

Dual 200mA High Speed Low Dropout CMOS Voltage Regulators

General Description

The LN6411 series are highly accurate, Dual, CMOS LDO voltage regulators. The LN6411 includes a reference voltage source, error amplifiers, driver transistors, current limiters and phase compensators internally. The LN6411's current limiter's foldback circuit also operates as a short protect for the output current limiter. The output voltage for each regulator is set independently by laser trimming. Voltages are selectable in 50mV steps within a range of 1.3V to 5.0V.

The EN function allows the output of each regulator to be turned off independently, resulting in greatly reduced power consumption. The LN6411 series is available in the SOT-25.

Features

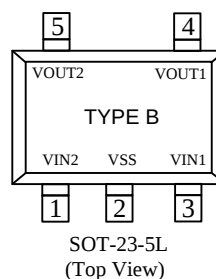
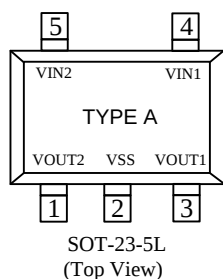
- Output Voltage Range : 1.3V to 6.0V (selectable in 50mV steps)
- Highly Accurate : $\pm 2\%$
- Dropout Voltage : 200mV @ 100mA (3.0V type)

Ordering Information

LN6411 ①②③④⑤⑥

Designator	Description	Symbol	Description
①②	Regulator1 Output Voltage	01~	eg. 30 represents 3.0V
③④	Regulator2 Output Voltage	01~	eg. 30 represents 3.0V
⑤	Packaging Types	M	SOT-25(A Type)
		D	SOT-25(B Type)
⑥	Device Orientation	R	Embossed tape: Standard feed
		L	Embossed tape: Reverse feed

Pin Configuration



- High Ripple Rejection : 40dB (1 kHz)
- Low Power Consumption : 2 μ A (TYP.)
- Maximum Output Current : 200mA ($V_{IN} \geq V_{OUT} + 1V$)
- Internal protector : current limiter and short protector
- Small packages: SOT-25 and other required

Applications

- Mobile phones
- Cordless phones and radio communication equipment
- Cameras, Video cameras
- Portable games
- Portable AV equipment
- PDAs

Package

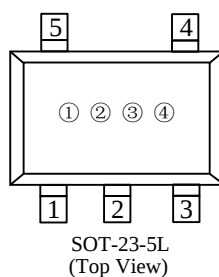
- SOT-23-5L

■ Pin Assignment

Pin Number		Pin Name	Function
SOT-25 (A)	SOT-25 (B)		
1	5	VOUT2	Output 2
2	2	VSS	Ground
3	4	VOUT1	Output 1
4	3	VIN1	Input 1
5	1	VIN2	Input 2

