3-Terminal Positive Voltage Regulator ME78L05

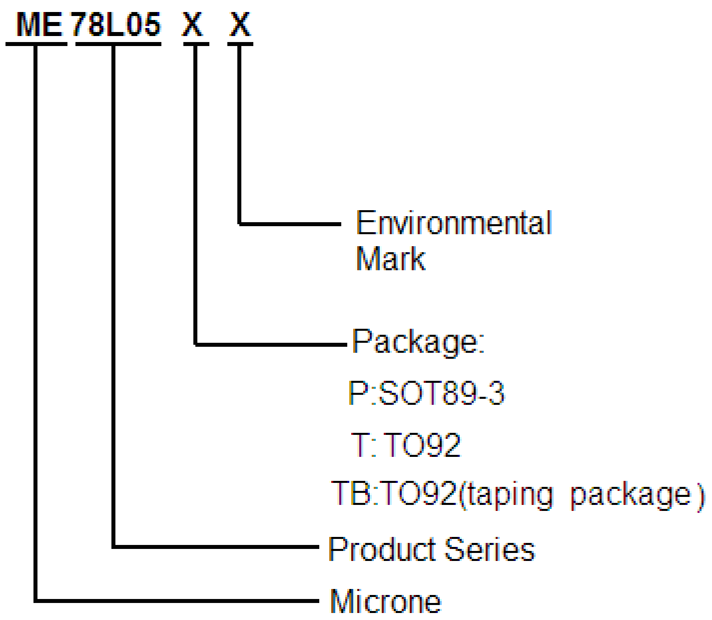
General Description

ME78L05 is three-terminal positive regulators. One of these regulators can deliver up to 100 mA of output current. The internal limiting and thermal -shutdown features of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor Comb-ination, an effective improvement in output impe-dance can be obtained, together with lower quiescent current.

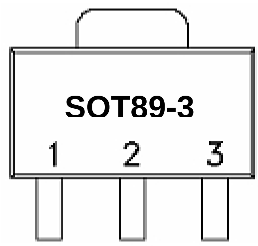
Features

- ●Output Current of 100mA
- ●Output Voltages of 5V±5% over the temperature range
- ●Thermal Overload Protection
- ●Short Circuit Protection
- ●Output transistor safe area protection
- ●No external components
- ●Package：SOT89-3 and TO92(Taping Package)

Selection Guide

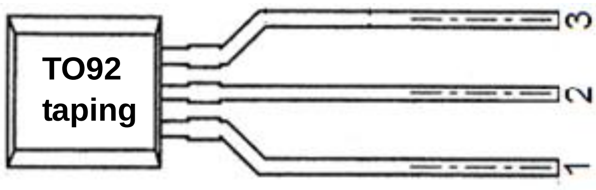


Pin Configuration



1. Output
2. GND
3. Input

1.Output 2.GND 3.Input



1.Output 2.GND 3.Input

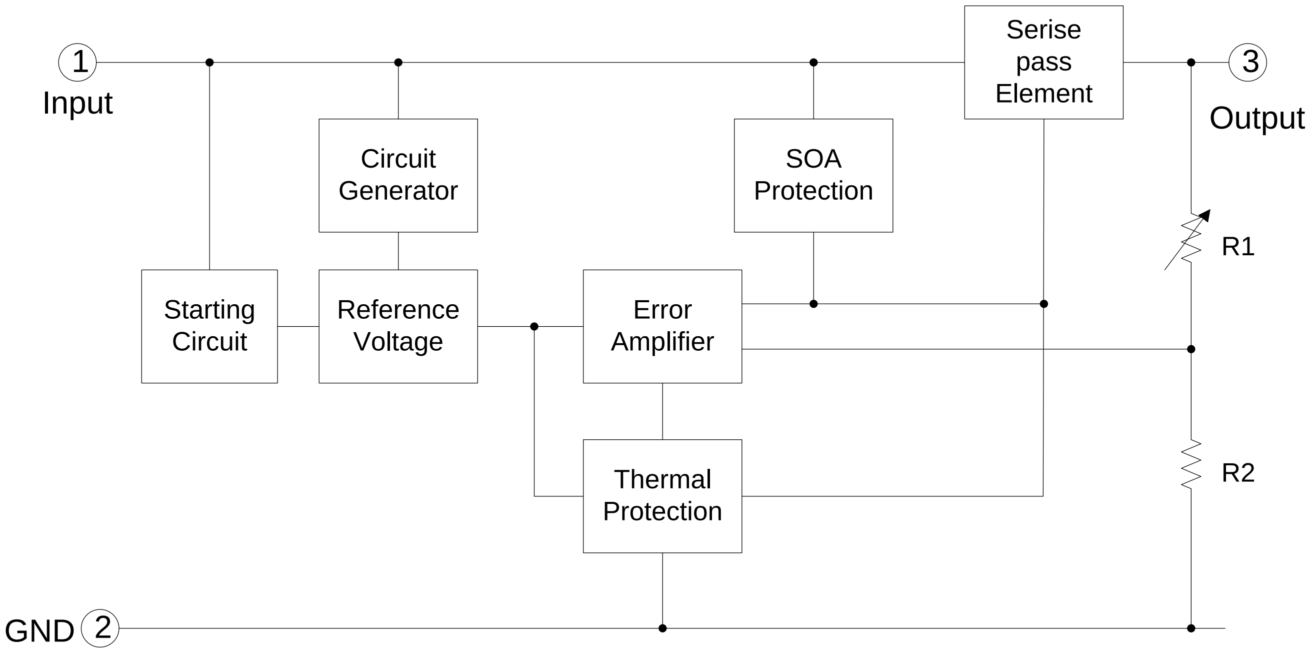
Maximum Ratings(Ta=25℃)

Parameter	Rating	Unit
Input supply voltage : VIN	30	V
MAX. Output current:Iout	100	mA
Max Power:Pmax	0.35	W
Maximum junction temperature: T_j	-25～125	℃
Storage temperature :T_{str}	-55～150	℃
Soldering temperature and time	+260（Recommended 10S）	℃

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.

Block Diagram



Electrical Characteristics

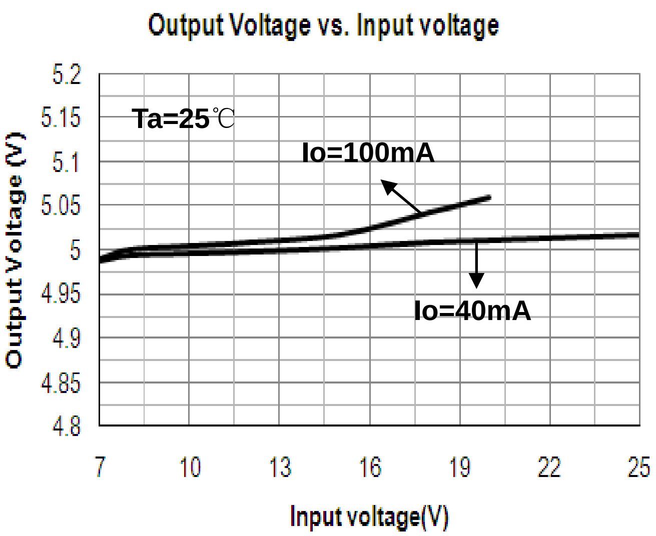
(Cin =0.33μF, Co =0.1μF,0≤Tj≤125^{O}C, unless otherwise noted)

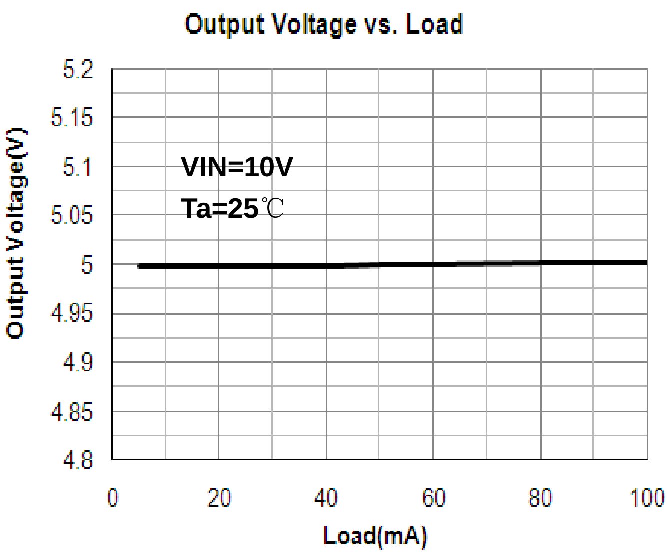
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	I_O=40mA, VIN=10V	4.82	5.0	5.18	V
		I_O=1mA～40mA VIN=7V～20V	4.8	5.0	5.2	
		I_O=1mA～10mA VIN=10V	4.75	5.0	5.25	
Line Regulations	LNR	VIN=7V～20V,I_O=40mA	-150	-	150	mV
		VIN=8V～20V,I_O=40mA	-100	-	100	
Load Regulation	LDR	VIN=10V,I_O=1mA-100mA	-60	-	60	mV
		VIN=10V,I_O=1mA-40mA	-30	-	30	
Dropout Voltage	V_{DIF}	Tj=25^{O}C,Io=100mA	-	2	-	V
Output noise Voltage	V_N	f=10Hz to 100KHz	-	40	-	μV/Vo
Ripple Rejection	PSRR	Tj=25^{O}C,f=120Hz,Io=40mA VIN=8V～20V	-	80	-	dB
Peak Output Current	I_{pk}	Tj=25^{O}C	-	500	-	mA
Quiescent Current	I_Q	VIN=10V,I_{OUT}=40mA	-	-	5.5	mA
Quiescent Current Change	ΔI_Q	VIN=8V～20V,I_O=40mA	-1.5	-	1.5	mA
		VIN=10V,I_O=1mA～40mA,	-0.1	-	0.1	

