400mA Adjustable Voltage High Speed LDO Regulators JTM6209 Series

General Description

The JTM6209 series are highly accurate, low noise, LDO Voltage Regulators .On chip trimming adjusts the reference/output voltage to within ±2% accuracy. Internal protection features consist of output current limiting, safe operating area compensation, and thermal shutdown. The current limiter's feedback circuit also operates as a short protect for the output current limiter and the output pin. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption. The JTM6209 series can operate with up to 18V input.

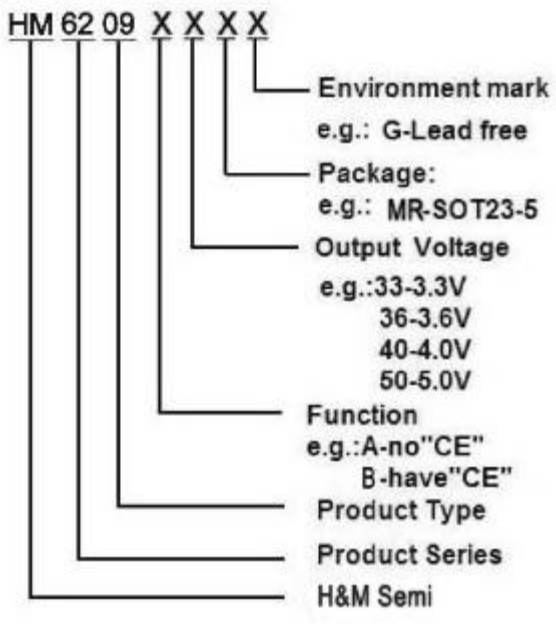
Features

- Maximum Output Current: 400mA
- Dropout Voltage:104mV@ I_{OUT} =100mA
- Operating Voltage Range: 2.5V～18V
- Highly Accuracy: ±2 ％
- Adjustable Output Voltage Option
- Standby Current: 60uA（TYP.）
- Line Regulation: 30mV（TYP.）
- Temperature Stability≤0.5%
- Thermal Shutdown Protection：164℃
- Packages:SOT23-5

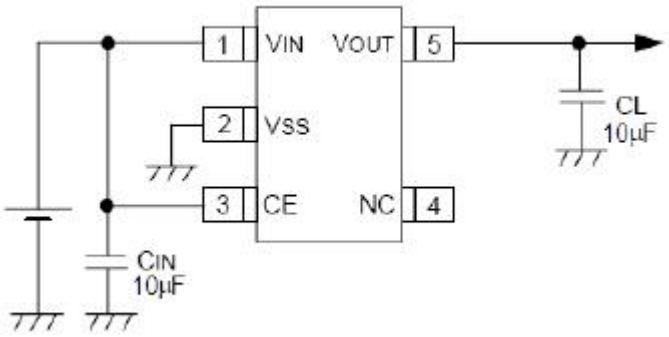
Typical Application

- Consumer and Industrial Equipment Point of Regulation
- Switching Power Supply Post Regulation
- Hard Drive Controllers
- Battery Chargers