■ Marking Rule

- SOT-23-5L



- ① Represents the product name

Symbol	Product Name
P	LN6411 ◆◆◆◆M◆

- ② ③ Represents internally set sequential number

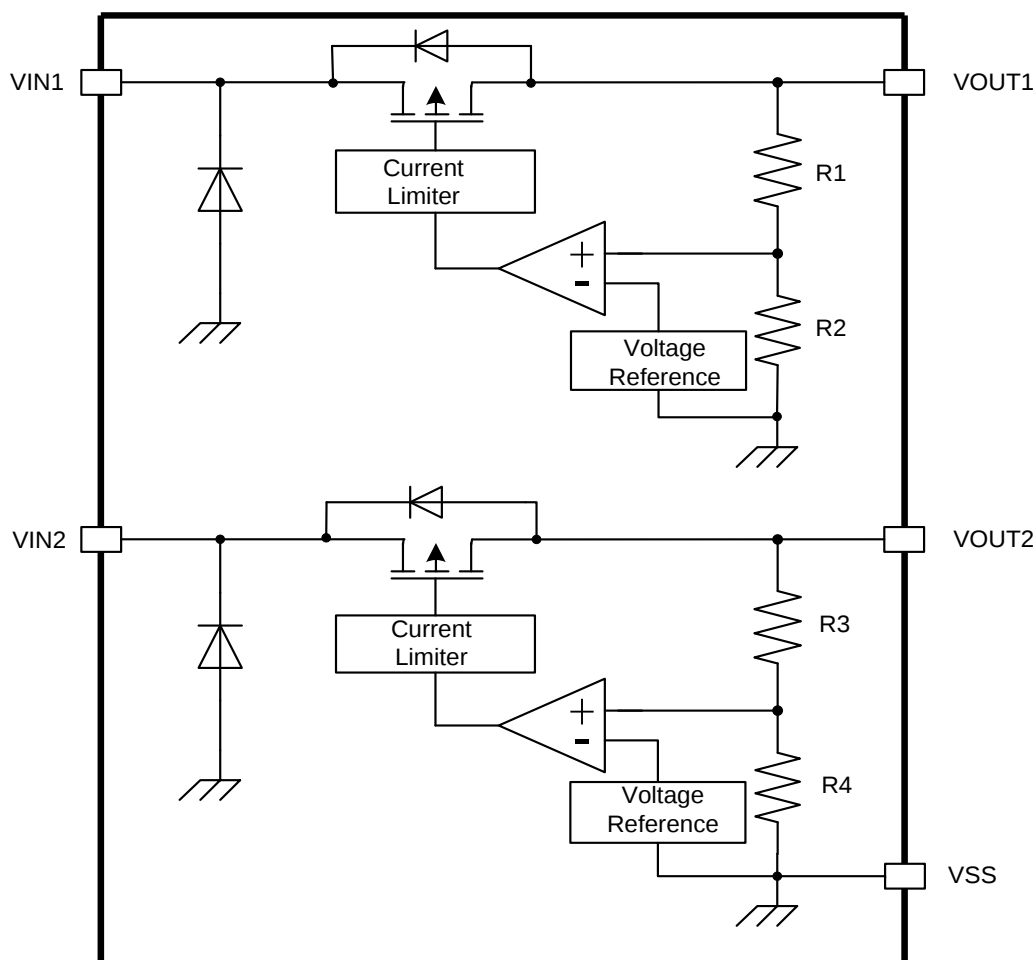
Mark		Internally Set Sequentially Number	Product Series
②	③		
C	2	C2	LN6411EE2025
C	0	C0	LN6411EE2520
0	1	01	LN6411FF2825
1	8	18	LN6411FF2528

- ④ Represents the assembly lot no.

0 to 9, A to Z, reversed character of 0 to 9 and A to Z repeated (G, I, J, O, Q W excepted) represents A type.

Hollow 0 to 9, A to Z, hollow reversed character of 0 to 9 and A to Z repeated (G, I, J, O, Q W excepted) represents B type.

■ Function Block Diagram

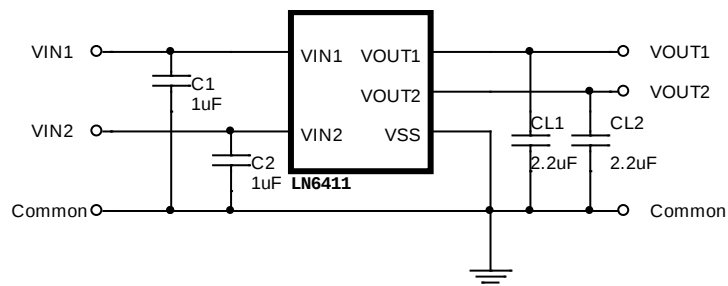


■ Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating	Unit
Input Voltage	V_{IN1}	$V_{SS}-0.3 \sim V_{SS}+6$	V
	V_{IN2}	$V_{SS}-0.3 \sim V_{SS}+6$	
Output Voltage	V_{OUT}	$V_{SS}-0.3 \sim V_{IN}+0.3$	
Output Current	$I_{OUT1}+I_{OUT2}$	400	mA
Power Dissipation	P_D	SOT-23-5	250
Operating Ambient Temperature	T_{opr}	-40~+85	°C
Storage Temperature	T_{stg}	-40~+125	

