwidth: 20MHz		25		mV
Dynamic load response	50-100% ILOAD , di/dt=2A/μS C_{out}=22 uF		150		mV

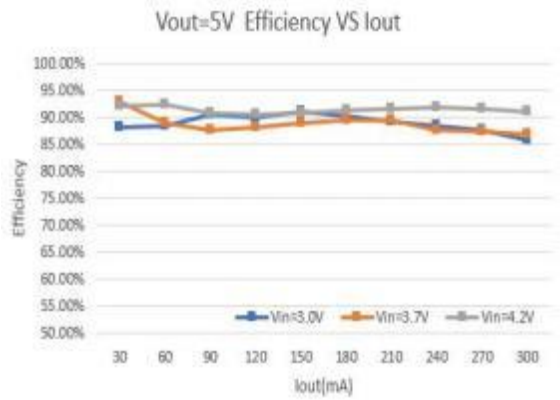
Electrical Characteristics(continued)

Structural Characteristics	Conditions	Minimum Value	Nominal Value	Maximum Value	Units
Dimensions	2.5×2.0×1.35Max 2.5×2.0×1.10Max				mm
Weight			0.024		g
Environmental Adaptability	**Conditions**	**Minimum Value**	**Nominal Value**	**Maximum Value**	**Units**
Operating Temperature (Case Temperature)		-40		125	℃
High-Temperature Storage (Ambient Temperature)	+125℃, 48h			125	℃
High-Temperature Operation (Ambient Temperature)	+85℃, 24h; Low Input Voltage, Nominal Input Voltage, High Input Voltage, 8 hours; V_{in} =60V, V_{out} =12V, I_{out}=2.4A			85	℃
Low-Temperature Storage (Ambient Temperature)	-55℃, 24h	-55			℃
Low-Temperature Operation (Ambient Temperature)	-40℃, 24h; Low Input Voltage, Nominal Input Voltage, High Input Voltage, 8 hours;	-40			℃
Humid Heat	High-Temperature and High-Humidity Stage: 60℃, 95%; Low-Temperature and High-Humidity Stage: 30℃, 95%; 10 cycles of 24h each	30		60	℃
Temperature Shock	High Temperature: 125℃, Low Temperature: -55℃, High and low temperatures of one hour each for a cycle, a total of 32 cycles of testing	-55		125	℃

Note: Stress above the values listed in the "Absolute Maximum Ratings" section may cause permanent damage to the device. Exposure to any absolute maximum rating condition for extended periods may affect the reliability and lifespan of the device.

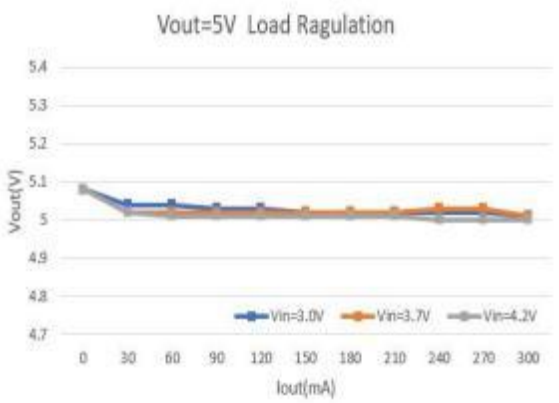
Typical characteristics

Unless otherwise noted, test conditions are T(environment) = 25℃



Vin=3.0V,3.7V,4.2V,Vout=5.0V

Figure 3. Load Efficiency with Different input

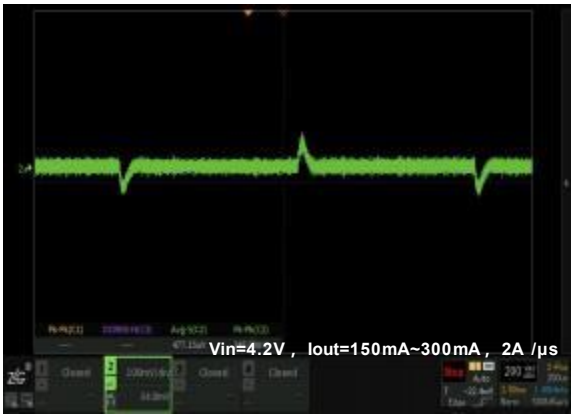


Vin=3.0V,3.7V,4.2V,Vout=5.0V

Figure 4. Load Regulation

Vin=3.7V,Vout=5.0V

Figure 5. Load Transient



Vin=4.2V,Vout=5.0V

Figure 6. Load Transient

Operation

Summary

The UDM92403 is a DC-DC boost power module with synchronous rectification control. It integrates an inductor, power MOSFETs, and filtering capacitors. The UDM92403 provides a complete power solution, requiring only a few external passive components to achieve a wide input voltage range of 0.7V to 5.5V, adjustable output voltage, and excellent load and line regulation.

The UDM92403 includes comprehensive protection features such as Over Current Protection (OCP), Short Circuit Protection (SCP), Over Voltage Protection (OVP), Under Voltage Protection (UVP), and Over Temperature Protection (OTP). These protections minimize the need for external components, making the UDM92403 highly efficient and easy to use.

