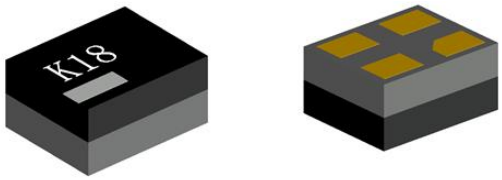
(2.3~5.5) V Input, 1A Output, DC-DC Ceramic Substrate Buck Module



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
- Achieves 2% voltage accuracy over the full load current range
- Wide input voltage range: 2.3V~5.5V (Recommended voltage difference Vin - Vout > 0.8V)
- Maximum Load Current: 1.0A (Depending on the output voltage, when Vout ≥ 2.5V, Ioutmax = 800mA)
- Fixed Output Voltage: 1.2V~3.3V (Factory Settings)
- Internal Soft Start and Over current protection

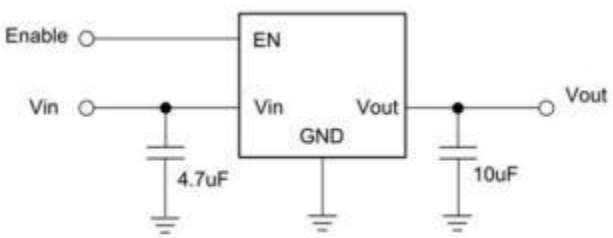
2 Applications

- Industrial control
- Medical imaging equipment
- Telecommunications and network applications
- Alternative to linear regulators (LDO)
- Miniaturized applications

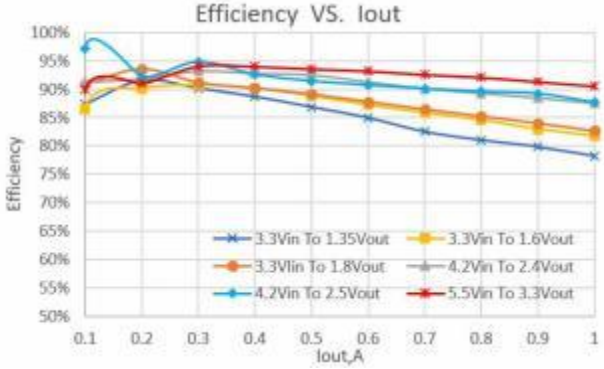
3 Description

The UDM22010 is a low-power buck DC-DC converter module suitable for space-constrained and noise-sensitive applications. It features an inductor-embedded ferrite substrate, which effectively reduces both radiated EMI noise and conducted noise. The module uses a single-package plastic encapsulation to enhance mounting reliability. By adding input/output capacitors, it can be used as an alternative to an LDO. Its low noise and ease of use ensure reliable power quality. The device smoothly switches between PFM and PWM modes based on the load current. Under light load conditions, it automatically switches to PFM mode to extend battery life. Under heavy load conditions, it automatically switches to PWM mode to ensure low ripple and high efficiency. The device maintains excellent output voltage accuracy even in PFM mode, keeping the output voltage accuracy within 2% over the entire load current range (0 to 1.0A).

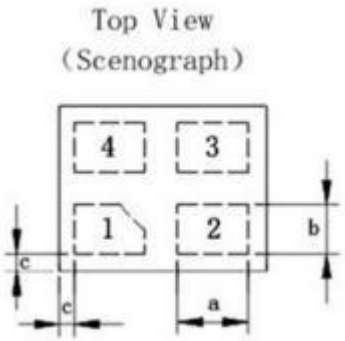
Typical application



Note: Recommended Cin: 4.7μF/6.3V, Recommended Cout: 10μF/6.3V; Add more capacitance can decrease the ripple.



Pin Configuration



Top view

Pin	Symbol	Description
1	Vin	The Vin pin provides current to the internal regulator of the module.
2	EN	This is the on/off control pin of the device. Connecting this pin to GND keeps the device in the off mode. Pulling this pin to Vin enables the device with a soft start function. This pin must not be left floating. If this pin remains open, the device may turn off at 100mA output. EN = H: Device On, EN = L: Device Off.
3	Vout	Regulated output pin. Connect the output load between this pin and GND.
4	GND	Ground Pin

Ordering Information

Product Model	Input		Output	Packaging	Note
	Input Range	Nominal Input			
UDM22010	2.3V~5.5V	--	1.2V~3.3V	3000pcs/roll	

Note: Output voltages available: 1.2V, 1.35V, 1.5V, 1.6V, 1.8V, 2.1V, 2.4V, 2.5V, 3.3V. For other custom voltages, please contact us for additional customization.