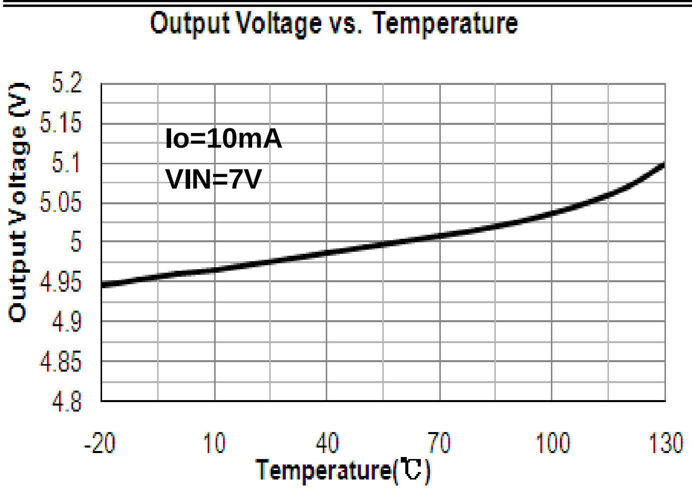
LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

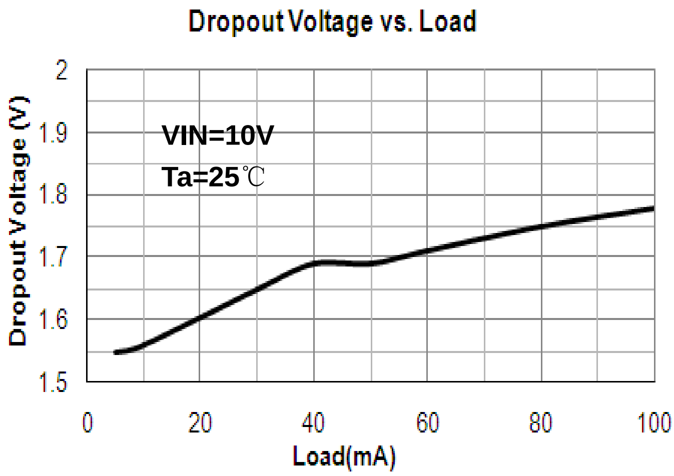
LDR: Load Regulation.The change in output voltage for a change in load current at constant chip temperature.

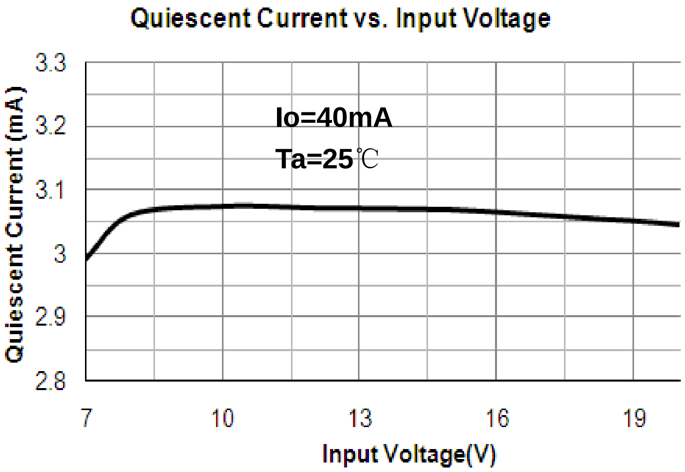
Type Characteristics

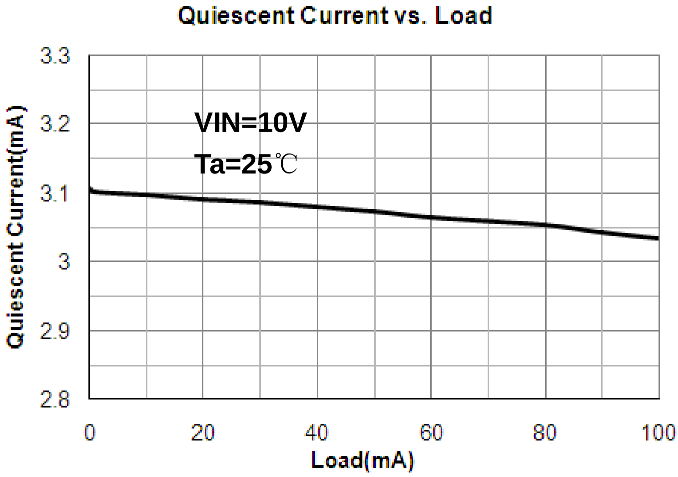












Operation Description

ME78L05 is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33μFor larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator’s input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Typical Application Circuit

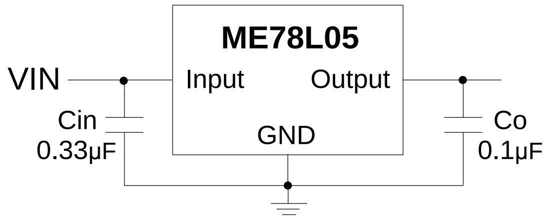


Fig.1 Fixed Output Regulator

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

- Cin is required if regulator is located an appreciable distance from power supply filter.
- Co is not needed for stability; however, it does improve transient response.

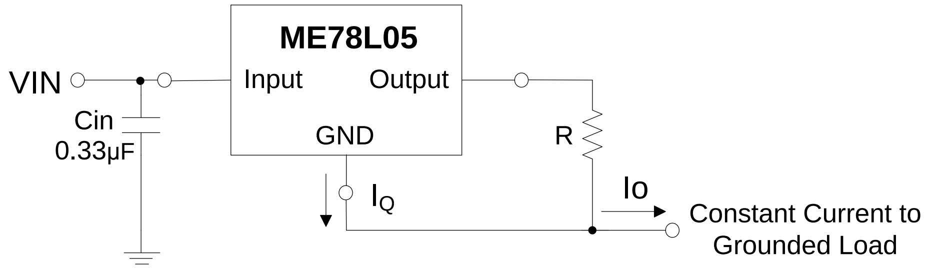


Fig.2 Constant Current Regulator

The ME78L05 regulatorcan also be used as a current source when connected as Fig.2. In order to minimize dissipation the ME78L05 is chosen in this application. Resistor R determines the current as follows: $I_O = \frac{5V}{R} + I_Q$

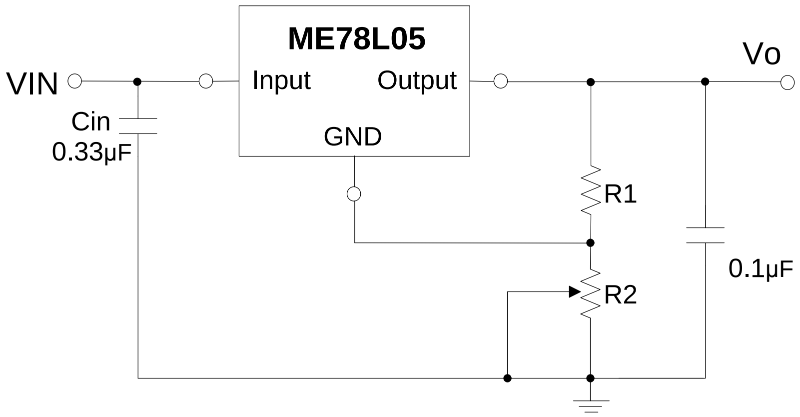


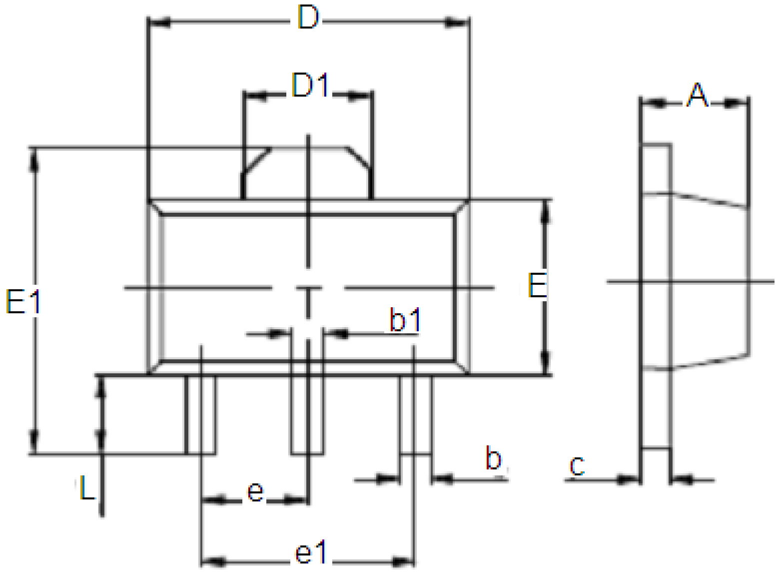
Fig.3 Adjustable Output Regulator

$Vo=5V+5V/R1+I_Q)*R2$

$5V/R1>3*I_Q$

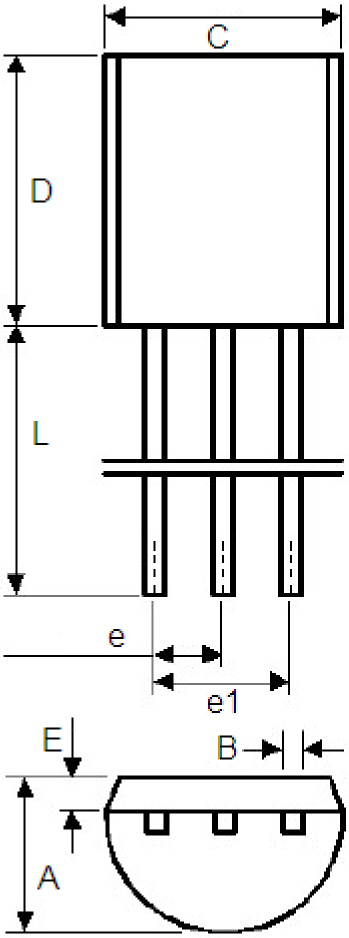
Package Information

Package Type:SOT89-3 Unit:mm(inch)