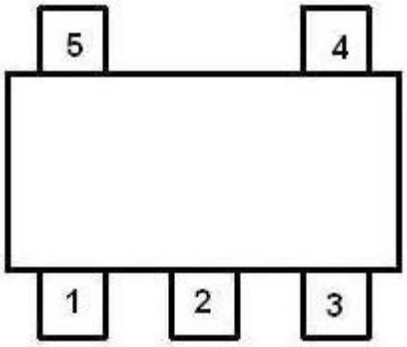
Selection Guide



Typical Application Circuit



Pin Configuration



SOT23-5

Pin Assignment

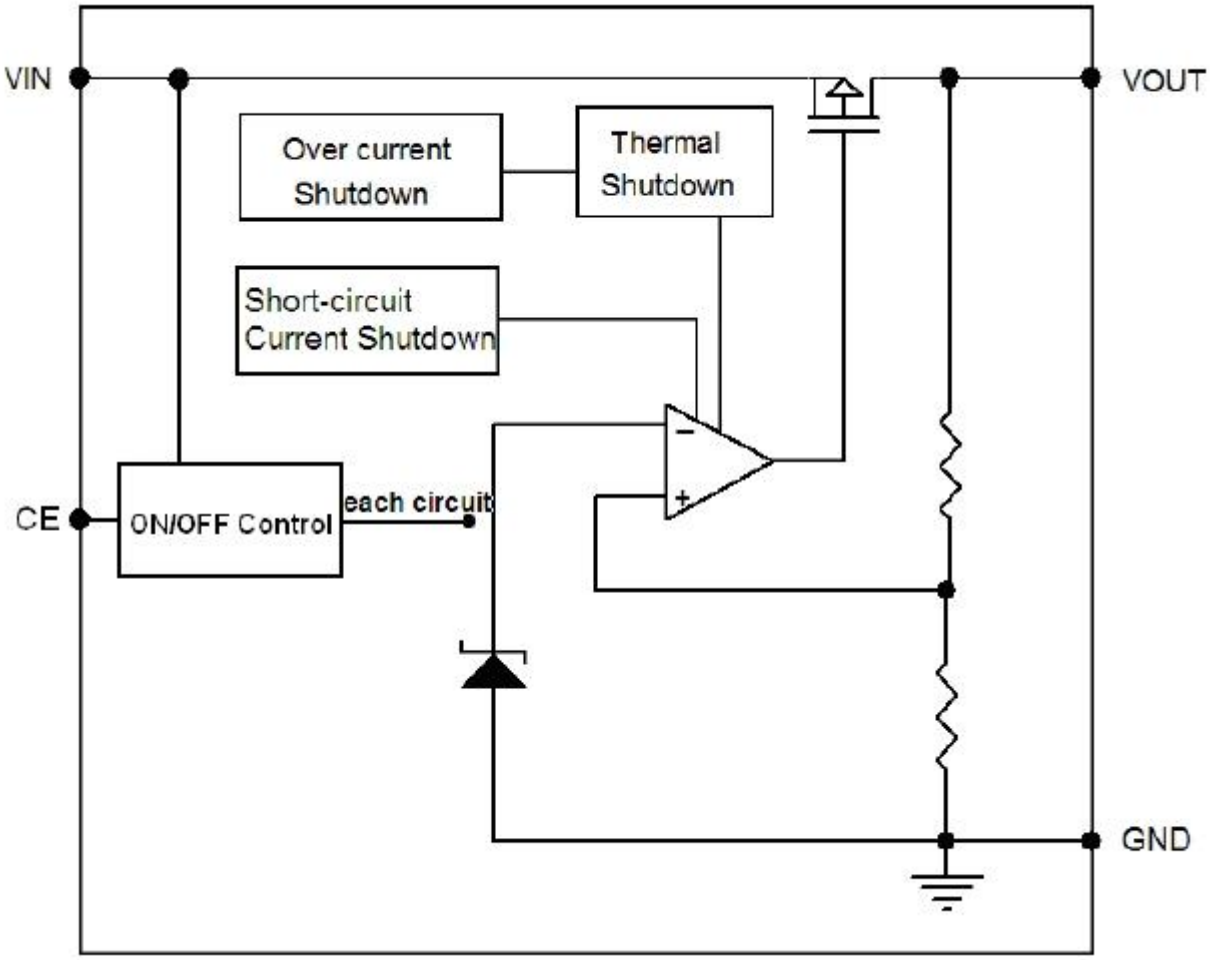
JTM6209BXX

Pin Number	Pin Name	Functions
SOT23-5		
1	V_{IN}	Power Input
2	V_{SS}	Ground
3	CE	ON / OFF Control
4	NC	No Connect
5	V_{OUT}	Output

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Voltage		V_{IN}	18	V
Output Current		I_{OUT}	500	mA
Output Voltage		V_{OUT}	Vss-0.3～V_{IN} +0.3	V
CE Pin Voltage		V_{CE}	Vss-0.3～V_{IN} +0.3	V
Power Dissipation	SOT23-5	P_D	250	mW
Operating Temperature Range		T_{OPR}	－40～＋125	℃
Storage Temperature Range		T_{STG}	－40～＋150	℃
Lead Temperature			260℃，4sec	