Electrical Characteristics

Absolute Maximum Ratings	Conditions	Minimum Value	Nominal Value	Maximum Value	Units
V_{IN}, EN		-0.3		6	V
Vsw		-0.3		6.3	V
V_{OUT}	**Factory Customization**	1.2		3.3	V
Storage Temperature		-40		+150	℃
Electrical characteristics	**Conditions**	**Minimum Value**	**Nominal Value**	**Maximum Value**	**Units**
Input Voltage Range		2.3		5.5	V
Input Undervoltage Lockout threshold (Rising)	Rising VIN		2.0	2.25	V
Input Undervoltage Lockout Threshold (Falling)			150		mV
Minimum Start-Up Voltage		2.3			V
Quiescent current	No Load, Not Switching		18		μA
Shutdown current	EN = GND		0.1	1	μA
Switching Frequency			8		MHz
EN Threshold (On)		1.2			V
EN Threshold (Off)				1.07	V
Maximum Duty Cycle				100	%
Soft-Start Time			280		μs
Line regulation	VOUT=1.8V， 2.3V < VIN< 5.5V， Iout = 1.0A			±1.5	%
Load regulation	VIN=3.3V， VOUT=1.8V,0A < Iout ≤ 1.0A			±2	%
Ripple and noise	V_{IN} =3.3V， Vout =1.8V， Iout=1.0A, C_{out}=10uF,Bandwidth:20MHz		20		mV
Dynamic load response	Vin=3.3V， Vout=1.8V， 0.5A to 1A, di/dt=2A/μS， C_{out}=10uF		54		mV

Electrical Characteristics(continued)

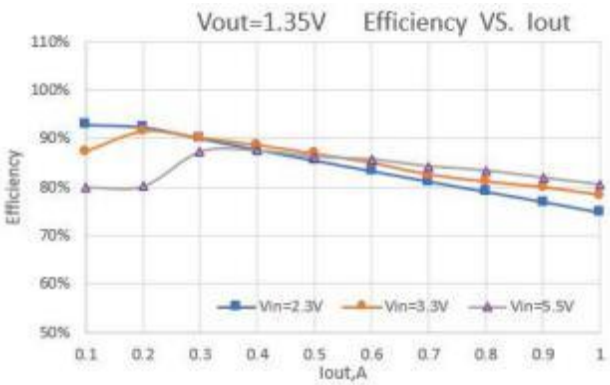
Structural Characteristics	Conditions	Minimum Value	Nominal Value	Maximum Value	Units
Dimensions	2.5mm×2.0mm×1.35mm or 2.5mm×2.0mm×1.10mm				mm
Weight			0.023		g
Environmental Adaptability	**Conditions**	**Minimum Value**	**Nominal Value**	**Maximum Value**	**Units**
Operating Temperature (Case Temperature)		-40		125	℃
High-Temperature Storage (Ambient Temperature)	+125℃, 48h				
High-Temperature Operation (Ambient Temperature)	+85℃, 24h; Low Input Voltage, Nominal Input Voltage, High Input Voltage, 8 hours each; V_{IN} =3.6V, V_{OUT} =1.8V, I_{OUT}=0.9A				
Low-Temperature Storage (Ambient Temperature)	-55℃, 24h				
Low-Temperature Operation (Ambient Temperature)	-40℃, 24h; Low Input Voltage, Nominal Input Voltage, High Input Voltage, 8 hours each;				
Humid Heat	High-Temperature and High-Humidity Stage: 60℃, 95%; Low-Temperature and High-Humidity Stage: 30℃, 95%; 10 cycles of 24h each				
Thermal 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				

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.