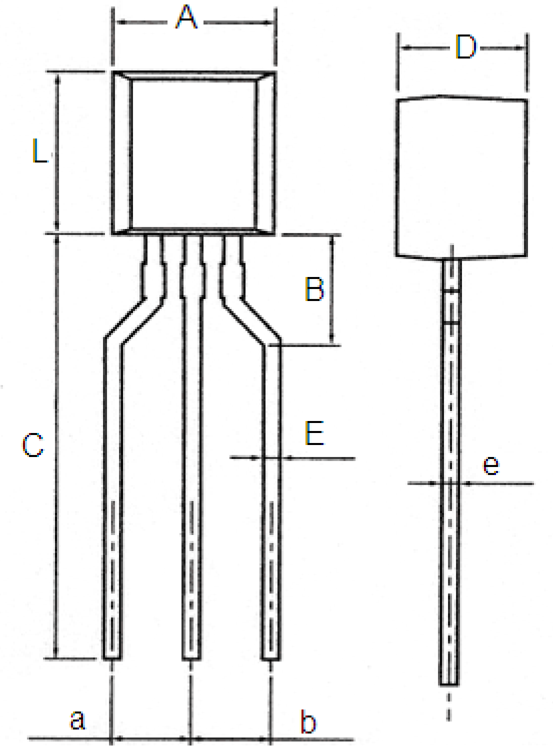
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.055	0.063
D	4.4	4.5	0.173	0.181
D1	1.55REF		0.06REF	
E	2.35	2.55	0.091	0.102
E1	3.94	4.26	0.155	0.167
L	0.9	1.1	0.035	0.047
b	0.35	0.52	0.013	0.197
b1	0.4	0.58	0.016	0.023
c	0.35	0.44	0.014	0.017
e	Type:1.5		Type:0.05	
e1	Type:3.0		Type:0.115	

Packaging Type: TO-92　Unit:mm(inch)



	Min	Max	Min	Max
A	3.4	3.7	0.1338	0.1457
B	0.36	0.5	0.0142	0.0167
C	4.35	4.7	0.1712	0.1850
D	4.35	4.7	0.1712	0.1850
E	0.9	1.5	0.0354	0.059
e	1.17	1.37	0.046	0.0539
e1	2.39	2.69	0.094	0.1059
L	12	16	0.4724	0.6299

Packaging Type: TO-92 taping package Unit:mm(inch)



	Min	Max	Min	Max
A	4.35	4.7	0.1712	0.1850
B	3.25	3.75	0.1279	0.1476
C	13.2	13.8	0.5197	0.5433
D	3.4	3.7	0.1338	0.1457
E	0.4	0.55	0.0157	0.0216
a	2.3	2.7	0.0905	0.1063
b	2.3	2.7	0.0905	0.1063
e	0.36	0.5	0.0142	0.0167
L	4.35	4.7	0.1712	0.1850

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3-Terminal 0.5A Positive Voltage Regulator ME78M05

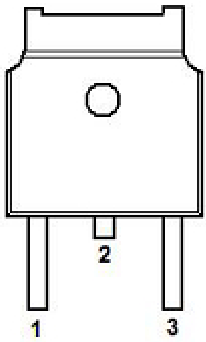
General Description

ME78M05 is a three-terminal positive regulator. Internal current limiting, thermal shutdown circuitry and safe-area compensation for the internal pass transistor combine to make these devices remarkably rugged under most operating conditions. Maximum output current, with adequate heat- sinking is 500 mA.

Features

- ●Output Current up to 0.5A
- ●Output Voltages of 5V
- ●Thermal Overload Protection
- ●Short Circuit Protection
- ●Package：TO252

Pin Configuration



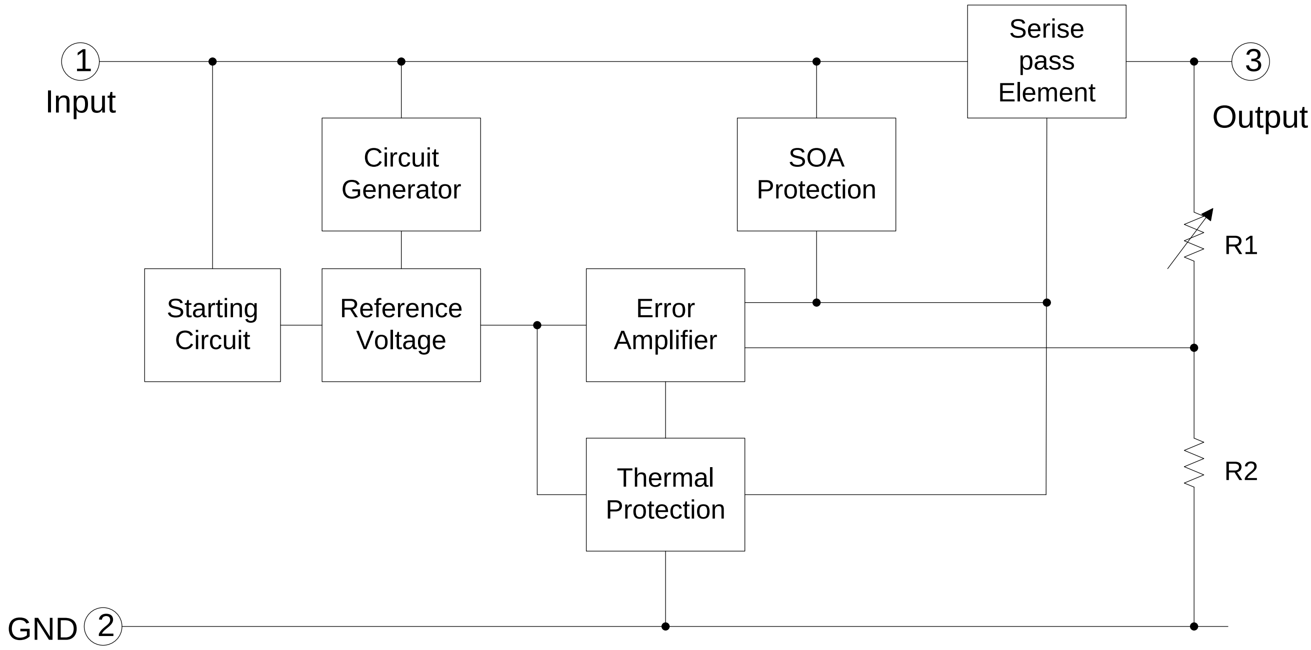
1. Input
2. GND
3. Output

Maximum Ratings(Ta=25℃)

Parameter	Rating	Unit
Input supply voltage : VIN	35	V
MAX. Output current:Iout	500	mA
Maximum junction temperature: T_j	-25～125	℃
Storage temperature :T_{str}	-55～150	℃
Soldering temperature and time	+260（Recommended 10S）	℃

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.

Block Diagram



Electrical Characteristics

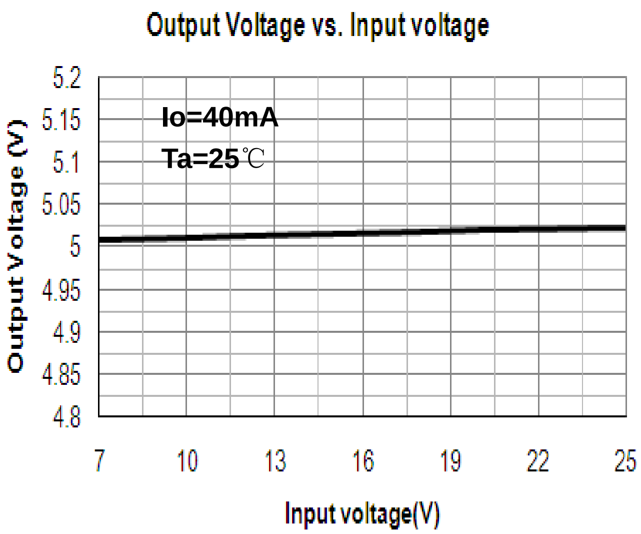
(Io =350mA, VIN=10V,0≤Tj≤125^{O}C, unless otherwise noted)

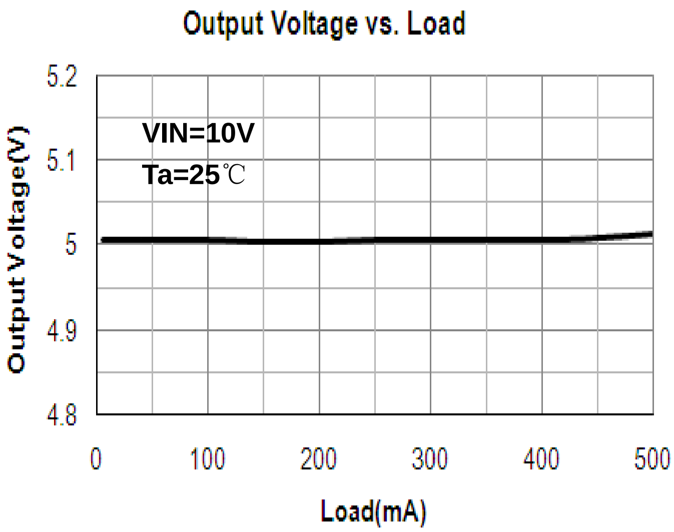
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	I_O=40mA, VIN=10V	4.8	5.0	5.2	V
		I_O=5mA～350mA VIN=7V～20V	4.75	5.0	5.25	
Line Regulations	LNR	VIN=7V～20V,I_O=40mA	-60	-	60	mV
Load Regulation	LDR	VIN=10V,I_O=5mA-500mA	-100	-	100	mV
Dropout Voltage	V_{DIF}	Tj=25^{O}C,Io=500mA	-	2	-	V
Output noise Voltage	V_N	f=10Hz to 100KHz	-	40	-	μV/Vo
Ripple Rejection	PSRR	Tj=25^{O}C,f=120Hz,Io=300mA VIN=8V～20V	-	80	-	dB
Peak Output Current	I_{pk}	Tj=25^{O}C	-	1000	-	mA
Quiescent Current	I_Q	Tj=25^{O}C	-	3.2	8	mA
Quiescent Current Change	ΔI_Q	I_O=5mA-350mA	-	-	0.5	mA
		I_O=200mA, VIN=8V～20V	-	-	0.8	

