HM6119

2A Low Consumption Linear Regulator

DESCRIPTION

HM6119 is a series of low power consumption, low dropout voltage regulator with a typical dropout voltage of 1.0V at 2A load current.

HM6119 can provide output value in the range of 1.2V~5.0V in 0.1V steps. It also can customized on command.

Other than every voltage version can be used as an adjustable voltage version, with which desired voltage can be achieved by setting the values of two external resistors of the application circuitry.

HM6119 has well load transient response and good temperature characteristic, And it uses trimming technique to guarantee output voltage accuracy within±2%.

HM6119 series is available in standard packages of SOT-223 and TO-252.

FEATURES

- Low Power Consumption:3.0uA (Typ.)
- Maximum output current : 2A
- Maximum input voltage: 18V
- Line regulation: 0.2% (Typical)
- Output Voltage Range:1.2V~5.0V (customized on command in 0.1V steps)
- Highly Accurate:±2%(±1% customized)
- Typical Dropout Voltage: 850mV@1.5A (Vout=3.3V)
- Operation environment Temperature: -40℃~85℃

APPLICATIONS

- Battery Charger
- Battery Powered equipment
- Post Regulators for Switching Supplies
- Reference Voltage Source Regulation after Switching Power

TYPICAL APPLICATION

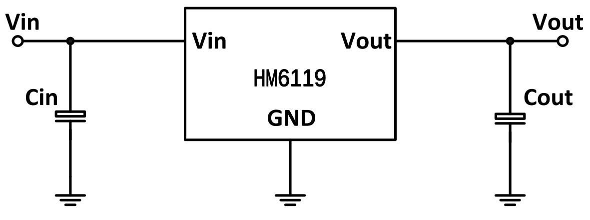
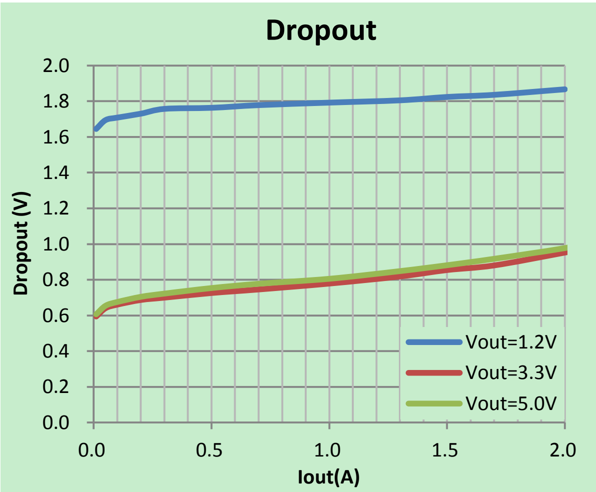


Fig1. HM6119 fixed voltage application circuit

Note: *Input capacitor (Cin=1uF) and Output capacitor (Cout=1uF) are recommended in all application circuit. ceramic capacitor is recommended.*

ELECTRICAL CHARACTERISTICS



ORDERING INFORMATION

HM6119 1 2 3 4 5

Code	Description
1	Temperature&Rohs: C: -40~85°C, Pb Free Rohs Std.
2	Package type: L: SOT-223 O:TO-252
3	Packing type: TR: Tape&Reel (Standard)
4	Output voltage: e.g. 18=1.8V 33=3.3V 50=5.0V
5	Voltage accuracy: Blank(default):±2% 1: ±1%

ABSOLUTE MAXIMUM RATING

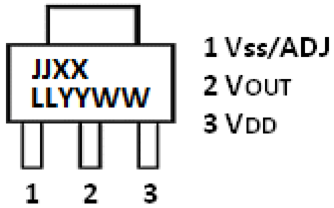
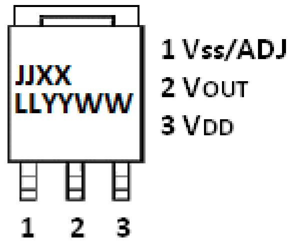
<table>
<tr><th colspan="2">Parameter</th><th>Value</th></tr>
<tr><td colspan="2">Max Input Voltage</td><td>20V</td></tr>
<tr><td colspan="2">Operating Junction Temperature(Tj)</td><td>125°C</td></tr>
<tr><td colspan="2">Ambient Temperature(Ta)</td><td>-40°C –85°C</td></tr>
<tr><td rowspan="2">Package Thermal Resistance</td><td>SOT-223</td><td>20°C / W</td></tr>
<tr><td>TO-252</td><td>12°C / W</td></tr>
<tr><td colspan="2">Storage Temperature(Ts)</td><td>-40°C -150°C</td></tr>
<tr><td colspan="2">Lead Temperature & Time</td><td>260°C,10S</td></tr>
</table>