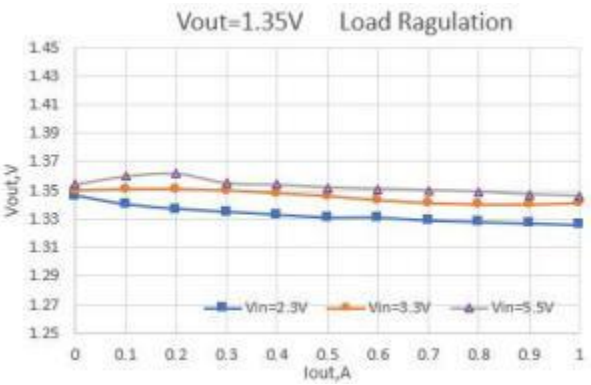
Typical characteristics

Unless otherwise noted, test conditions are T_ambient = 25℃。

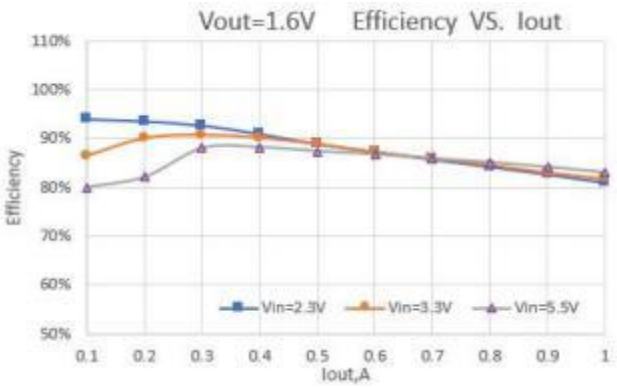
Efficiency



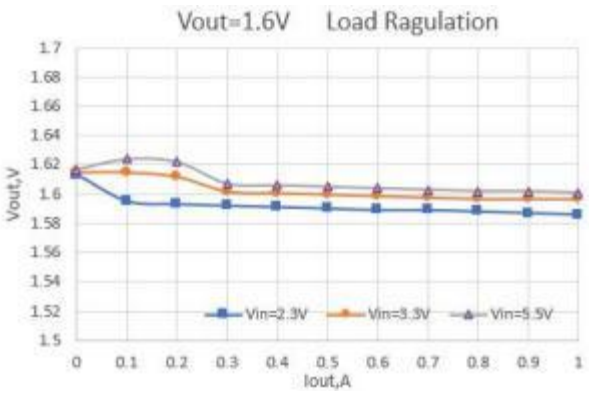
Load regulation



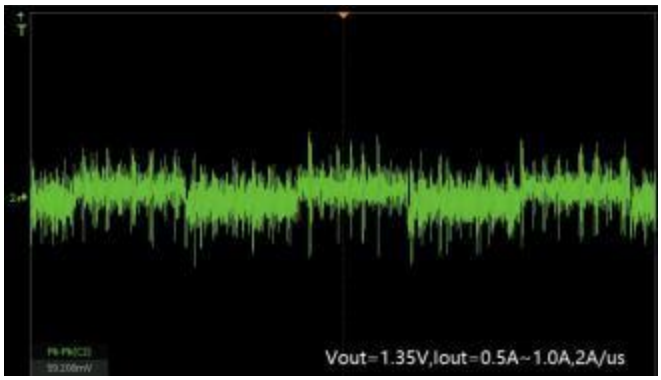
Efficiency



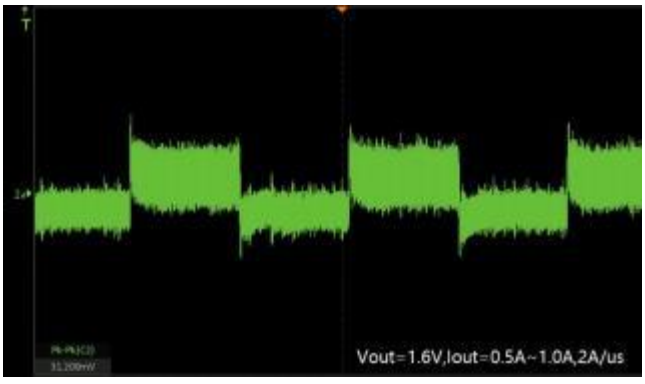
Load regulation



Vout=1.35V Dynamic Response (Vin=3.3V)