Block Diagram



Electrical Characteristics

JTM6209B33

(V_{IN}= V_{OUT}+1V，V_{CE}＝V_{IN} ，C_{IN}=C_L=10uF，Ta=25°C，unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=30mA, V_{IN}= V_{OUT}+1V	X 0.98	V_{OUT} (T) (Note 1)	X 1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1V		400		mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT}+1V , 1mA≤I_{OUT}≤100mA		8		mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA		130		mV
	V_{DIF2}	I_{OUT} =200mA		260		mV
Supply Current	I_{SS}	V_{IN}= V_{OUT}+1V		60		μA
Stand-by Current	I_{CEL}	V_{CE}＝0V		0		μA
Line Regulation	ΔV_{OUT}	I_{OUT} =30mA V_{OUT}+1V ≤V_{IN}≤18V		20		mV
CE “High” Voltage	VCEH	Start up	1.20			V
CE “Low” Voltage	VCEL	Shut down			0.8	V
Short-circuit Current	I_{SHORT}	V_{IN}= V_{OUT}+1V, V_{CE}＝V_{IN}, V_{OUT}＝0V		60		mA
Thermal Shutdown Protection	T_{sd}	I_{OUT}=1mA, V_{IN}= V_{OUT}+1V		164		℃
Over Current Protection	I_{limit}	V_{IN}= 4.3V		550		mA

JTM6209B50

(V_{IN}= V_{OUT}+1V，V_{CE}＝V_{IN} ，C_{IN}=C_L=10uF，Ta=25oC，unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=30mA, V_{IN}= V_{OUT}+1V	X 0.98	V_{OUT} (T) (Note 1)	X 1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1V		400		mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT}+1V , 1mA≤I_{OUT}≤100mA		8		mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA		104		mV
	V_{DIF2}	I_{OUT} =200mA		210		mV
Supply Current	I_{SS}	V_{IN}= V_{OUT}+1V		60		μA
Stand-by Current	I_{CEL}	V_{CE}＝0V		0		μA
Line Regulation	ΔV_{OUT}	I_{OUT} =30mA V_{OUT}+1V ≤V_{IN}≤18V		30		mV
CE “High” Voltage	VCEH	Start up	1.20			V
CE “Low” Voltage	VCEL	Shut down			0.8	V
Short-circuit Current	I_{SHORT}	V_{IN}= V_{OUT}+1V, V_{CE}＝V_{IN}, V_{OUT}＝0V		50		mA
Thermal Shutdown Protection	T_{sd}	I_{OUT}=1mA, V_{IN}= V_{OUT}+1V		164		℃
Over Current Protection	I_{limit}	V_{IN}= 6.0V		510		mA

Note ：

1. V_{OUT} (T) ： Specified Output Voltage

2.V_{OUT} (E) ： Effective Output Voltage (Ie. The output voltage when “V_{OUT} (T)+1.0V”is provided at the Vin pin while maintaining a certain I_{OUT} value.)

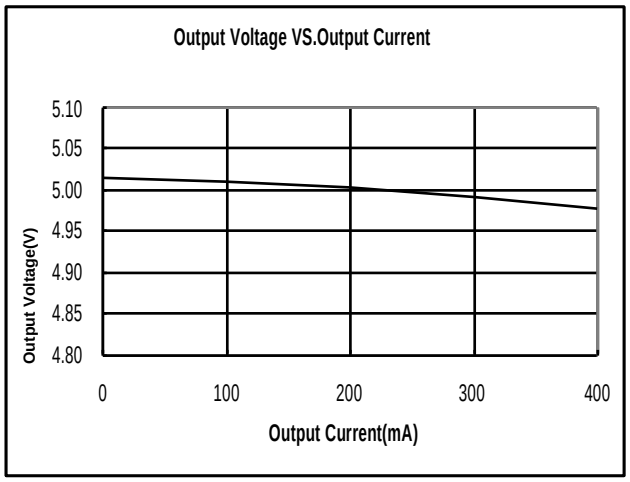
3.V_{DIF}：V_{IN1} –V_{OUT} (E)’

V_{IN1} ： The input voltage when V_{OUT}(E)’ appears as input voltage is gradually decreased.

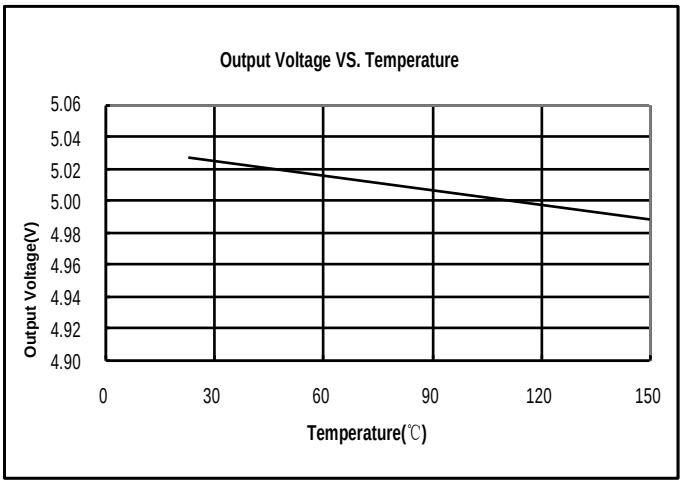
V_{OUT} (E)’=A voltage equal to 98% of the output voltage whenever an amply stabilized I_{OUT} {V_{OUT} (T)+1.0V} is input.