Note:
Exceed these limits to damage to the device.
Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

Parameter	Value
Input Voltage Range	Max.18V
Ambient Temperature	-40°C –85°C

PIN CONFIGURATION

<table>
<tr><td>Product Classification</td><td>HM6119CLTR□□</td></tr>
<tr><td>JJ: Product Code</td><td rowspan="4">SOT-223
</td></tr>
<tr><td>XX: Output Voltage</td></tr>
<tr><td>LL: Lot No.</td></tr>
<tr><td>YYWW: Date Code</td></tr>
<tr><td>Product Classification</td><td>HM6119COTR□□</td></tr>
<tr><td>JJ: Product Code</td><td rowspan="4">TO-252
</td></tr>
<tr><td>XX: Output Voltage</td></tr>
<tr><td>LL: Lot No.</td></tr>
<tr><td>YYWW: Date Code</td></tr>
</table>

XX: Output voltage code, e.g. 12=1.2V, 25=2.5V, 33=3.3V;
YY: The Year of manufacturing, "11" stands for year 2011, "12" stands for year 2012, and "28"stands for year2028.
WW: The week of manufacturing. "01" stands for week 1, "02" stands for week 02, "52" stands for week 52.

ELECTRICAL CHARACTERISTICS

(Test Conditions: Cin=1uF, Cout=1uF, TA=25 ℃, Unless Otherwise Specified)

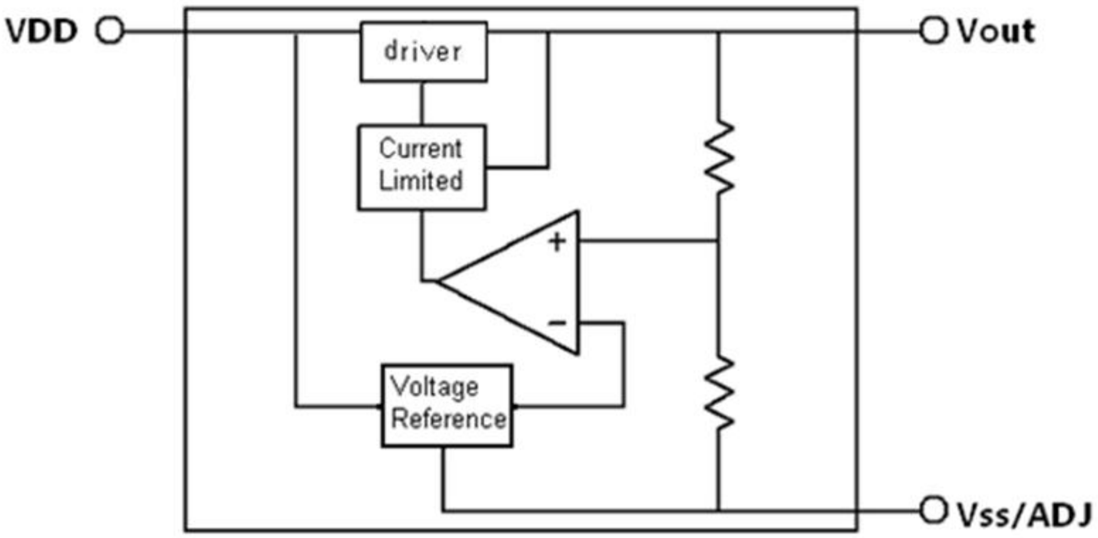
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Vin	Input Voltage					18	V
Vout	Output Voltage			Vout x0.98		Vout X1.02	V
Iout(Max.)	Maximum Output Current	Vin-Vout=1.9V	Vout <1.5V	2			A
		Vin-Vout=1.5V	1.5V≤Vout<2.0V				
		Vin-Vout=1V	Vout ≥2.0V				
Dropout Voltage	Input-Output Voltage Differential (note 3)	Iout≤1.5A	Vout <1.5V		1600	1800	mV
			1.5V≤Vout<2.0V		1200	1400	
			Vout ≥2.0V		850	950	
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line Regulation (note 1)	Iout=10mA Set Vout+1V≤Vin≤18V			0.1	0.3	%/V
$\Delta Vout$	Load Regulation (note 1,2)	1mA≤Iout≤1.5A	Vout <1.5V		40	60	mV
			1.5V≤Vout<2.0V		20	40	
			Vout ≥2.0V		10	30	
Iq	Quiescent Current	Vin=Set Vout+1V			3.0	5.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output Voltage Temperature Coefficient	Iout=100mA			200		ppm/°C
θ_{JC}	Thermal Resistance junction to case	SOT-223 TO-252			20 12		°C / W