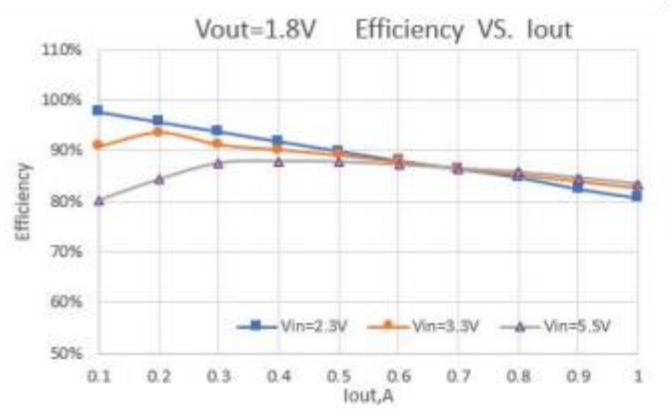
Vout=1.6V Dynamic Response (Vin=3.3V)



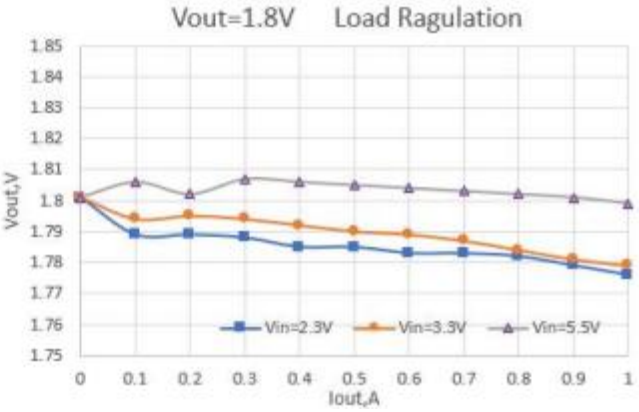
Typical characteristics

Unless otherwise noted, test conditions are T_ambient = 25℃。

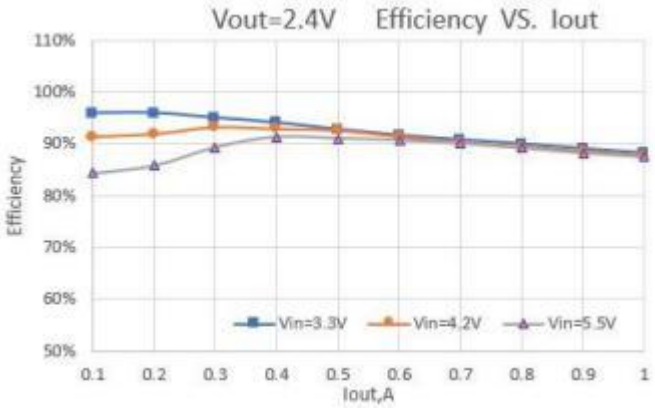
Efficiency