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Typical Application Circuit



Caution: The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

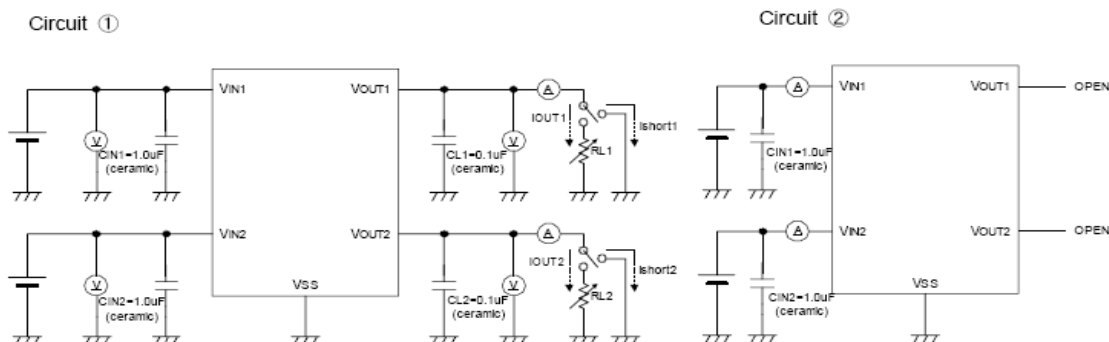
Application Conditions

Input capacitor (C_{IN}): 1.0 μ F or more

Output capacitor (C_L): 1.0 μ F or more (tantalum capacitor)

Caution A general series regulator may oscillate, depending on the external components selected. Check that no oscillation occurs with the application using the above capacitor.

Test Circuits

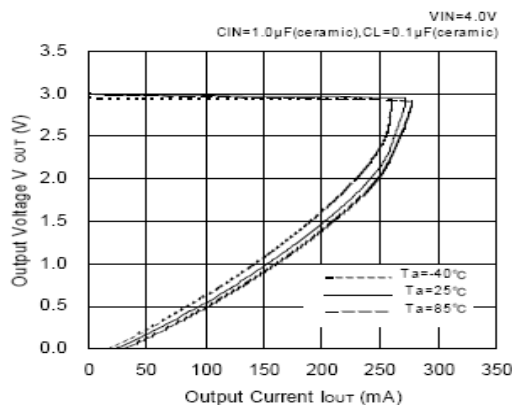


■ Electrical Characteristics

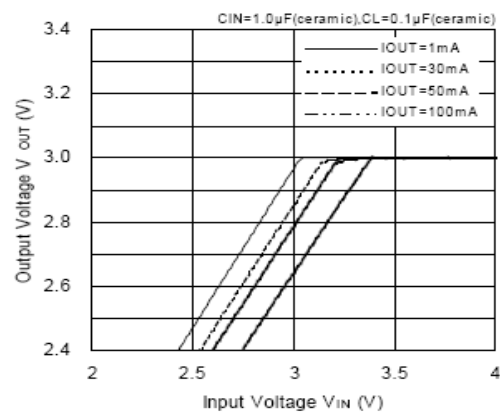
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Circuit
Output Voltage	$V_{OUT(E)}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, $I_{OUT}=10\text{ mA}$	$V_{OUT(S)} \times 0.98$	$V_{OUT(S)}$	$V_{OUT(S)} \times 1.02$	V	1
Output Current	I_{OUT}	$V_{IN} \geq V_{OUT(S)} + 1.0\text{ V}$	200 *5	—	—	mA	1
Dropout Voltage	V_{drop}	$I_{OUT}=30\text{ mA}$	—	0.06	0.10	V	1
		$I_{OUT}=80\text{ mA}$	—	0.20	0.30		
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \bullet V_{OUT}}$	$V_{OUT(S)}+0.5\text{ V} \leq V_{IN} \leq 5\text{ V}$ $I_{OUT}=10\text{ mA}$	—	0.05	0.20	%/V	
Load Regulation	ΔV_{OUT2}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$ $1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$	—	15	50	mV	
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Ta \bullet V_{OUT}}$	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, $I_{OUT}=10\text{ mA}$ $-40^{\circ}\text{C} \leq Ta \leq 85^{\circ}\text{C}$	—	± 100	—	ppm/°C	
Supply Current	I_{SS1}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$	—	25	40	μA	2
Input Voltage	V_{IN}	—	2.0	—	6	V	—
Ripple-Rejection	PSRR	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, $f=1\text{ kHz}$ $V_{rip}=0.5\text{ V}_{rms}$, $I_{OUT}=30\text{ mA}$	—	40	—	dB	—
Short-circuit Current	I_{short}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$	—	30	—	mA	1
Current limiter	I_{lim}	$V_{IN}=V_{OUT(T)}+1\text{ V}$	-	300	-	mA	1

