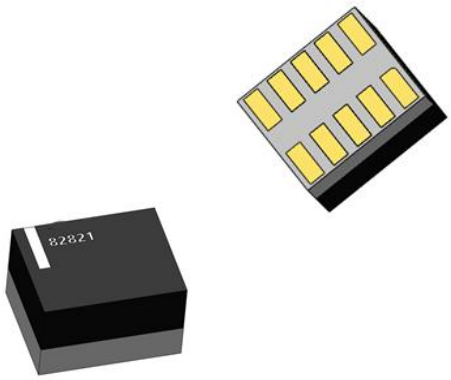
DC DC POWER MODULES

2.3~5.5V Input, Maximum 1.2A Output DC-DC Ceramic Substrate Buck Module



1 Features

- Ferrite ceramic substrate with integrated power inductor, providing ultra-small footprint (5mm²) and low EMI noise performance.
- Integrated capacitors within a unified plastic package, offering 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
- Maximum Load Current: 1.2A (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

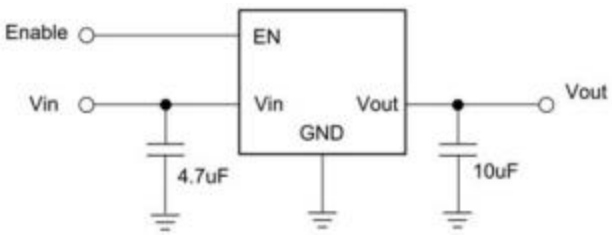
The UDM82821 is a low-power buck DC-DC converter module suitable for space-constrained and noise-sensitive applications. This module uses an inductor-embedded ferrite substrate, which effectively reduces radiated EMI noise and conducted noise. It employs an integrated plastic package to enhance mounting reliability.

By adding input and output capacitors, the module can be used as an alternative to an LDO (Low Dropout Regulator). Its low noise and ease of use ensure reliable power quality. The device smoothly switches between PFM (Pulse Frequency Modulation) mode and PWM (Pulse Width Modulation) mode based on the load current. Under light load conditions, it automatically switches to PFM mode to extend battery life; under heavier load conditions, it automatically switches to PWM mode to ensure low ripple and high efficiency. The device provides excellent output voltage accuracy even in PFM mode. It maintains ±2% output voltage accuracy across the entire load current range (0 to 1.2A).

This module can be used as an alternative to TI's TPSM82821, but with the following differences:

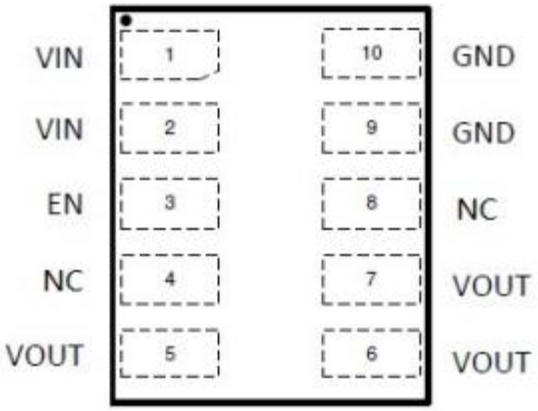
TPSM82821	UDM82821
Feedback (FB) Pin for Adjustable Output	No FB Pin, Fixed Output Voltage
Power Good (PG) Output	No Power Good (PG) Output

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、2	V_{in}	The Vin pin provides current to the internal regulator of the module.
3	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.
5、6、7	V_{out}	Regulated output pin. Connect the output load between this pin and GND.
9、10	GND	Ground Pin
4、8	NC	Floating

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 =1.2A			±1.5	%
Load regulation	VIN=3.3V , VOUT=1.8V,0A < Iout ≤ 1.2A			±2	%
Ripple and noise	V_{IN} =3.3V , Vout =1.8V , Iout=1.2A, C_{out}=10uF, Bandwidth:20MHz		20		mV
Dynamic load response	Vin=3.3V , Vout=1.8V , 0.5A-1A, di/dt=2A/μS , C_{out}=10uF		50		mV

Electrical Characteristics(continued)