Type Characteristics (V_{OUT}=5.0V)

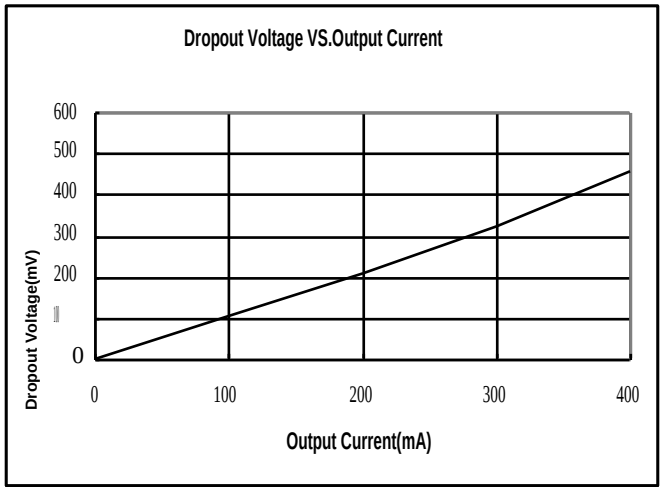
（1）Output Voltage VS. Output Current
（VIN=V_{OUT}+1V）



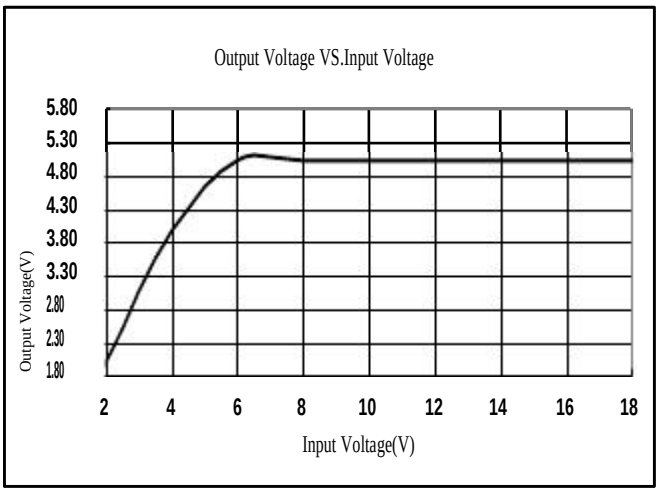
（2） Output Voltage VS. Temperature
（VIN=V_{OUT}+1V , I_{OUT}=1mA）



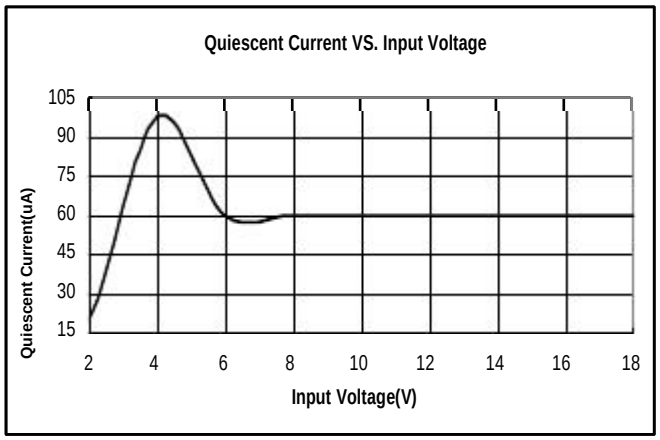
（3）Dropout Voltage VS. Output Current（Ta = 25 °C）



（4）Output Voltage VS. Input Voltage（I_{OUT} =10mA）
（Ta = 25 °C）



（5）Quiescent Current VS. Input Voltage



Applications Information

1. Input Bypass Capacitor

An input capacitor is recommended. A 10uF tantalum on the input is a suitable input bypassing for almost all applications.