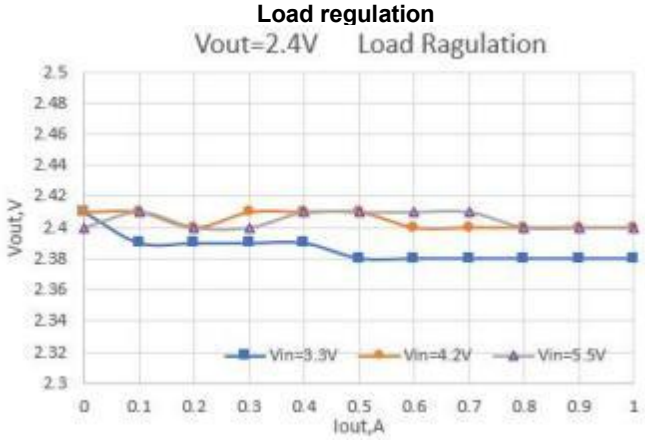
Load regulation



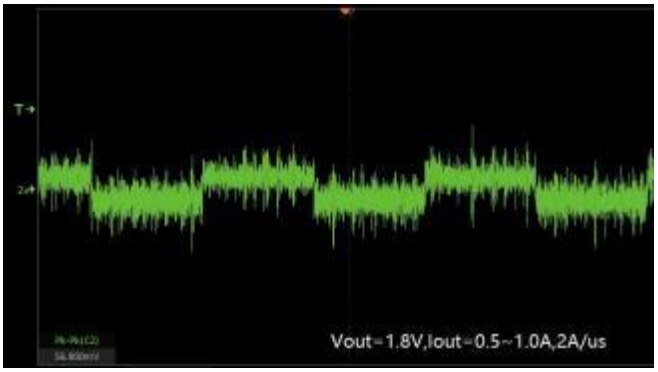
Efficiency



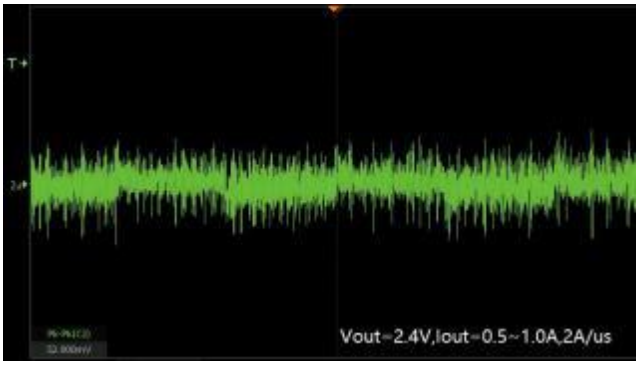
Load regulation



Vout=1.8V Dynamic Response (Vin=3.3V)



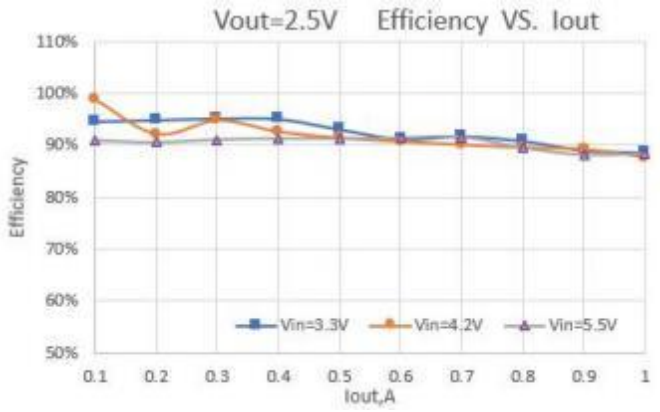
Vout=2.4V Dynamic Response (Vin=4.2V)