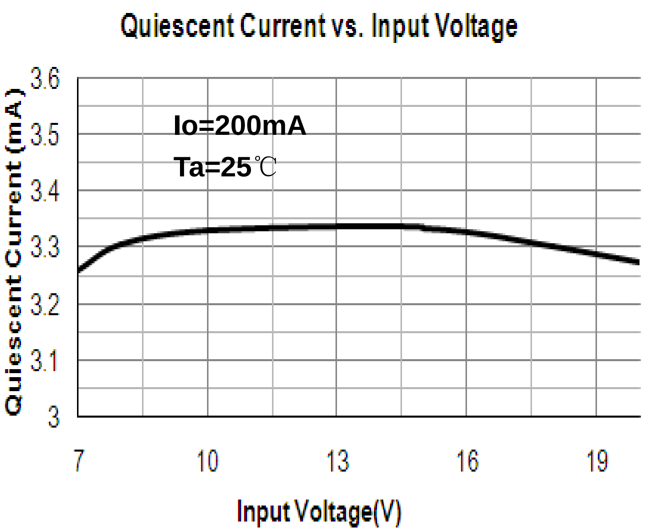
LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

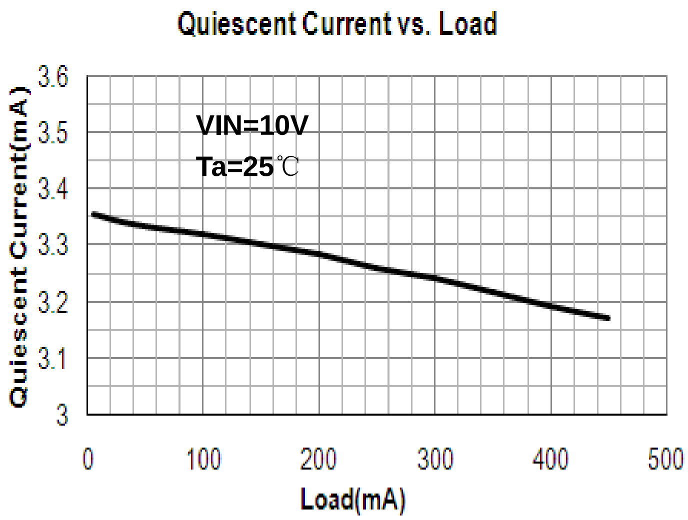
LDR: Load Regulation.The change in output voltage for a change in load current at constant chip temperature.

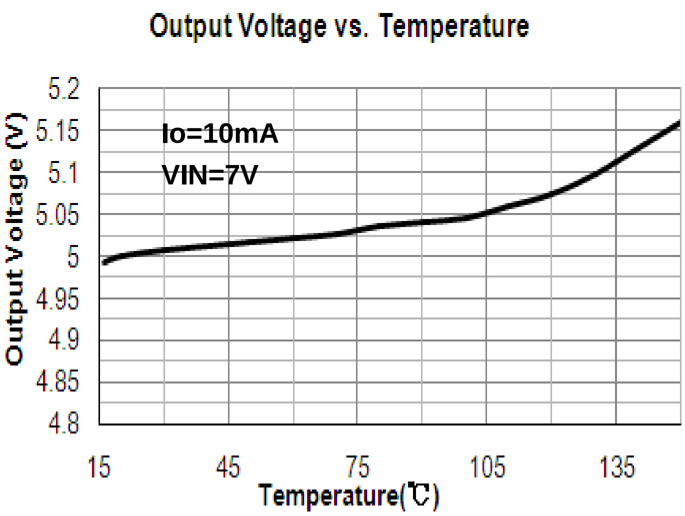
Type Characteristics

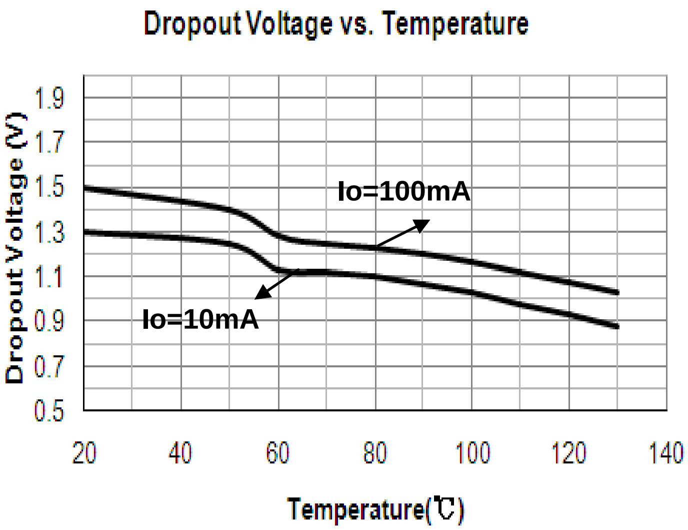












Operation Description

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In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33μFor larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Typical Application Circuit

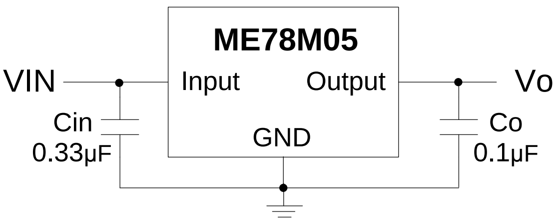


Fig.1 Fixed Output Regulator

Note:a.Cin is required if the regulator is located an appreciable distance from the power supply filter.

b.Although no output capacitor is needed for stability, it does improve transient response.

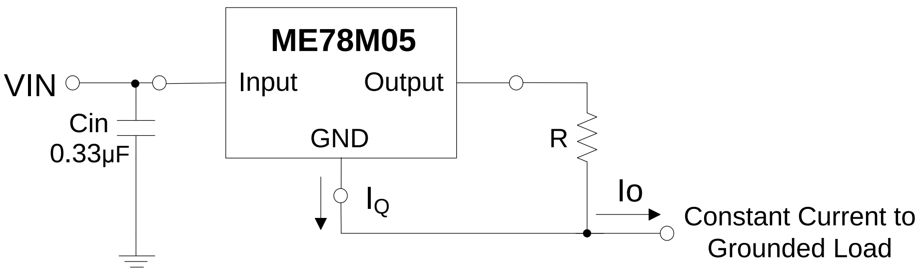
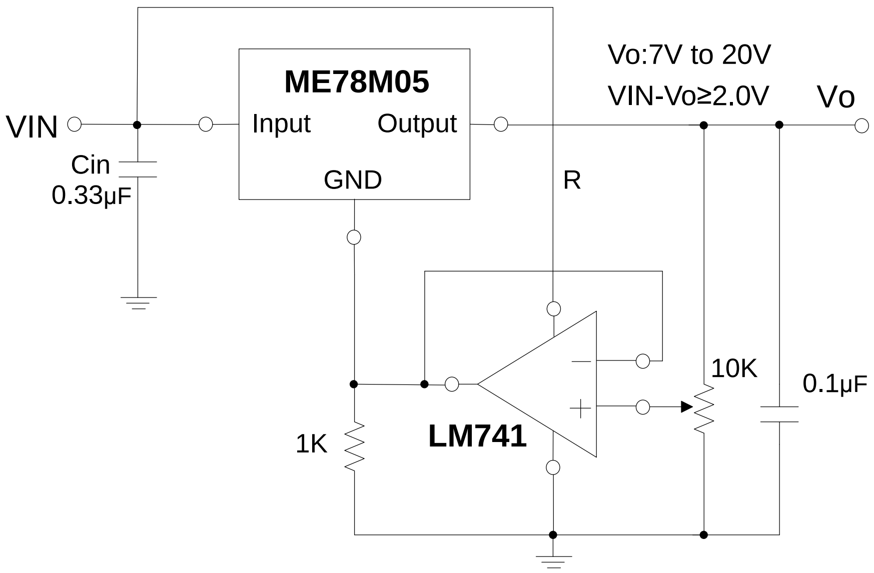


Fig.2 Constant Current Regulator

The ME78M05 regulatorcan also be used as a current source when connected as Fig.2. In order to minimize dissipation the ME78M05 is chosen in this application. Resistor R determines the current as follows:

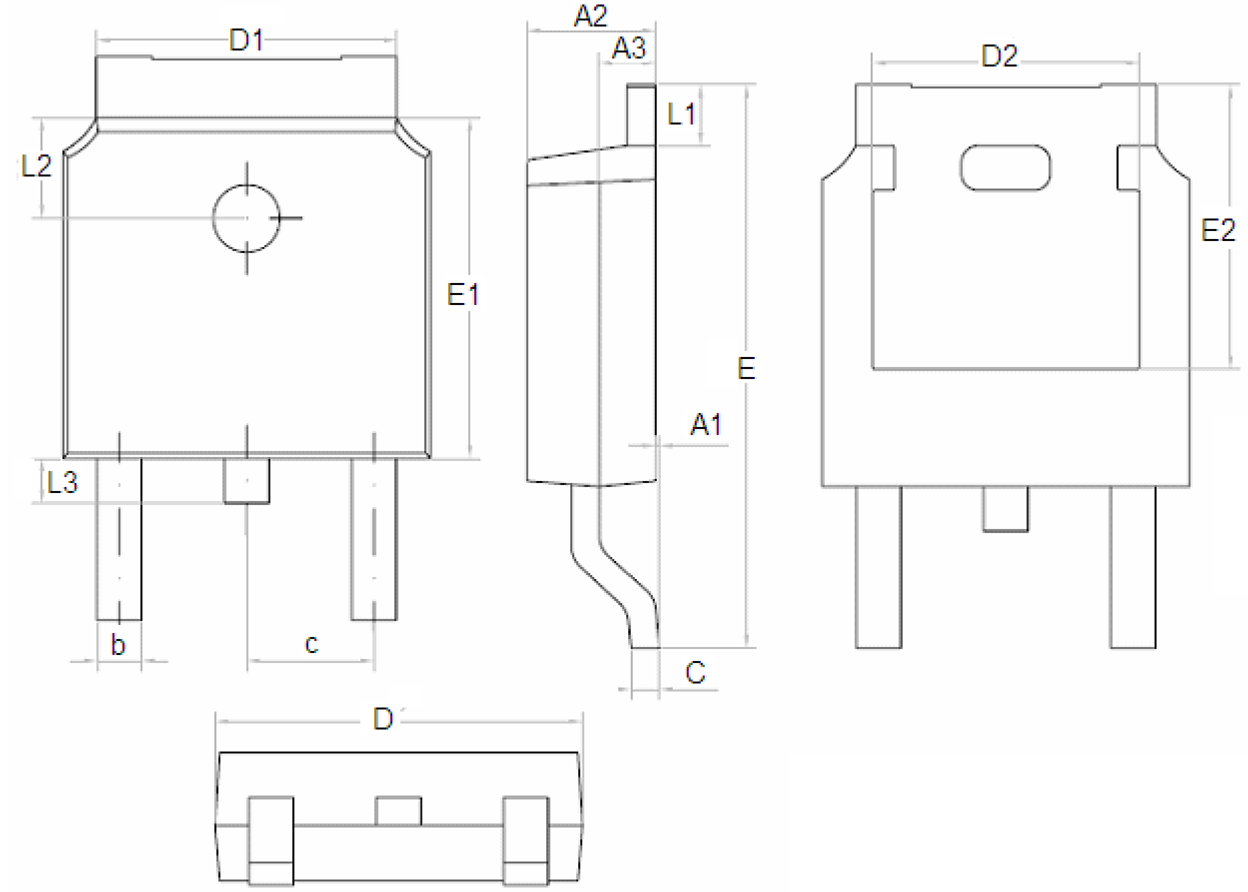
$$I_O = \frac{5V}{R} + I_Q$$



The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtainable with this arrangement is 2.0 V greater than the regulator voltage.

Package Information

Package Type:TO-252



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A1	0	0.1	0	0.004
A2	2.20	2.40	0.0866	0.0945
A3	0.90	1.10	0.0354	0.0433
b	0.75	0.85	0.0295	0.0335
c	2.20	2.40	0.0866	0.0945
C	0.50	0.60	0.0197	0.0236
D	6.50	6.70	0.2559	0.2638
D1	5.30	5.50	0.2087	0.2165
D2	4.70	4.90	0.1850	0.1929
E	9.90	10.30	0.3898	0.4055
E1	6.00	6.20	0.2362	0.2441
E2	5.20	5.40	0.2047	0.2126
L1	0.90	1.25	0.0354	0.0492
L2	1.70	1.90	0.0669	0.0748
L3	0.60	1.00	0.0236	0.0394

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1.0A Adjustable Voltage High Speed LDO Regulators ME1117 Series

General Description

ME1117 series are highly accurate, low noise, LDO Voltage Regulators that are capable of providing an output current that is in excess of 1.0 A with a maximum dropout voltage of 1.3 V at 1.0A. This series contains six fixed output voltages of 1.2 V, 1.5V,1.8 V, 2.5 V, 3.3 V, and 5.0 V that have no minimum load requirement to maintain regulation. Also included is an adjustable output version that can be programmed from 1.25 V to 20 V with two external resistors. On chip trimming adjusts the reference/output voltage to within ±2.0% accuracy. Internal protection features consist of output current limiting, safe operating area compensation, and thermal shutdown. The ME1117 series can operate with up to 20 V input.

Features

- Output Current in Excess of 1.0A
- Dropout Voltage：1.07V@ I_{OUT} =100mA
- Operating Voltage Range：
  4.8V～20V（ME1117A33）
- Highly Accuracy： ±2％
- Adjustable Output Voltage Option
- Standby Current：3mA（TPY.）
- High Ripple Rejection：60dB@1KHz（ME1117A33）
- Line Regulation: 0.1％（TYP.）
- Temperature Stability≤0.5%
- Current Limit（1.3A）
- Thermal Shutdown Protection（160℃）

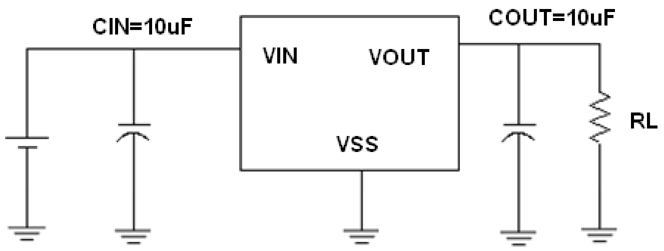
Typical Application

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

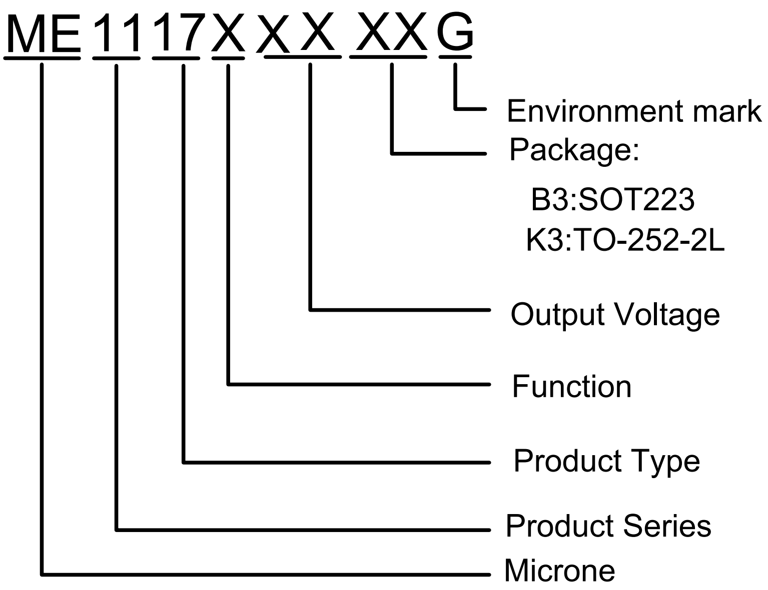
Package

- 3-pin SOT223、、TO-252-2L

Typical Application Circuit



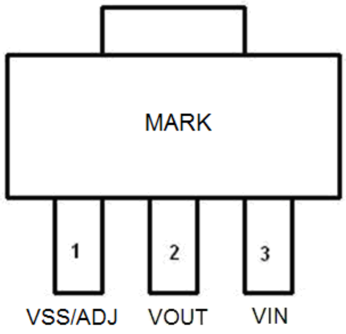
Selection Guide



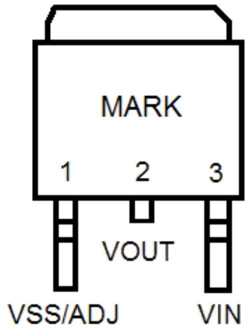
product series	product description
ME1117A15B3G	V_{OUT} =1.5V； Package：SOT223
ME1117A18B3G	V_{OUT} =1.8V； Package：SOT223
ME1117A25B3G	V_{OUT} =2.5V； Package：SOT223
ME1117A33B3G	V_{OUT} =3.3V； Package：SOT223
ME1117A50B3G	V_{OUT} =3.3V； Package：SOT223
ME1117A33K3G	V_{OUT} =3.3V； Package：TO-252-2L
ME1117A50K3G	V_{OUT} =3.3V； Package： TO-252-2L
ME1117FB3G	V_{FB} =1.25V； Package：SOT223

NOTE: At present ,there are six kinds of voltage value:1.25V（VFB）、 1.5V、1.8V、2.5V、3.3V、5.0V。If you need other voltage and package, please contact our sales staff。

Pin Configuration



SOT223



TO252-2L

Pin Assignment

ME1117A

Pin Number	Pin Name	Functions
1	V_{SS}	Ground
2	V_{OUT}	Output
3	V_{IN}	Power Input

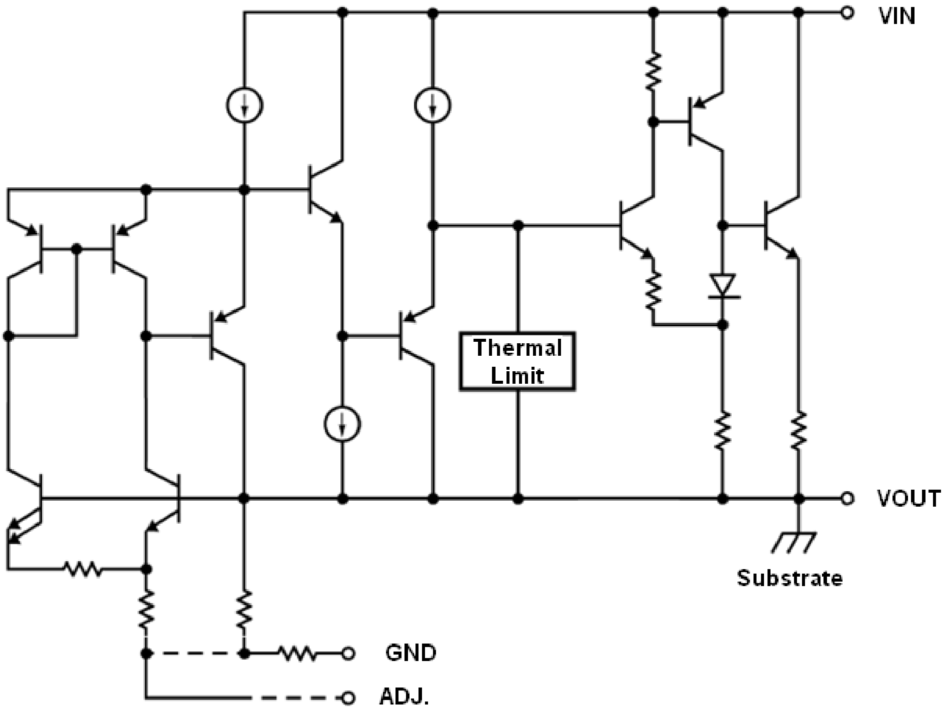
ME1117F

Pin Number	Pin Name	Functions
1	V_{ADJ}	Adjustable Output
2	V_{OUT}	Output
3	V_{IN}	Power Input