Note1: *Line Regulation and Load Regulation in Table1 are tested under constant junction temperature.*

Note2: *When load current varies between 0~2A and Vin-Vout ranges from 1V~18V at constant junction temperature, the parameter is satisfied the criterion in table.*

Note3: *Dropout Voltage is the voltage difference between the input and output pin when the input voltage is minimum to maintain the lowest spec output voltage.*

BLOCK DIAGRAM



DETAILED DESCRIPTION

HM6119 is a series of low dropout voltage and low power consumption regulator. Its application circuitry requires minimum number of external components. Both fixed voltage and adjustable voltage application circuits need input and output capacitors to assure output voltage stability. Any desired output voltage from fixed voltage to 18V can be achieved by assigning proper values to two external resistors in its application circuitry (as shown in Fig.3, as R1, R2 are the two external resistors.).
HM6119 uses trimming technique to assure the accuracy of output value within ±2%, at the same time, temperature compensation is elaborately considered in this chip, which makes HM6119's temperature coefficient within 100ppm/℃。

TYPICAL APPLICATION

HM6119 has fixed voltage and adjustable voltage application mode, Fig.4 shows their typical application circuitry.
A 1uF ceramic capacitor connected between input and GND as bypass capacitor and a 1uF ceramic capacitor between output and GND are recommended for all application.

Using a bypass capacitor (C_{Adj}) between the adjust terminal and ground can improve ripple rejection. The bypass capacitor prevents ripple from being amplified in case the output voltage is increased. The impedance of C_{Adj} should be less than the resistance of R_1 to prevent ripple from being amplified at any frequency. As R1 is normally in the range of 1KΩ~10KΩ, the value of C_{Adj} should satisfy the following condition:

$$1/(2\pi * Frequency_{Ripple} * C_{adj}) < R_1$$

A 0.1µF ceramic capacitor is recommended.