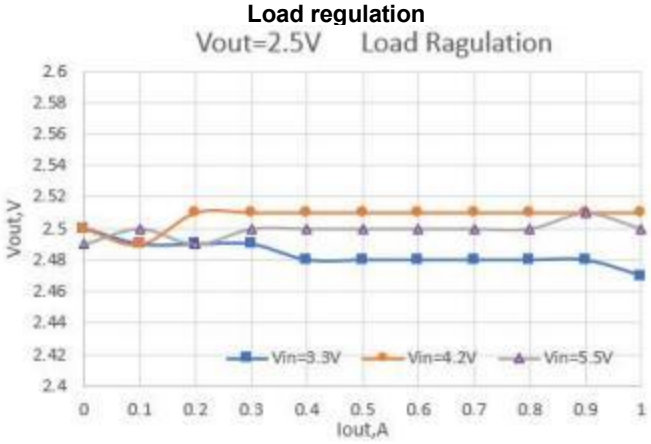
Typical characteristics

Unless otherwise noted, test conditions are T_ambient = 25℃。

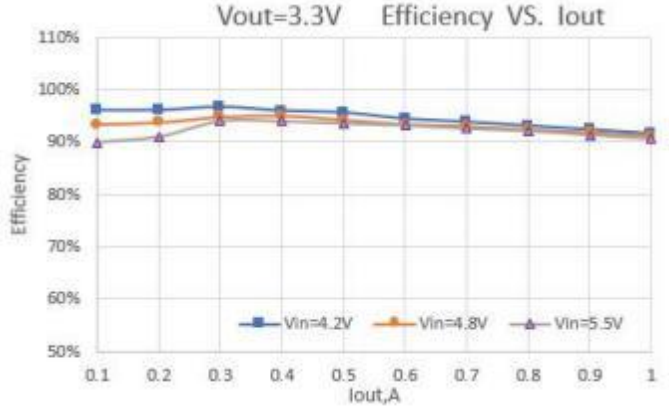
Efficiency



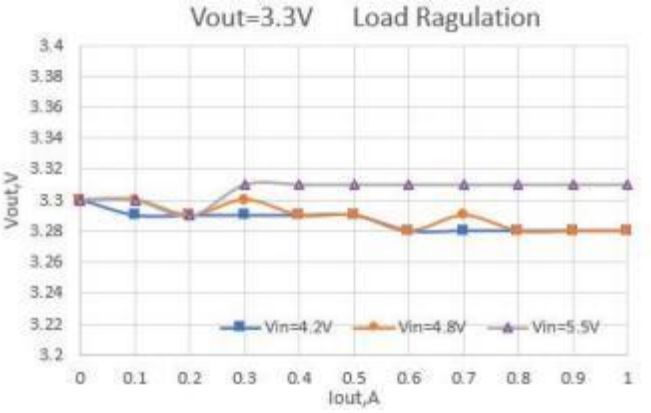
Load regulation



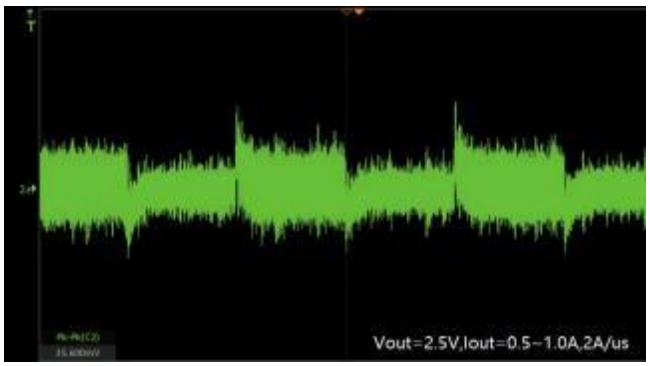
Efficiency



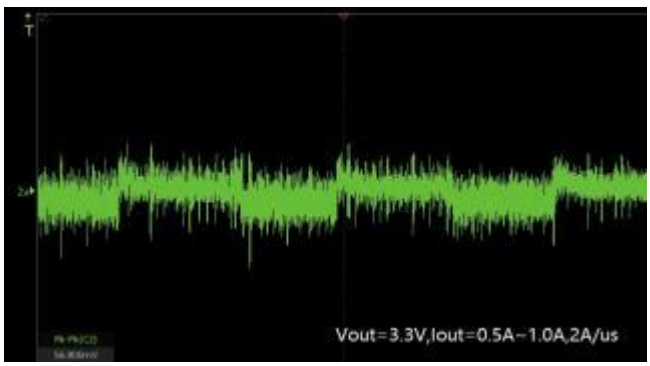
Load regulation



Vout=2.5V Dynamic Response (Vin=4.2V)



Vout=3.3V Dynamic Response (Vin=5.5V)



Operation

summary

The UDM22010 is a DC-DC buck power module with synchronous rectification control, featuring an embedded inductor on a magnetic ceramic substrate. It integrates a control IC, power MOSFETs, and filtering capacitors. The module requires only input and output capacitors for operation. It has a small footprint and high power density, making it particularly suitable for applications with limited board space.

It uses a ceramic substrate with a shielded structure, providing excellent EMI resistance. It combines high reliability, good thermal conductivity, and low temperature rise.

The device smoothly switches between PFM and PWM modes based on the load current. Under light load conditions, it automatically switches to PFM mode to extend battery life. Under heavy load conditions, it automatically switches to PWM mode to ensure low ripple and high efficiency. The device maintains good output voltage accuracy even in PFM mode. It maintains 2% output voltage accuracy over the entire load current range (0 to 600mA).

Internal Soft-Start (SS)

The soft start function is designed to prevent inrush current during module startup. The UDM22010 has an integrated soft start feature: when the module is enabled, the typical soft start time is 280μs.