Typical Performance Characteristics (3.0V output)

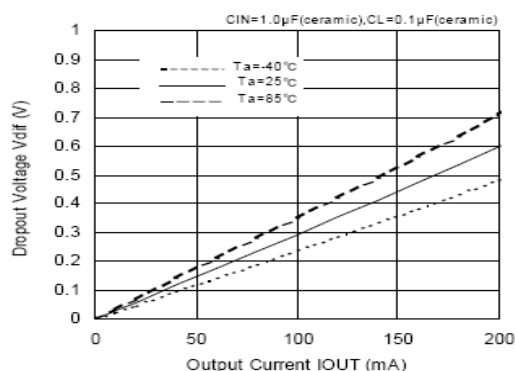
1、Output Voltage vs. Output Current



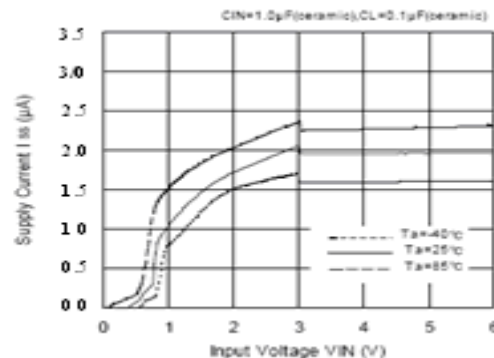
2、Outpout Voltage vs. Input Current (Contd)