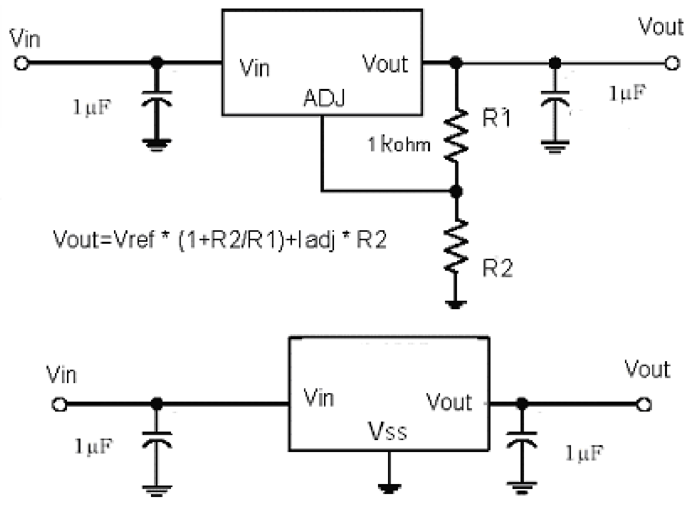


Fig 3. Typical Application of HM6119

EXPLANATION

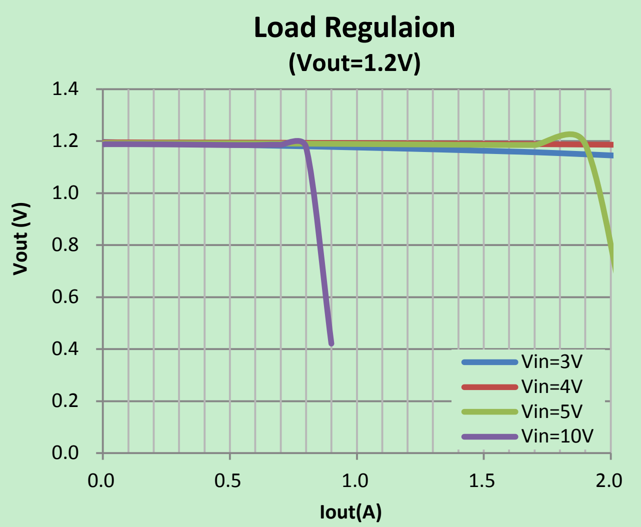
The output voltage of adjustable application satisfies this followed equation:

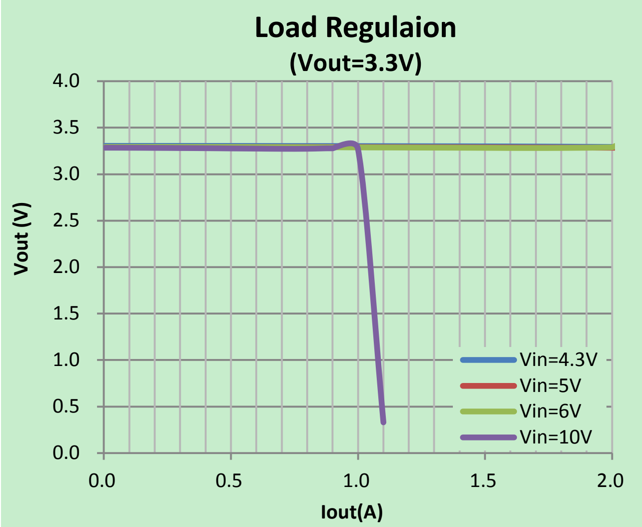
$$V_{out}=V_{Ref}\times (1+R_2/R_1)+I_{Adj}\times R_2.$$

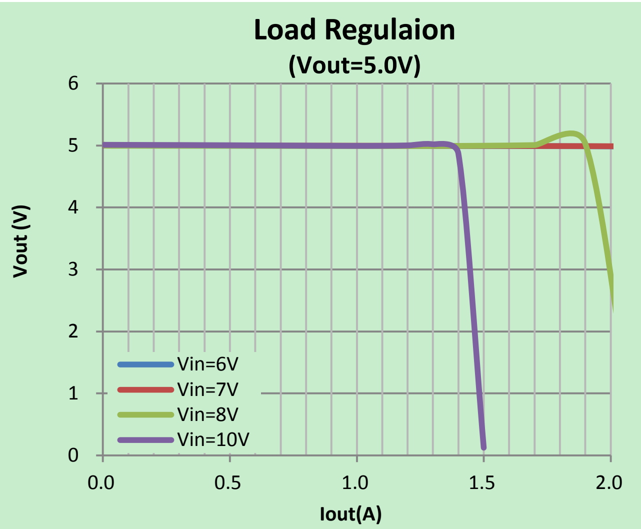
The second term $I_{Adj}\times R_2$ can be ignored since the adjustable pin current I_{Adj} (~ 2µA) is much less than the current through R_1 (~1mA).