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Voltage		V_{IN}	20	V
Output Current		I_{OUT}	1.3	A
Output Voltage		V_{OUT}	Vss-0.3～V_{IN} +0.3	V
Power Dissipation	SOT223	P_D	750	mW
	TO252-2L		2000	mW
Operating Temperature Range		T_{OPR}	－40～＋125	℃
Storage Temperature Range		T_{STG}	－40～＋150	℃
Junction Temperature Range		T_J	0～＋150	℃
Lead Temperature	SOT223		260℃，4sec	
	TO252-2L		260℃，10sec	
Thermal Resistance Junction-to-Case	SOT223		15	°C/W
	TO252-2L		10	°C/W
Thermal Resistance Junction-to-Ambient (No heat sink; No air flow)	SOT223		136	°C/W
	TO252-2L		92	°C/W

Block Diagram



Electrical Characteristics

ME1117F

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C ,unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reference Voltage	V_{REF}	V_{IN}= V_{OUT}+1.5V，I_{OUT} =10mA 10mA≤I_{OUT}≤1A ， V_{OUT}+1.5V ≤V_{IN}≤20V	×0.98 ×0.98	1.25 1.25	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V		1000		mA
Minimum Output Current	I_{OUTMIN}	V_{IN}= V_{OUT}+1.5V		2		mA
Line Regulation	Δ $V_{REF-LINE}$	I_{OUT} =10mA V_{OUT}+1.5V ≤V_{IN}≤20V		0.03	0.2	%
Load Regulation	Δ$V_{REF-LOAD}$	V_{IN}= V_{OUT}+1.5V ,0mA≤I_{OUT}≤1A		9	13	mV
Adjustment Pin Current	I_{ADJ}	V_{IN}= V_{OUT}+1.5V		12	30	uA
Adjust Pin Current Change		10mA≤ I_{OUT}≤ 1A, 1.5V ≤ V_{IN}-V_{OUT} ≤ 20V		0.2	5	uA
Thermal Shutdown		Junction Temperature		150		℃

ME1117A12

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C ,unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	1.2 1.2	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}= V_{OUT}+1.5V , 0mA≤I_{OUT}≤1A			9	15	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.05	1.10	V
	V_{DIF2}	I_{OUT} =500mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.3	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA， V_{OUT}+1.5V ≤V_{IN}≤20V			1	6	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown	TJ	Junction Temperature			150		℃

ME1117A15

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C ,unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	1.5 1.5	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}= V_{OUT}+1.5V , 0mA≤I_{OUT}≤1A			12	16	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.05	1.10	V
	V_{DIF2}	I_{OUT} =500mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.3	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA， V_{OUT}+1.5V ≤V_{IN}≤20V			1	6	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown	TJ	Junction Temperature			150		℃

ME1117A18

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C ,unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	1.8 1.8	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}= V_{OUT}+1.5V , 0mA≤I_{OUT}≤1A			13	18	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.05	1.10	V
	V_{DIF2}	I_{OUT} =500mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.5	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA， V_{OUT}+1.5V ≤V_{IN}≤20V			1	6	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown		Junction Temperature			150		℃

ME1117A25

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C, unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	2.5 2.5	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}=V_{OUT}+1.5V ， 0mA≤I_{OUT}≤1000mA			17	25	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.05	1.10	V
	V_{DIF2}	I_{OUT} =800mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.5	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA， V_{OUT}+1.5V ≤V_{IN}≤20V			2	6	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown		Junction Temperature			150		℃

ME1117A33

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C, unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	3.3 3.3	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}= V_{OUT}+1.5V , 0mA≤I_{OUT}≤1A			24	33	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.07	1.10	V
	V_{DIF2}	I_{OUT} =800mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.5	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA， V_{OUT}+1.5V ≤V_{IN}≤20V			2	6	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown		Junction Temperature			150		℃

ME1117A50

(V_{IN}= V_{OUT}+1.5V，C_{IN}=C_L=10uF，Ta=25^{O}C, unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Output Voltage	V_{OUT}	I_{OUT}=10mA,V_{IN}= V_{OUT}+1.5V 10mA≤I_{OUT}≤1A， V_{OUT}+1.5V ≤V_{IN}≤20V		×0.98 ×0.98	5.0 5.0	×1.02 ×1.02	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1.5V			1000		mA
Load Regulation	$\Delta V_{OUT-LOAD}$	V_{IN}= V_{OUT}+1.5V , 0mA≤I_{OUT}≤1A			35	50	mV
Dropout Voltage (Note 1)	V_{DIF1}	I_{OUT} =100mA			1.05	1.10	V
	V_{DIF2}	I_{OUT} =800mA			1.20	1.30	V
	V_{DIF3}	I_{OUT} =1A			1.30	1.40	V
Quiescent Current	I_{SS}	V_{IN}= V_{OUT}+1.5V			3.8	8	mA
Line Regulation	$\Delta V_{OUT-LINE}$	I_{OUT} =10mA V_{OUT}+1.5V ≤V_{IN}≤20V			2	10	mV
Ripple Rejection Rate	PSRR	V_{IN} = 12V +1Vp-pAC	I_{OUT}=10mA,1kHZ		65		dB
			I_{OUT}=100mA,1kHZ		60		
Thermal Shutdown		Junction Temperature			150		℃

Note ： 1 .V_{DIF}：V_{IN1} –V_{OUT} (E)'

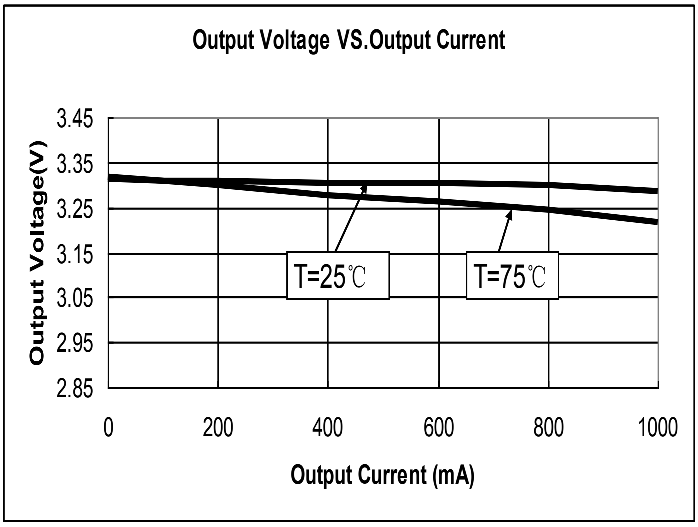
V_{IN1} ： The input voltage when V_{OUT}(E)' appears as input voltage is gradually decreased.

V_{OUT} (E)'=A voltage equal to 99% of the output voltage whenever an amply stabilized Iout and {V_{OUT} (T)+1.5V} is input.

Type Characteristics

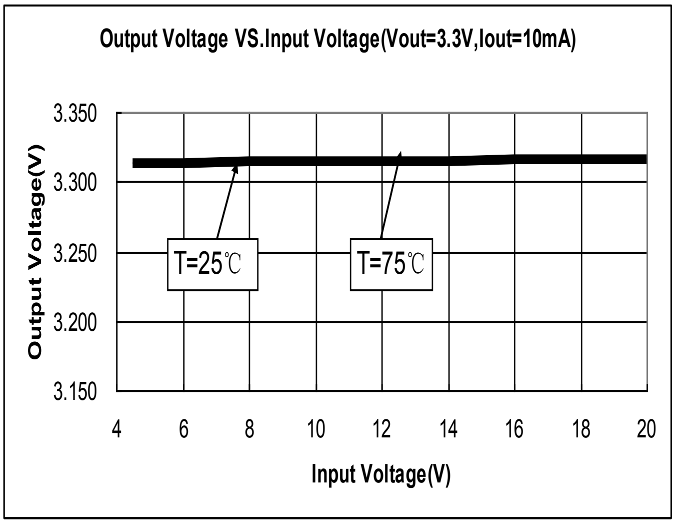
（1） Output Voltage VS. Output Current
（$V_{IN}=V_{OUT}+1.5V$）

ME1117A33



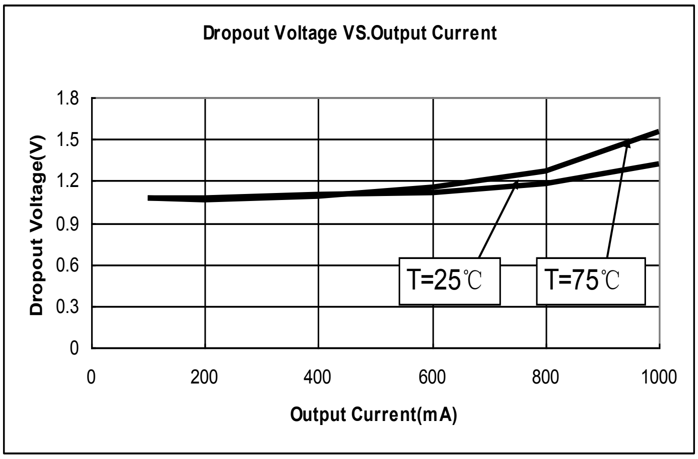
（2） Output Voltage VS. Input Voltage
（Vout=3.3V , I_{OUT}=10mA）