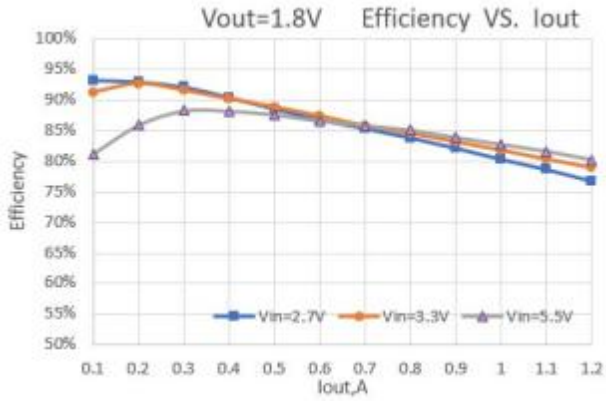
Structural Characteristics	Conditions	Minimum Value	Nominal Value	Maximum Value	Units
Dimensions	2.5mm×2.0mm×1.35mm or 2.5mm×2.0mm×1.10mm				mm
Weight			0.030		g
Environmental Adaptability	**Conditions**	**Minimum Value**	**Nominal Value**	**Maximum Value**	**Units**
Operating Temperature (Case Temperature)		-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 each; 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 each;	-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	℃
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	-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.

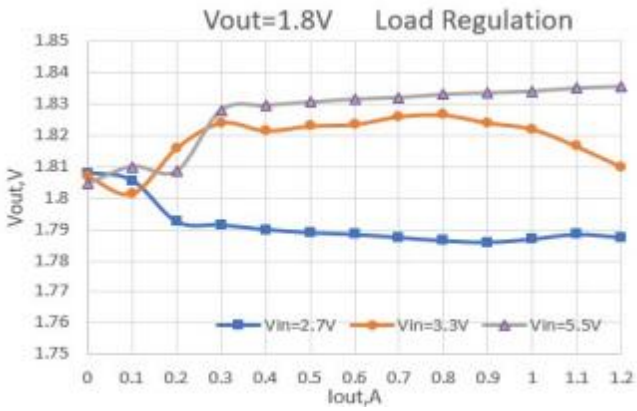
Typical characteristics

Unless otherwise noted, test conditions are T = 25℃.