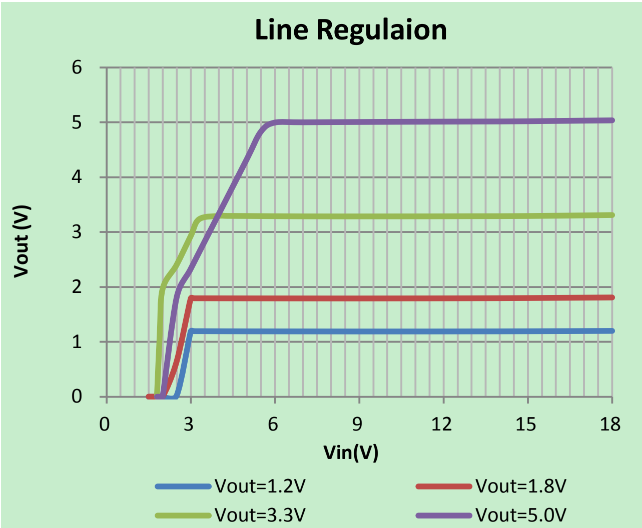
The value of R_1 is preferred in the range of 1KΩ～10KΩ and the value of V_{Ref} is the output voltage of typical fixed voltage application circuit.

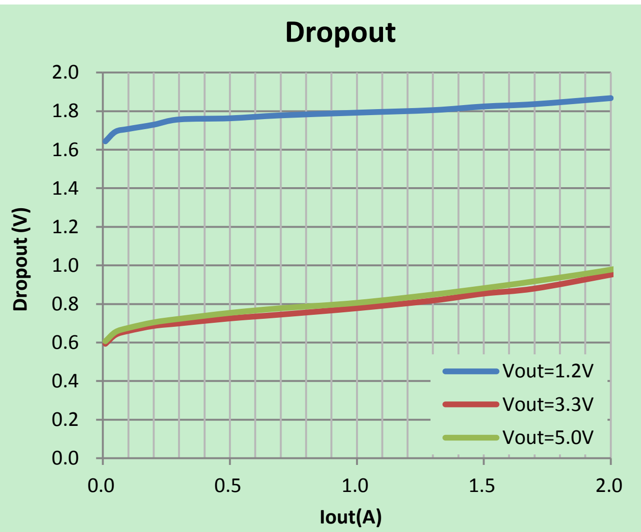
TYPICAL PERFORMANCE CHARACTERISTICS

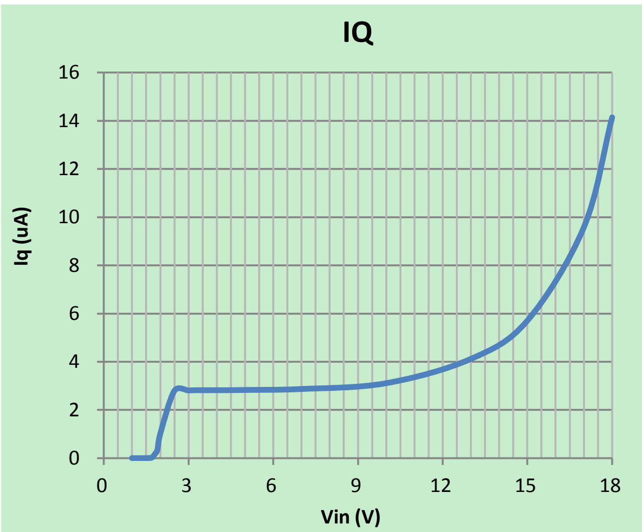








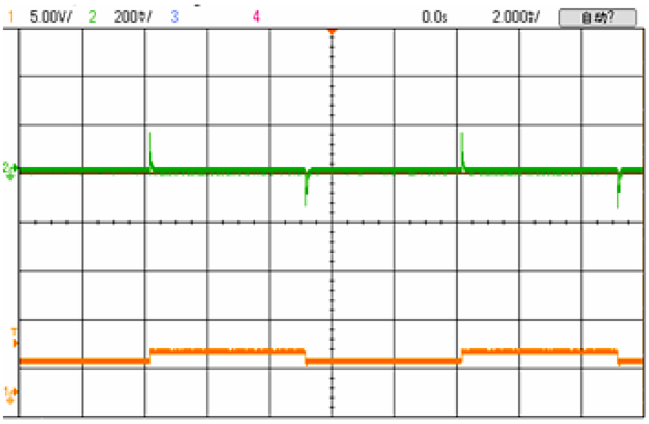




Line Transient Response

Iout=100mA,Vin=3.3V to 4.3V

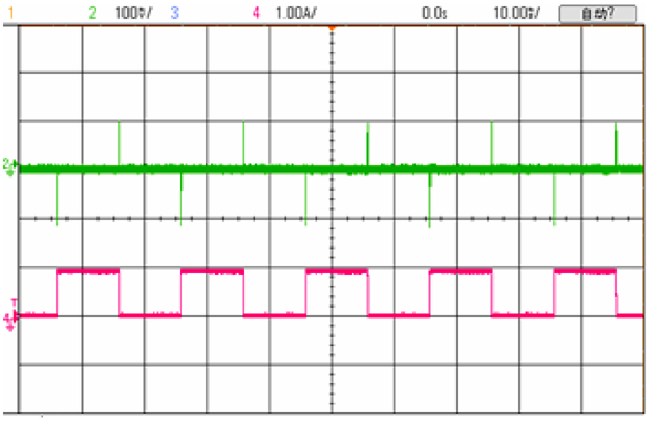
(Orange: Vin, Green: Vout)



Load Transient Response

Vin=3.3V, Iout=0.1A to 1A

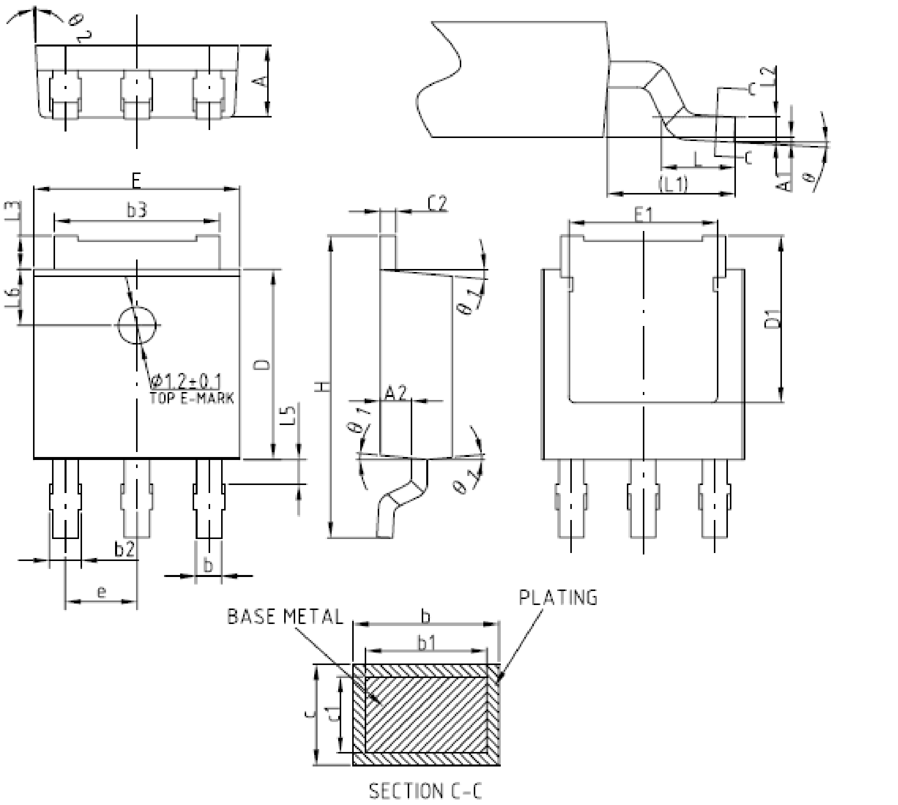
(Pink: Iout, Green: Vout)



PACKAGE LINE

Package	TO-252	Devices per reel	2500	Unit	mm

Package specification：



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	–	0.10
A2	0.90	1.00	1.10
b	0.77	–	0.89
b1	0.76	0.81	0.86
b2	0.77	–	1.10
b3	5.23	5.33	5.43
c	0.47	–	0.60
c1	0.46	0.51	0.56
c2	0.47	–	0.60
D	6.00	6.10	6.20
D1	5.25	–	–
E	6.50	6.60	6.70
E1	4.70	–	–
e	2.28BSC		
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	–	1.25
L5	0.90	–	1.50
L6	1.80REF		
θ	0°	–	8°
θ1	3°	5°	7°
θ2	1°	3°	5°

Package	SOT-223	Devices per reel	2500	Unit	mm

Package specification：