ME1117A33



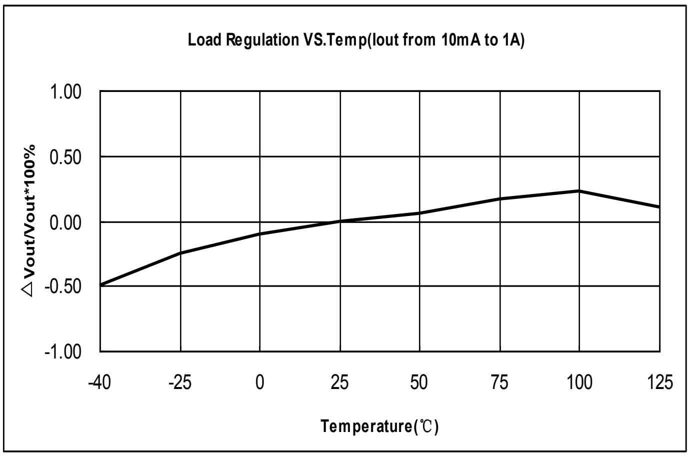
（3） Dropout Voltage VS. Output Current

ME1117A33



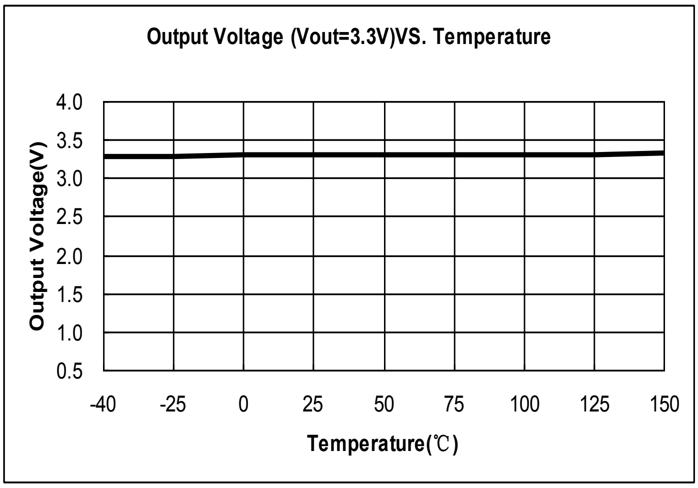
（4）Load Regulation VS.Temp(Iout from 10mA to 1A)

ME1117A33



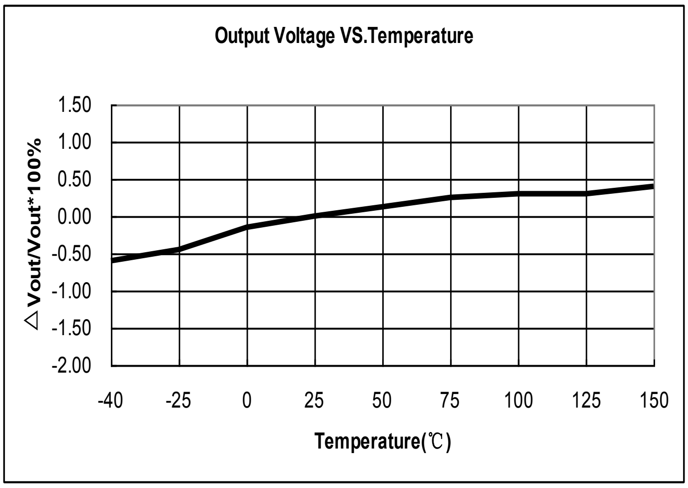
（5）Output Voltage VS. Temperature

ME1117A33



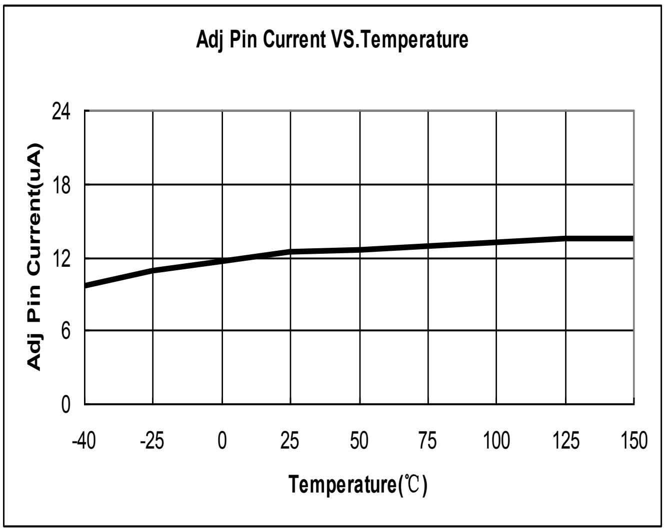
（6）Output Voltage Change VS. Temperature

ME1117A33



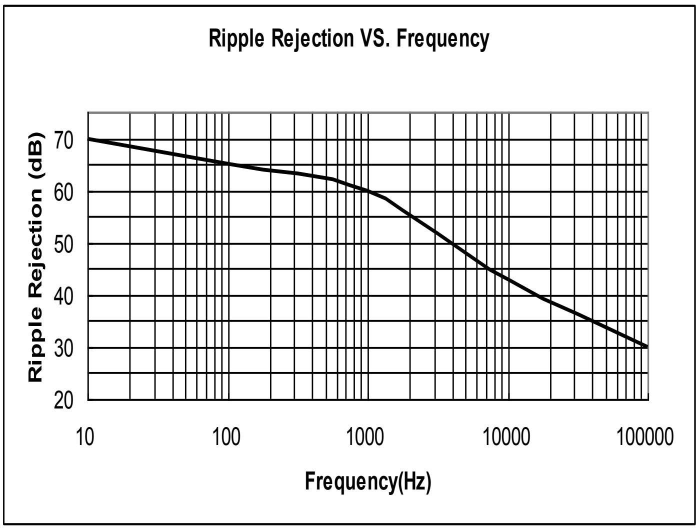
（7）Adj Pin Current VS.Temperature

ME1117F



（8）Ripple Rejection vs. Frequency

ME1117A33

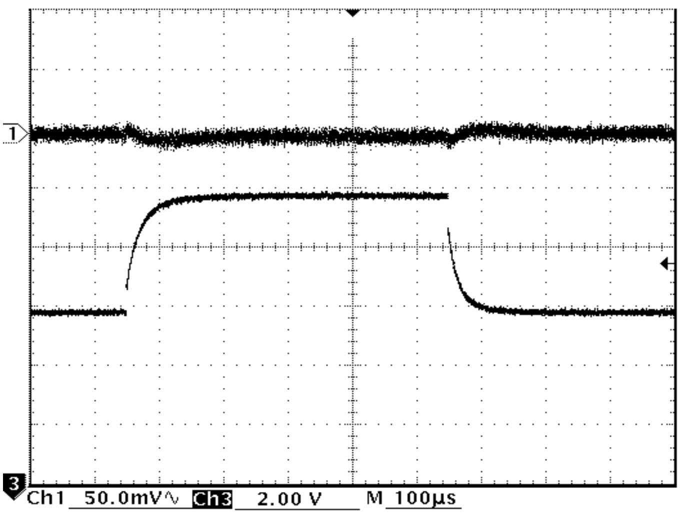


（9）Line Transient Response

ME1117A33

Ch1：Output Voltage Ch3：Input Voltage

V_{IN}=8V～12V,I_{OUT}=0mA,Ta = 25 °C

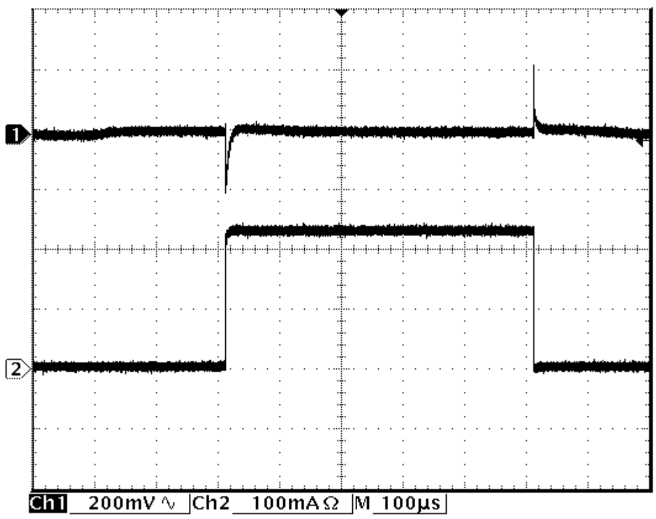


（10）Load Transient Response

ME1117A33

Ch1：Output Voltage Ch2：Load Current

V_{IN}=4.8V, I_{OUT}=0mA ～240mA,Ta = 25 °C



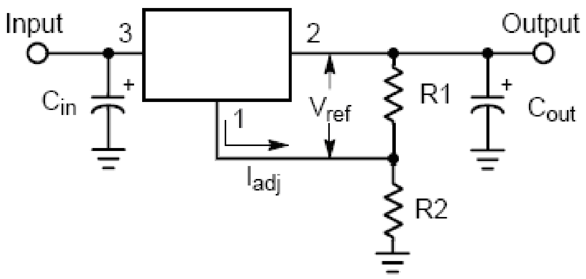
Applications Information

➢ **Introduction**

The ME1117 features a significant reduction in dropout voltage along with enhanced output voltage accuracy and temperature stability when compared to older industry standard three−terminal adjustable regulators.

➢ **Output Voltage**

The typical application circuit for adjustable output regulator is shown in following Figure. They develop and maintain the nominal 1.25 V reference voltage between the output and adjust pins. The reference voltage is programmed to a constant current source by resistor R1, and this current flows through R2 to ground to set the output voltage. The programmed current level is usually selected to be greater than the specified 3.0mA minimum that is required for regulation. Since the adjust pin current, I_{ADJ}, is significantly lower and constant with respect to the programmed load current, it generates a small output voltage error that can usually be ignored.



