AXPM411xxyz

150mA, 300mA, 500mA, Low Vin, Low VOUT, Ultra-low Dropout PMOS Regulator

Preliminary Datasheet ─ Feb 2022

Description

The AXPM411xxyz is a high accuracy, low quiescent current, ultra-low dropout regulator (LDO) that can source 500mA. It's PMOS pass transistor only requires single VIN for ultra-low dropout performance at low input voltages.

This enables high efficiency and together with its low quiescent current the AXPM411xxyz is ideal for low power battery-operated, power-sensitive applications. Sort circuit and thermal protection are included. It can be stabilized with a small capacitor at the output, saving on external component space overheads.
An enable logic control function puts the AXPM411xxyz in shutdown mode, enabling a total current consumption of less than 0.1 µA.
APPM411xxyz is available in SOT23-5Lpackages for highest density mounting of IC onboard PCB.

Features

- Input Voltage Range: 2.4 V to 5.5 V
- Ultra-Low Dropout 150mV typ at 500 mA
- Low Quiescent Current 31uA typ at no load
- +/- 1.0% VOUT accuracy over Temperature
- High SVR: 76 dB at 1 KHz
- Available in Eight Fixed-Output Voltages:
  - 0.8, 1.0, 1.2, 15.,1.8, 2.5, 2,8.,3.3V
- Packages:
  - SOT23-5L 2.9 x 1.65 x 1.0mm
- Short circuit protection
- Thermal shutdown

Applications

- Camera supply
- Mobile Phones
- Tablets
- Battery-powered systems

Packaging

SOT23-5L 2.9 x 1.6 x 1.1

Ordering Information

AXPM411xxyz

xx: 08 = 0.8V, 10 = 1.0V, 12 = 1.2V, 15 = 1.5V,
18 = 1.8V, 25 = 2.5V, 28 = 2.8V, 33 = 3.3V

y: N = SOT23-5L 2.9 x 1.65 x 1.0 (3000 per reel)