Active Output Capacitor Discharge

After EN is turned off, an internal resistive discharge path is provided between the output capacitor and ground.

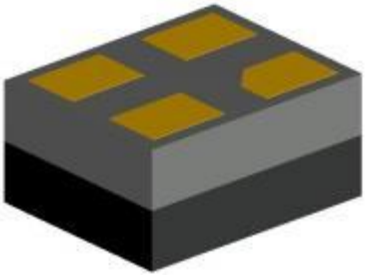
Overcurrent Protection and Short Circuit (OCP)

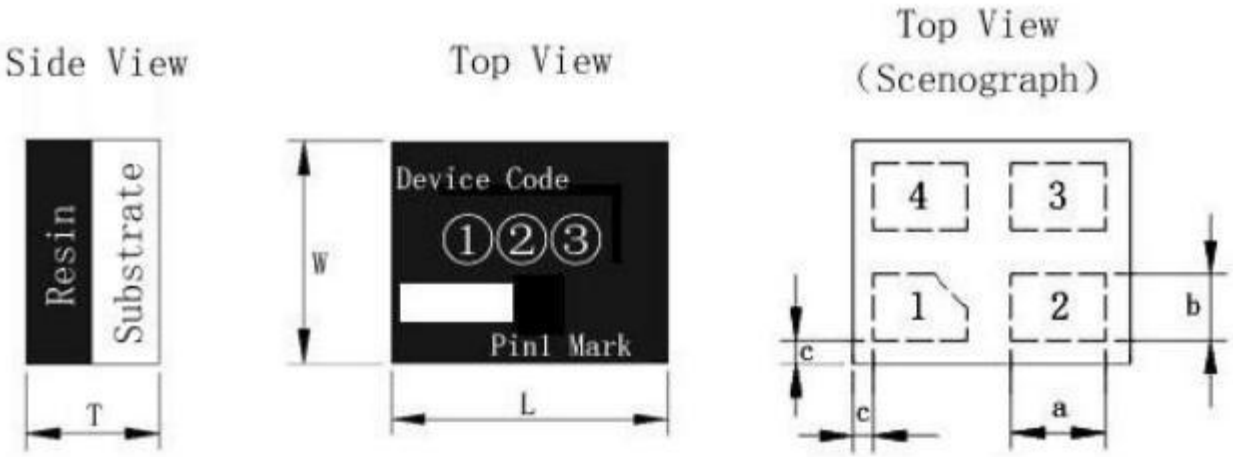
The UDM22010 features cycle-by-cycle current limit protection. When the inductor current peak exceeds the internal peak current limit threshold, the upper transistor is turned off and a counter begins. After about ten consecutive occurrences, the device will enter the EN off state. Approximately 1.5ms later, EN will turn on again, and the power module will perform a soft start.

Overtemperature Shutdown Protection (OTP)

To prevent damage from overheating, the UDM22010 stops switching when the internal chip temperature exceeds 150°C. Once the temperature falls below the threshold (typically 120°C), the module resumes operation.

PACKAGE DESCRIPTION

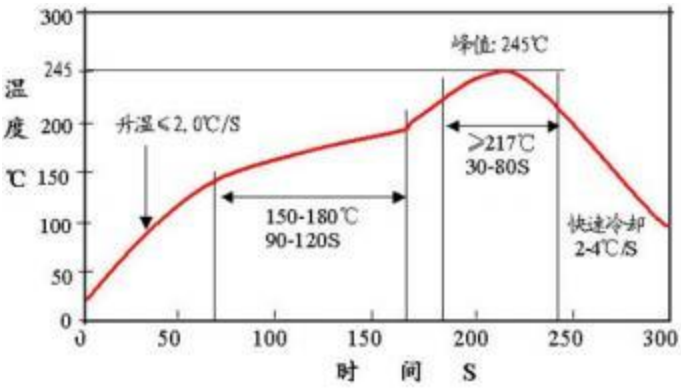




Symbol	Dimension (mm)
L	2.5±0.2
W	2.0±0.2
T	1.35Max or1.1Max
a	0.85±0.1
b	0.60±0.1
c	0.15±0.15

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.