Internal Soft-Start (SS)

The soft start function is designed to prevent overvoltage at the output during the module's startup process. The UDM92403 has an integrated soft start feature: when the EN pin is connected to a high voltage, the UDM92403 begins to start. Initially, the device operates at the boundary between Discontinuous Conduction Mode (DCM) and Continuous Conduction Mode (CCM), with the peak inductor current limited to around 200mA. When the output voltage charges to approximately 1.6V or higher, the device begins to operate in hysteretic current mode. The soft start function helps reduce inrush current during startup. Once Vout reaches the target value, the soft start phase ends, and the peak current is determined by the output of the internal error amplifier, which compares the feedback of the output voltage with the internal reference voltage.

Startup and Shutdown

If both Vin and VEN exceed their respective thresholds, the module starts. The internal reference voltage circuit starts first, generating a stable reference voltage. Subsequently, the internal regulator is enabled, providing a stable power supply to the rest of the circuit.

Three conditions can cause the chip to shut down: Vin being too low, VEN being too low, and over-temperature shutdown protection. During the shutdown process, the signal loop is first blocked to prevent false triggering. Subsequently, the COMP voltage and internal power supply are pulled down. The open-drain driver is not affected by this shutdown command.

Overcurrent Protection and Short Circuit (OCP)

The UDM92403 features overcurrent protection. If the inductor peak current reaches the current limit threshold, the main switch turns off, preventing further increase in input current. In this situation, the output voltage will drop until a power balance is achieved between the input and output.

Output Short-Circuit Protection

In the event of a ground short circuit, the short-circuit current is limited to around 85mA. After the short-circuit condition is removed, the UDM92403 will return to soft start and regulate the output voltage.

Overtemperature Shutdown Protection (OTP)

To prevent any damage caused by overheating, the UDM92403 stops switching when the internal chip temperature exceeds 150°C. Once the temperature falls below the threshold (typically 130°C), the module resumes operation.

Undervoltage Lockout Protection (UVLO)

When the input voltage drops below the typical UVLO (Undervoltage Lockout) threshold of 0.4V, the UVLO circuit stops the operation of the converter. The hysteresis voltage value is 200mV.

Output Voltage Setting

The module internally integrates a 510kΩ pull-up resistor. The output voltage can be adjusted by connecting an external pull-down resistor Rj to the FB pin. The reference calculation formula is as follows:

$$V_{out} = \left(1 + \frac{510k}{R_j}\right)V$$

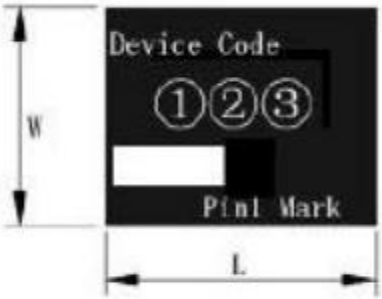
Table 1 provides recommended parameters for common output voltages.

Under normal circumstances, it is suggested to set the output voltage between 1.8V and 5.5V.

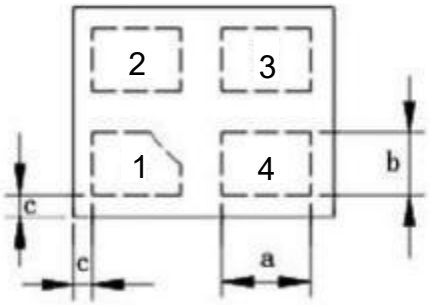
PACKAGE DESCRIPTION

Side View

Top View



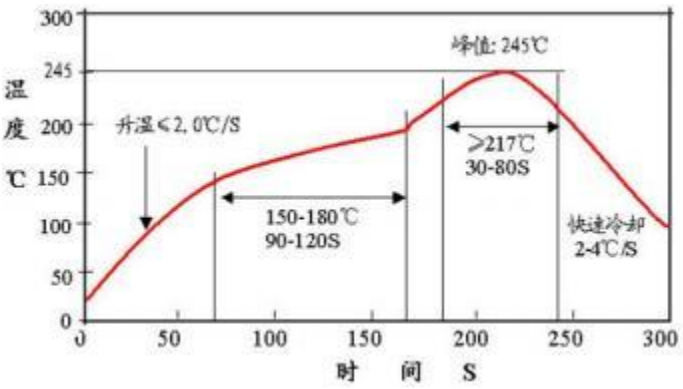
Top View
(Scenpgraph)



Symbol	Dimension (mm)
L	2.5±0.2
W	2.0±0.2
T	1.35Max or1.1Max
a	0.85±0.1
b	0.60±0.1
c	0.15±0.15

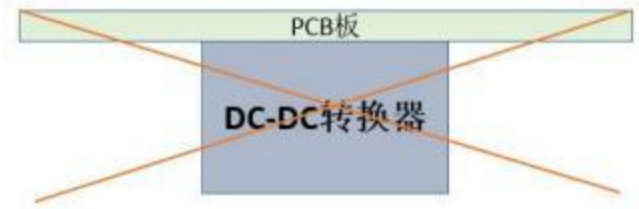
Soldering and Storage Precautions

Recommended Reflow Soldering Profile



Note:

1.Due to the larger size of the module, do not place the module on the bottom side of the board during reflow soldering to avoid module drop.



2.For bulk and unpackaged products, store them in a dry box (relative humidity should be kept below 10%). For products that are still in their original packaging, store them in a dry box whenever possible.

3.Before mounting, moisture-sensitive products must be baked according to strict baking conditions: bake for more than 48 hours at 125°C.