z: A=150mA, B=300mA, C=500mA

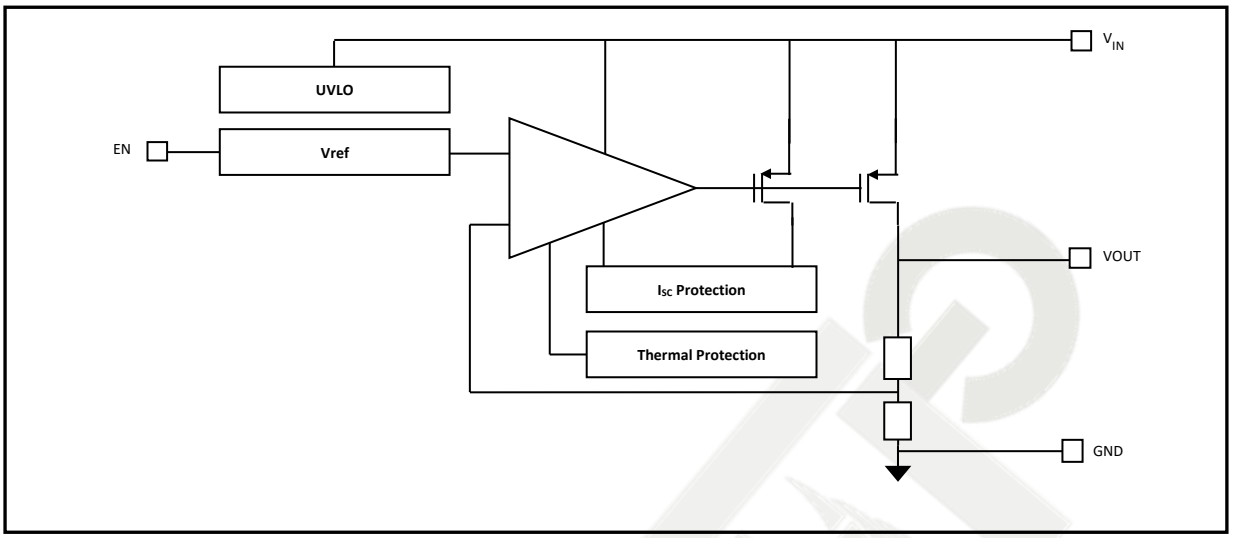
Contents

List of Figures

List of Tables

1 Block Diagram

Figure 1 Block Diagram



2 Pinout Configuration

Figure 2 Pinout Configurations

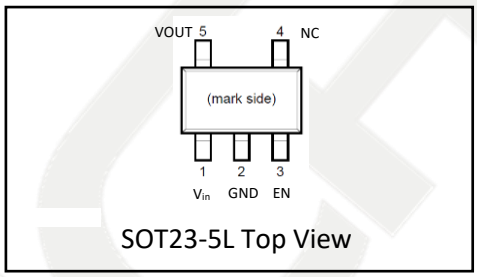


Table 1 Pinout Descriptions

Pin	Name	SOT23 Pinout Description
1	Vin	Input Supply Voltage
2	GND	Common ground
3	EN	Enable pin logic input low = shutdown, high = active.
4	NC	Not Connected
5	VOUT	Output voltage

3 Application Diagram

Figure 3 Application Diagram

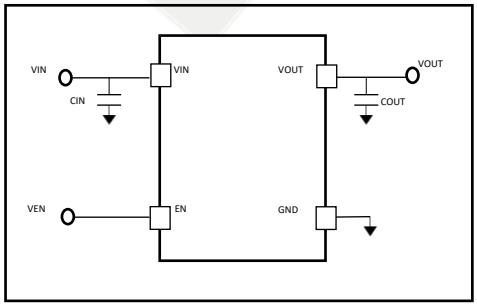


Table 2 Typical Application Bill of Materials

Device	Value	Description
CIN	Ceramic 1uF	Input Supply Voltage
COUT	Ceramic 1uF	Output Voltage

4 Absolute Maximum Ratings

Table 3 Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}	Input voltage	- 0.3 to 7	V
VOUT	Output voltage	- 0.3 to V_{IN} + 0.3	V
V_{EN}	Enable input voltage	- 0.3 to 7	V
I_{OUT}	Output current	Internally limited	mA
PD	Power dissipation	Internally limited	mW
T_{STG}	Storage temperature range	- 40 to 150	°C
T_{OP}	Operating temperature range	- 40 to 85	°C
T_{JCT}	Junction temperature range	- 40 to 125	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. The functional operation at or over these absolute maximum ratings is not assured.

5 Recommended Operating Conditions

Table 4 Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V_{IN}	Input voltage	VOUT+1V to 5.5	V
T_A	Ambient operating temperature range	-40 to 85	°C

6 Thermal Data

Table 5 Thermal Data

Symbol	Parameter		Rating	Unit
R_{THJA}	Thermal resistance junction-ambient	SOT23-5L	340	°C/W

7 ESD Data

Symbol	Parameter		Rating	Unit
ESD	Electronics Static Discharge protection voltage	HBM	+/-2	kV
		CDM	+/-200	V

8 Electrical Characteristics

V_{IN} = $V_{OUT(NOM)}$ + 1 V; I_{OUT} = 1 mA; CIN = 1 µF, COUT = 1 µF; V_{EN} = V_{IN}; typical values are at T_A = 25 °C, unless otherwise specified.