2. Output Capacitor

The output capacitor is critical in maintaining regulator stability, and must meet the required conditions for both minimum amount of capacitance and ESR (Equivalent Series Resistance).The minimum output capacitance required by the JTM6209 is 10μF,if a tantalum capacitor is used. Any increase of the output capacitance will merely improve the loop stability and transient response. The ESR of the output capacitor should be less than 0.5Ω .

3. Load Regulation

The JTM6209 regulates the voltage that appears between its output and ground pins, or between its output and adjust pins. In some cases, line resistances can introduce errors to the voltage across the load. To obtain the best load regulation, a few precautions are needed. Figure1, shows a typical application using a fixed output regulator. The Rt1 and Rt2 are the line resistances. It is obvious that the V_{LOAD} is less than the V_{OUT} by the sum of the voltage drops along the line resistances. In this case, the load regulation seen at the R_{LOAD} would be degraded from the datasheet specification. To improve this , the load should be tied directly to the output terminal on the positive side and directly tied to the ground terminal on the negative side.

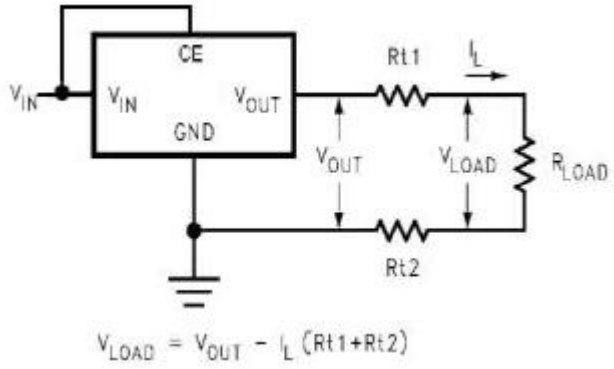
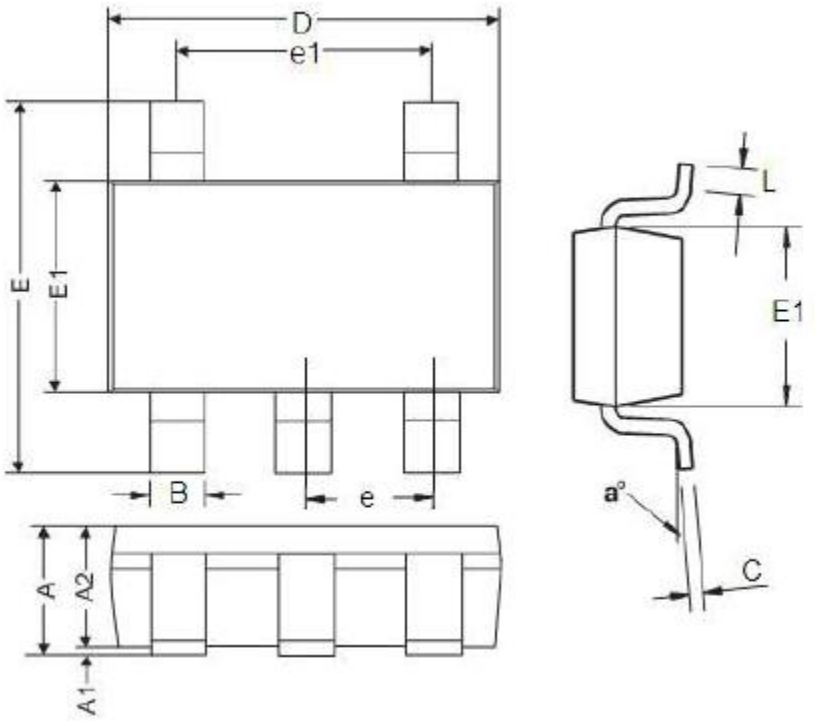


FIGURE 1. Typical Application using Fixed Output Regulator

Packaging Information

● SOT23-5 Unit: mm



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.45	0.0354	0.0570
A1	0	0.15	0	0.0059
A2	0.9	1.3	0.0354	0.0511
B	0.2	0.5	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.7	3.10	0.1062	0.1220
E	2.2	3.2	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95REF		0.0374REF	
e1	1.90REF		0.0748REF	
L	0.10	0.60	0.0039	0.0236
a^0	0^0	30^0	0^0	30^0