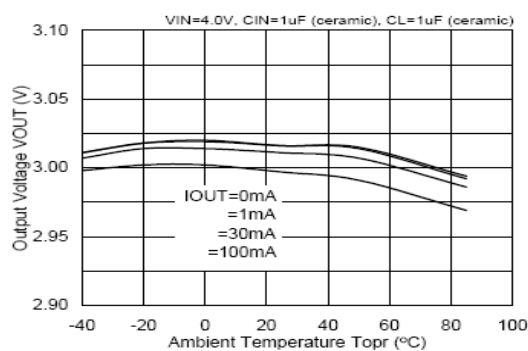
3、Dropout Voltage vs. Output Current



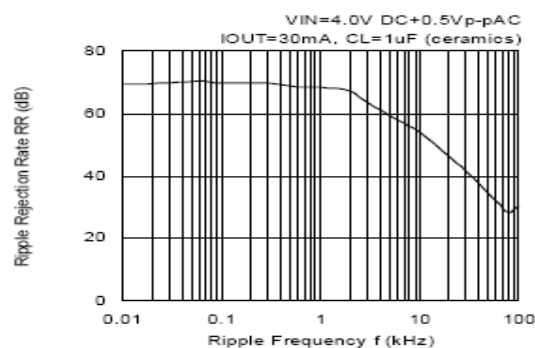
4、Dropout Voltage vs. Output Voltage



5、Output Voltage VS. Ambient Temperature

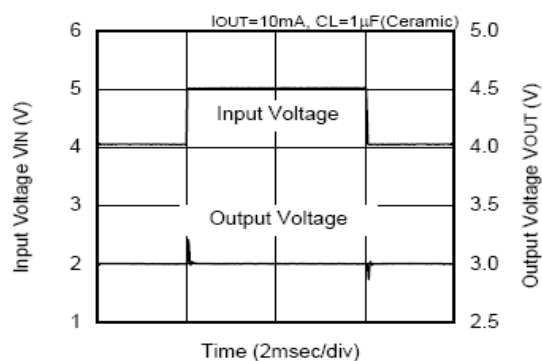


6、Ripple Rejection Rate

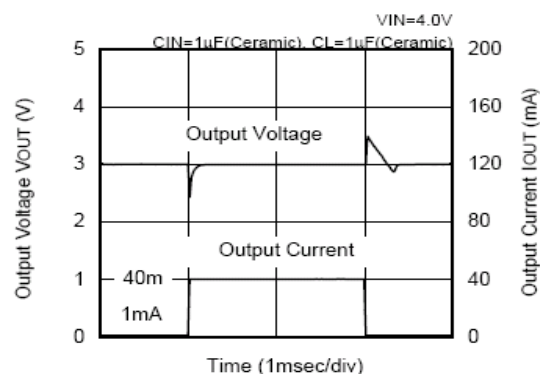


7. Transient Response

Input Transient Response

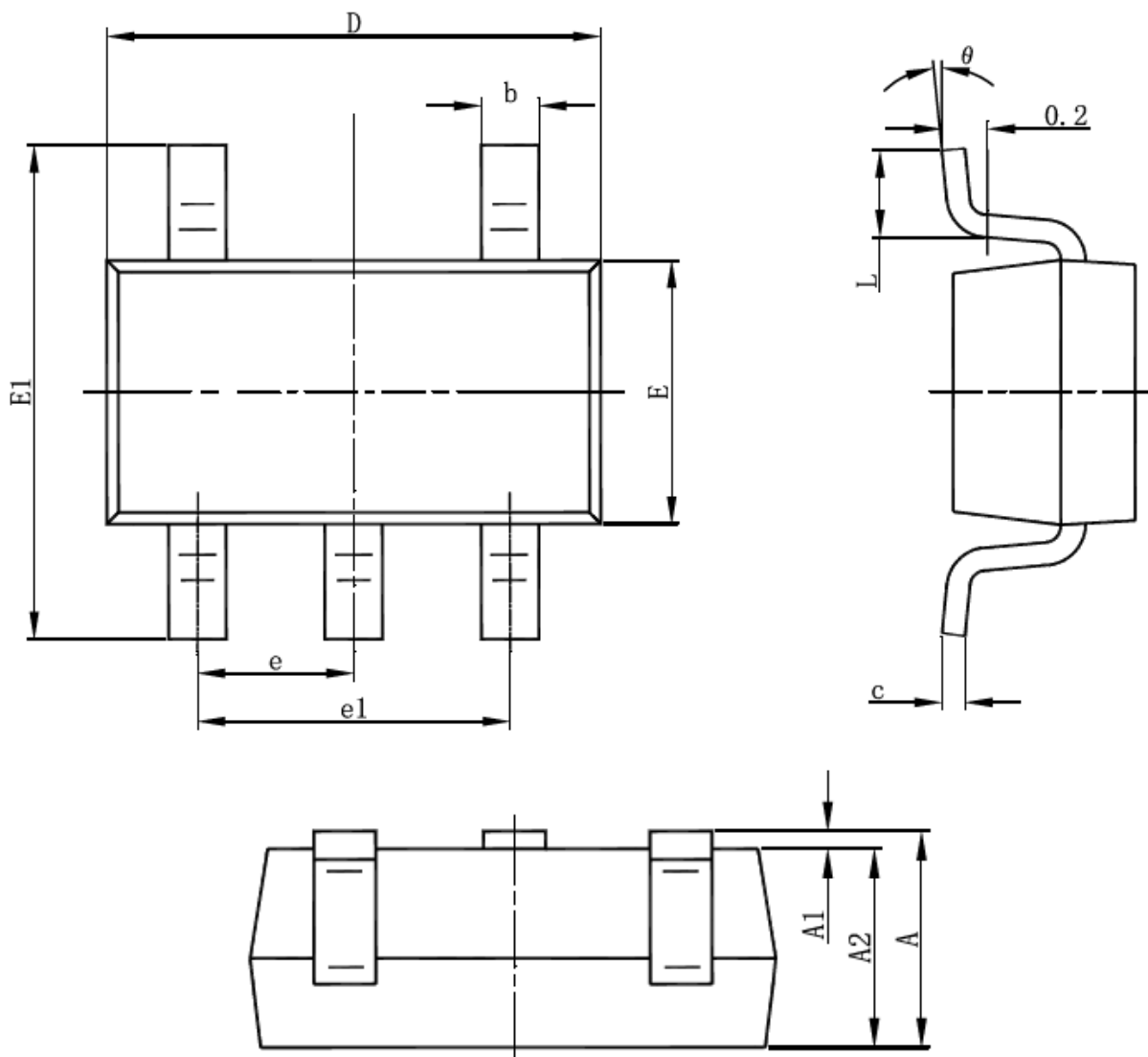


Load Transient Response



■ Package Information

● SOT-23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°