Table 6 Electrical Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating input voltage (1)		2.4		5.5	V
V_{UVLO}	Turn-on threshold			2.0	2.15	V
	Turn-off threshold		1.9	1.95		
V_{OUT}	Output voltage accuracy	I_{OUT} = 1 mA, -40 °C < TJ < 125 °C	-1.8		1.8	%
ΔV_{OUT}	VIN static regulation	$V_{OUT(NOM)}$ + 1 V ⩽ VIN ⩽ 5.5 V, IOUT = 1 mA		0.001		%/V
ΔV_{OUT}	Static load regulation	I_{OUT} = 1 mA to 500 mA		0.001		%/mA
V_{DROP}	Dropout voltage (2)	I_{OUT} = 500m A, Vout >2.2V -40 °C < TJ < 125 °C		150	210	mV
e_N	Output noise voltage	$V_{OUT(NOM)}$ = 1.5 V; 10 Hz to 100 kHz, I_{OUT} = 10 mA		20		µVRMS
SVR_{IN}	VIN supply voltage Rejection Vout=1.5V	V_{IN} = $V_{OUT(NOM)}$ + 1 V +/- V_{RIPPLE} V_{RIPPLE} = 0.5 V, freq=1 kHz, I_{OUT} = 1 mA;		76		dB
		V_{IN} = $V_{OUT(NOM)}$ + 1 V +/- V_{RIPPLE} V_{RIPPLE} = 0.5 V, freq=10 kHz, I_{OUT} = 1 mA;		76		dB
		V_{IN} = $V_{OUT(NOM)}$ + 1 V +/- V_{RIPPLE} V_{RIPPLE} = 0.5 V, freq=100 kHz, I_{OUT} = 1 mA;		54		dB
I_Q	Quiescent Current	I_{OUT} = 0 mA		31	60	µA
		Iout = 0 to 500mA		75	110	µA
		V_{IN} input current in OFF MODE: V_{EN} = GND		0.001	1	µA
I_{SC}	Sort circuit current	RL=0	200			mA
V_{EN}	Enable input logic low				0.4	V
	Enable input logic high		0.9			
I_{EN}	Enable pin input current	V_{EN} = 5.5 V		0.1	100	nA
T_{ON} (3)	Turn on time	$V_{OUT(NOM)}$ = 1.0 V		200		µs
T_{SHDN}	Thermal shutdown			160		°C
	Hysteresis			20		
COUT	Output capacitor		1		4.7	µF

1. For $V_{OUT(NOM)}$ < 1.3 V, V_{IN} = 2.4 V.
2. Dropout voltage is the input-to-output voltage difference at which the output voltage is 100 mV below its nominal value. This specification does not apply to output voltages below 1.7 V.
3. Turn-on time is time measured between the enable input just exceeding V_{EN} high value and the output voltage just reaching 95% of its nominal value.

9 Application

9.1 Thermal protection

AXPM411xxyz is protected with Thermal Shutdown when the junction temperature reaches 160 °C typical and recovers on cooling and reaching thermal hysteresis value

9.2 UVLO

An undervoltage lockout function for Vin is included. On powering up, lockout is maintained till Vin reaches 2.0V. A hysteresis of 0.2V is designed in to ensure clean entry and exit from lockout.

9.3 Short Circuit and Current Limitation

Short circuit current limit foldback protection is integrated. The load current is limited to I_{LIM} when V_{OUT} is equal to 90% of its nominal value. On further decreasing V_{OUT} due to low impedance short circuit, foldback circuit starts operating, limiting the current to I_{SC} when $V_{OUT} = 0$.

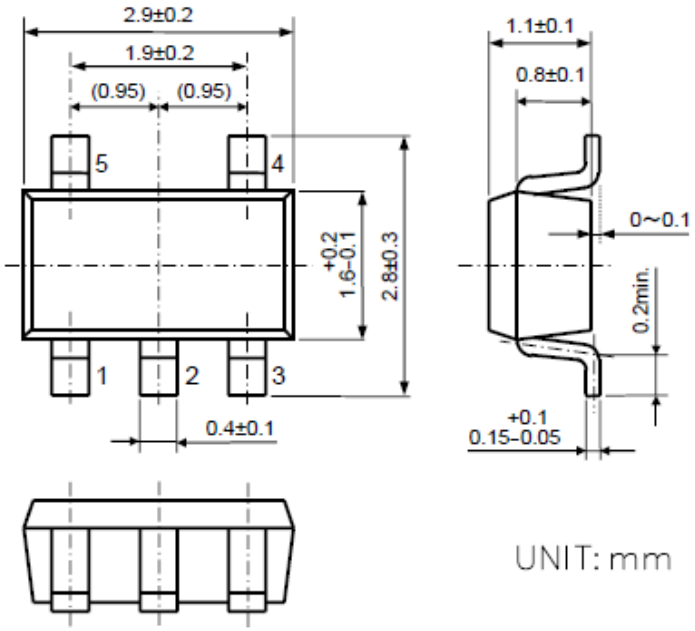
9.4 Thermal Protection

AXPM411xxyz is protected with thermal shutdown when the junction temperature reaches 160°C typical. It recovers upon cooling and reaching thermal hysteresis value.

10 Package information

10.1 SOT23-5L 2.9 x 1.6 x 1.1

Figure 4 SOT23-5L 2.9 x 1.6 x 1.1 Package outline



11 Revision History

Table 6 Document revision history

Date	Version	Description
Feb 2022	Draft	Preliminary Version