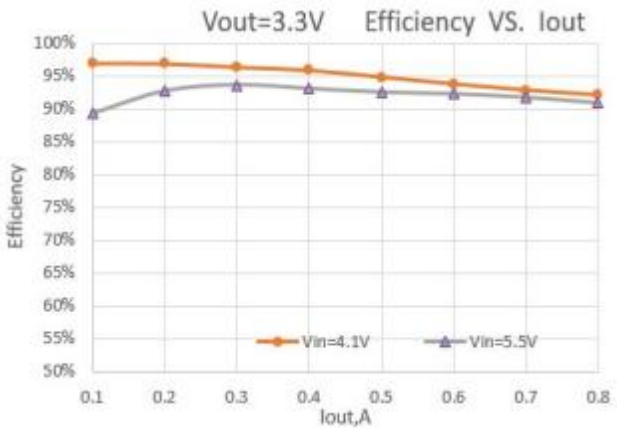
Efficiency



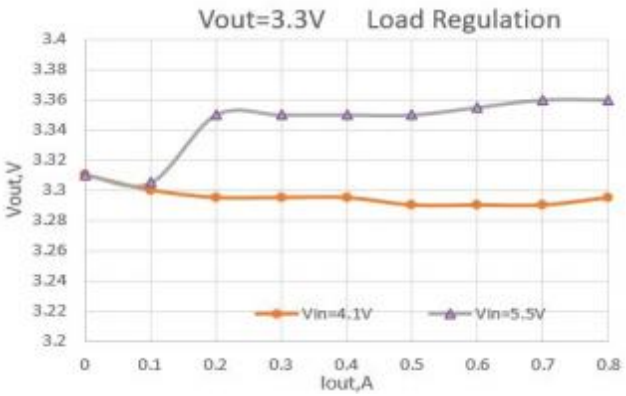
Load regulation



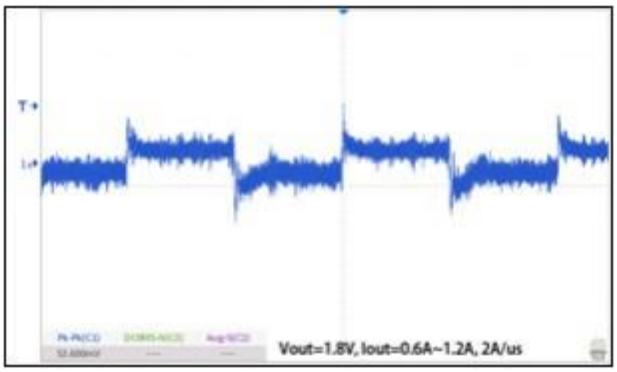
Efficiency



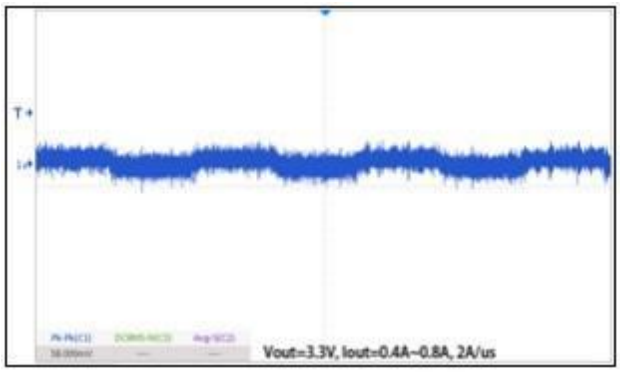
Load regulation



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



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



Operation

summary

The UDM82821 is a DC-DC buck power module that employs a magnetic ceramic substrate with an embedded inductor. It integrates a control IC, power MOSFETs, and filtering capacitors, utilizing synchronous rectification control. By adding input and output capacitors, the device can be easily used. 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, excellent 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 excellent 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 UDM82821 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.

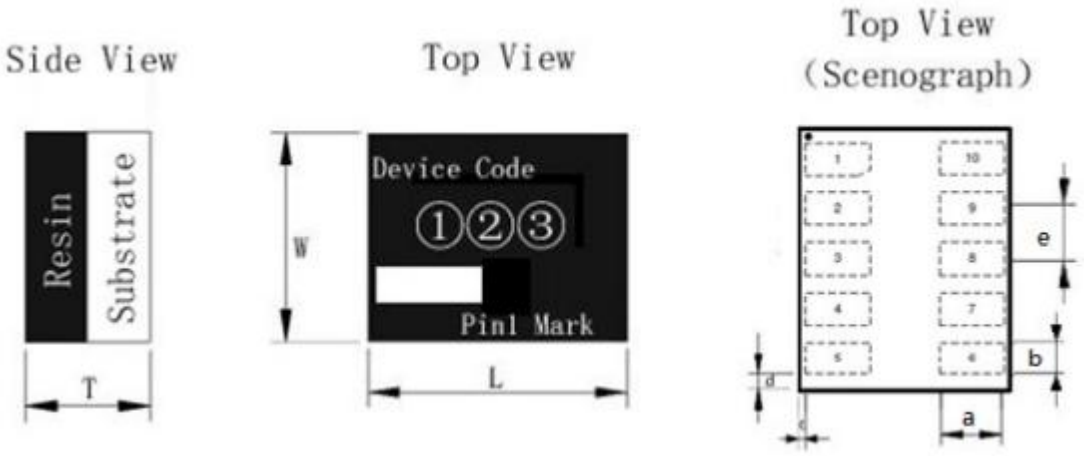
Overcurrent Protection and Short Circuit (OCP)

The UDM82821 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)

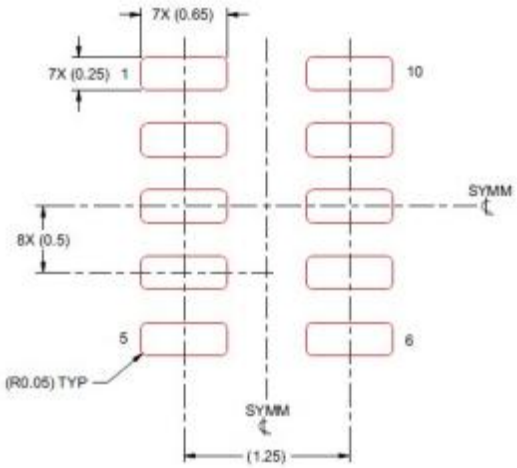
To prevent damage from overheating, the UDM82821 stops switching when the internal chip temperature exceeds 135°C. Once the temperature falls below the threshold (typically 120°C), the module resumes operation.

PACKAGE DESCRIPTION



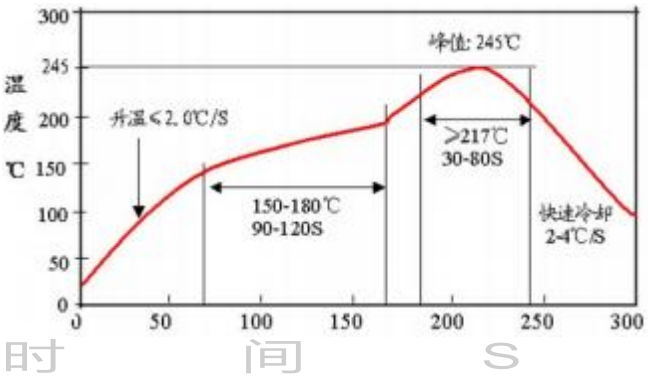
Symbol	Dimension(mm)
L	2.5±0.2
W	2.0±0.2
T	1.35MAX
a	0.65±0.05
b	0.25±0.05
c	0.05
d	0.12
e	0.5

Recommended pad sizes



Welding and Storage Precautions

Reflow Soldering Profile Recommendation



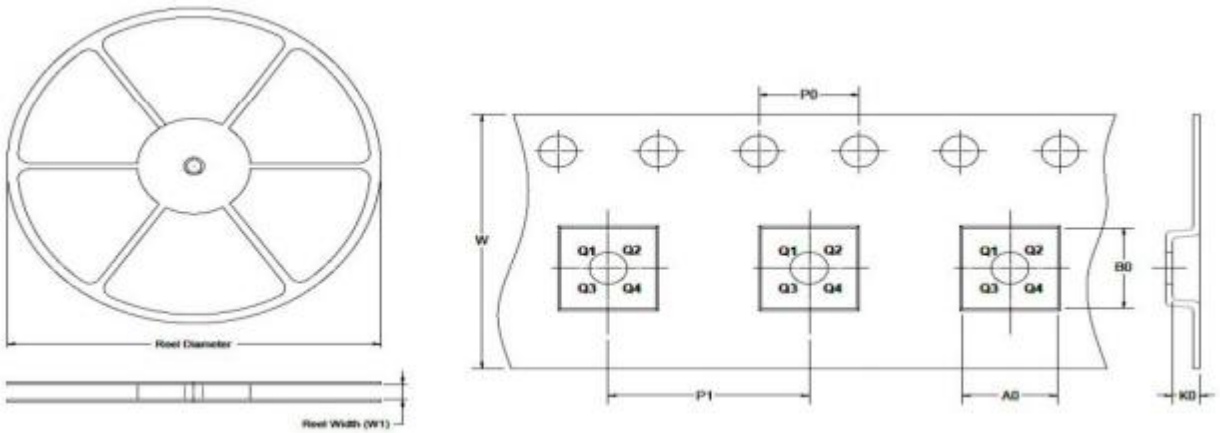
Precautions:

1. Due to the large size of the module, do not place the module on the underside of the board during reflow soldering to avoid the module falling off.

2. For bulk products and those with original packaging already opened, store them in a dry box (the relative humidity in the dry box should be kept below 10%). For products with unopened original packaging, store them in a dry box whenever possible.

3. Before mounting on the board, strictly follow the baking conditions to dry the samples: bake for more than 48 hours at 125°C.

Packaging Information



Reel Diameter	Reel Width W1(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant	MOQ
7"	8.8	2.35	2.80	1.350	4.0	4.0	8.0	Q1	T/R,3000pcs/R

Ordering Information

Product Model	Input		Output	Packaging	Note
	Input Range	Nominal Input			
UDM82821-1V2	2.3V~5.5V	3.3	1.2V@1.2A	3000pcs/Reel	
UDM82821-1V35	2.3V~5.5V	3.3	1.35V@1.2A	3000pcs/Reel	
UDM82821-1V5	2.3V~5.5V	3.3	1.5V@1.2A	3000pcs/Reel	
UDM82821-1V6	2.3V~5.5V	3.3	1.6V@1.2A	3000pcs/Reel	
UDM82821-1V8	2.3V~5.5V	3.3	1.8V@1.2A	3000pcs/Reel	
UDM82821-2V1	2.3V~5.5V	3.3	2.1V@1A	3000pcs/Reel	
UDM82821-2V4	2.3V~5.5V	3.3	2.4V@1A	3000pcs/Reel	
UDM82821-2V5	2.3V~5.5V	3.3	2.5V@0.8A	3000pcs/Reel	
UDM82821-3V3	2.3V~5.5V	3.3	3.3V@0.8A	3000pcs/Reel	

Note : The available output voltages are 1.2V, 1.35V, 1.5V, 1.6V, 1.8V, 2.1V, 2.4V, 2.5V, and 3.3V. For other custom voltage requirements, please contact us for additional customization.