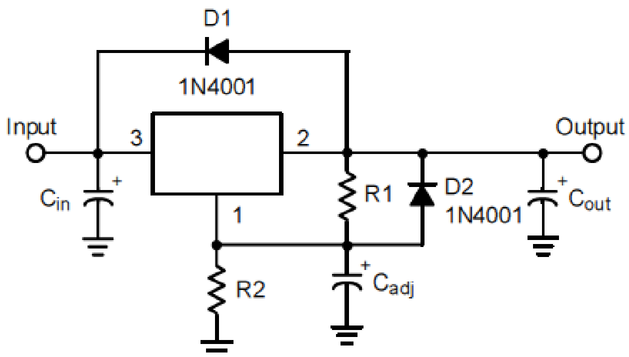
$$V_{out} = V_{ref}\left(1 + \frac{R2}{R1}\right) + I_{adj}\,R2$$

➢ **External Capacitors**

Input bypass capacitor C_{IN} may be required for regulator stability. This capacitor will reduce the circuit's sensitivity when powered from a complex source. A 10uF ceramic or tantalum capacitor should be adequate for most applications. Frequency compensation for the regulator is provided by capacitor C_{OUT} and its use is mandatory to ensure output stability. A minimum capacitance value of 4.7uF with an equivalent series resistance (ESR) that is within the limits of 0.25 ohm to 2.2 ohm is required. Higher values of output capacitance can be used to enhance loop stability and transient response with the additional benefit of reducing output noise. The output ripple will increase linearly for fixed and adjustable devices as the ratio of output voltage to the reference voltage increases.

➢ **Protection Diodes**

The ME1117 has two internal low impedance diode paths that normally do not require protection when used in the typical regulator applications. The first path connects between V_{OUT} and V_{IN} , and it can withstand a peak surge current of about 15 A. Only when V_{IN} is shorted to ground and C_{OUT} is greater than 100uF, it becomes possible for device damage to occur. Under these conditions, diode D1 is required to protect the device. The second path connects between C_{ADJ} and V_{OUT}, and it can withstand a peak surge current of about 150mA. Protection diode D2 is required if the output is shorted to ground and C_{ADJ} is greater than 10uF.

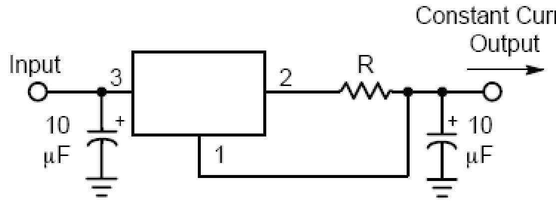


➢ **Thermal Considerations**

This series contains an internal thermal limiting circuit that is designed to protect the regulator in the event that the maximum junction temperature is exceeded. When activated, typically at 175°C, the regulator output switches off and then back on as the die cools.

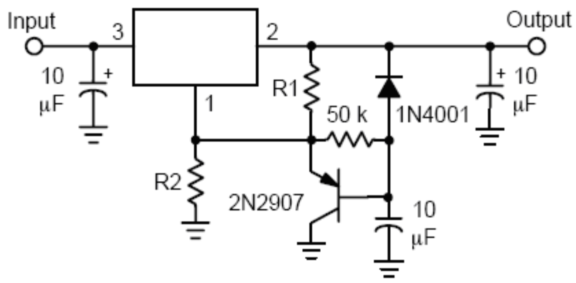
Other Application Circuit

（1） Constant Current Regulator

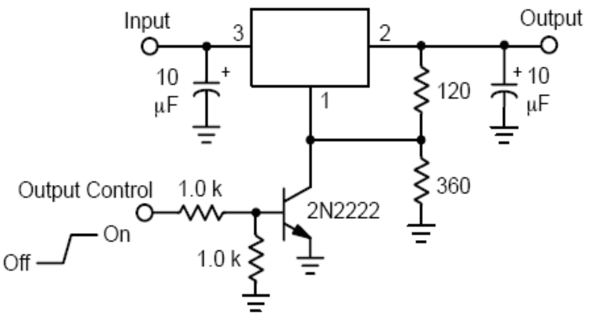


$$I_{out} = \frac{V_{ref}}{R} + I_{adj}$$

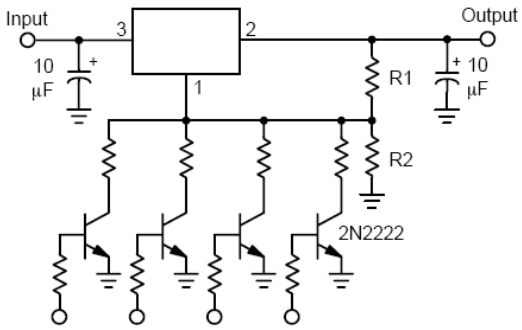
（2）Slow Turn−On Regulator



（3）Regulator with Shutdown

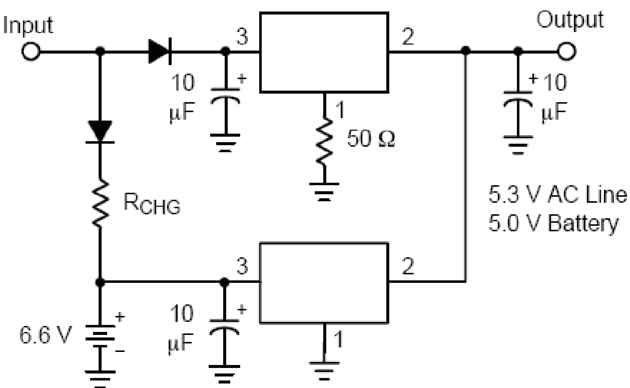


（4）Digitally Controlled Regulator



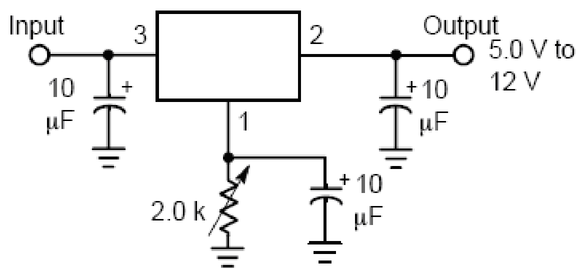
Resistor R2 sets the maximum output voltage. Each transistor reduces the output voltage when turned on.

（5）Battery Backed−Up Power Supply



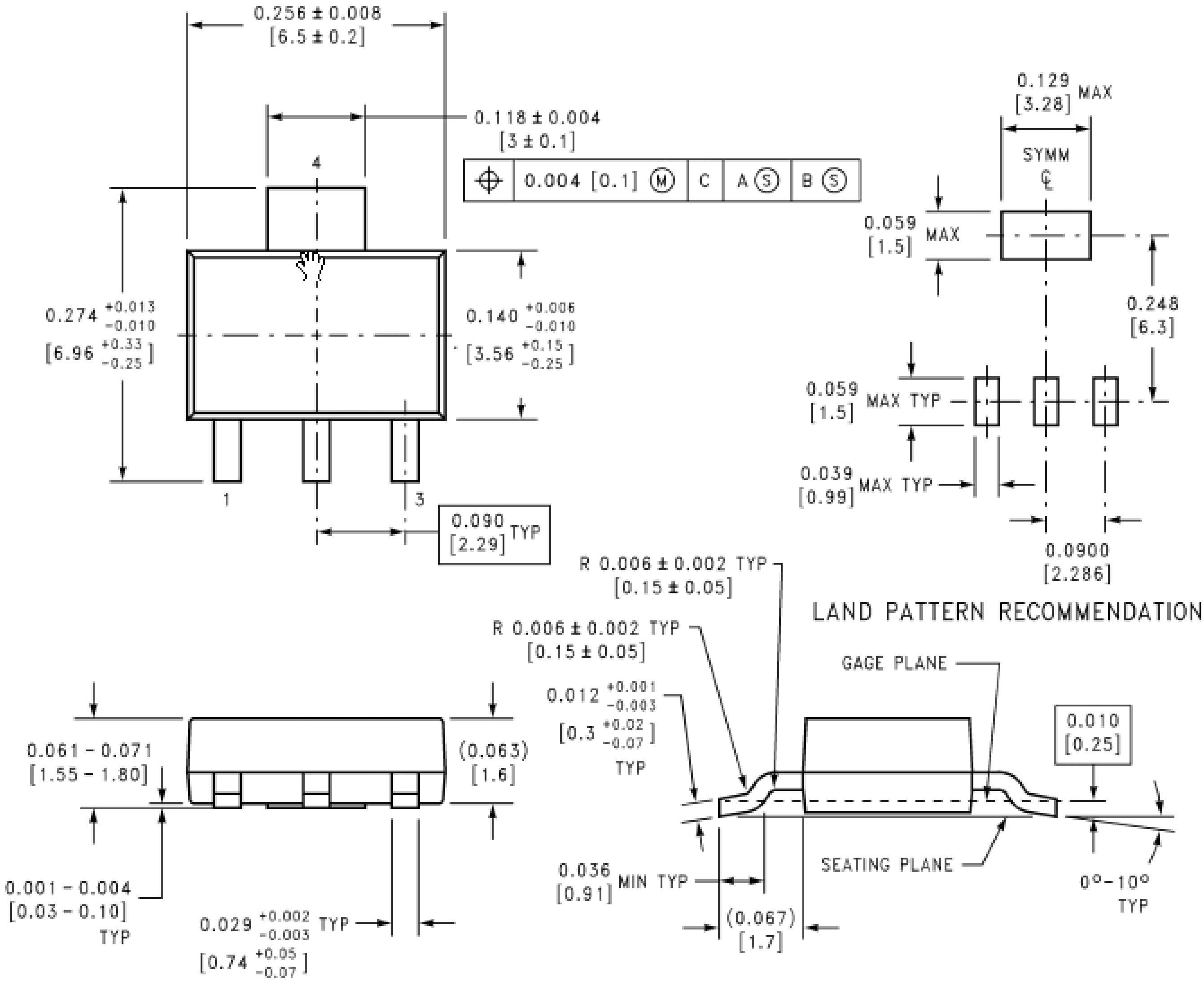
The 50 ohm resistor that is in series with the ground pin of the upper regulator level shifts its output 300 mV higher than the lower regulator. This keeps the lower regulator off until the input source is removed.

（6）Adjusting Output of Fixed Voltage Regulators

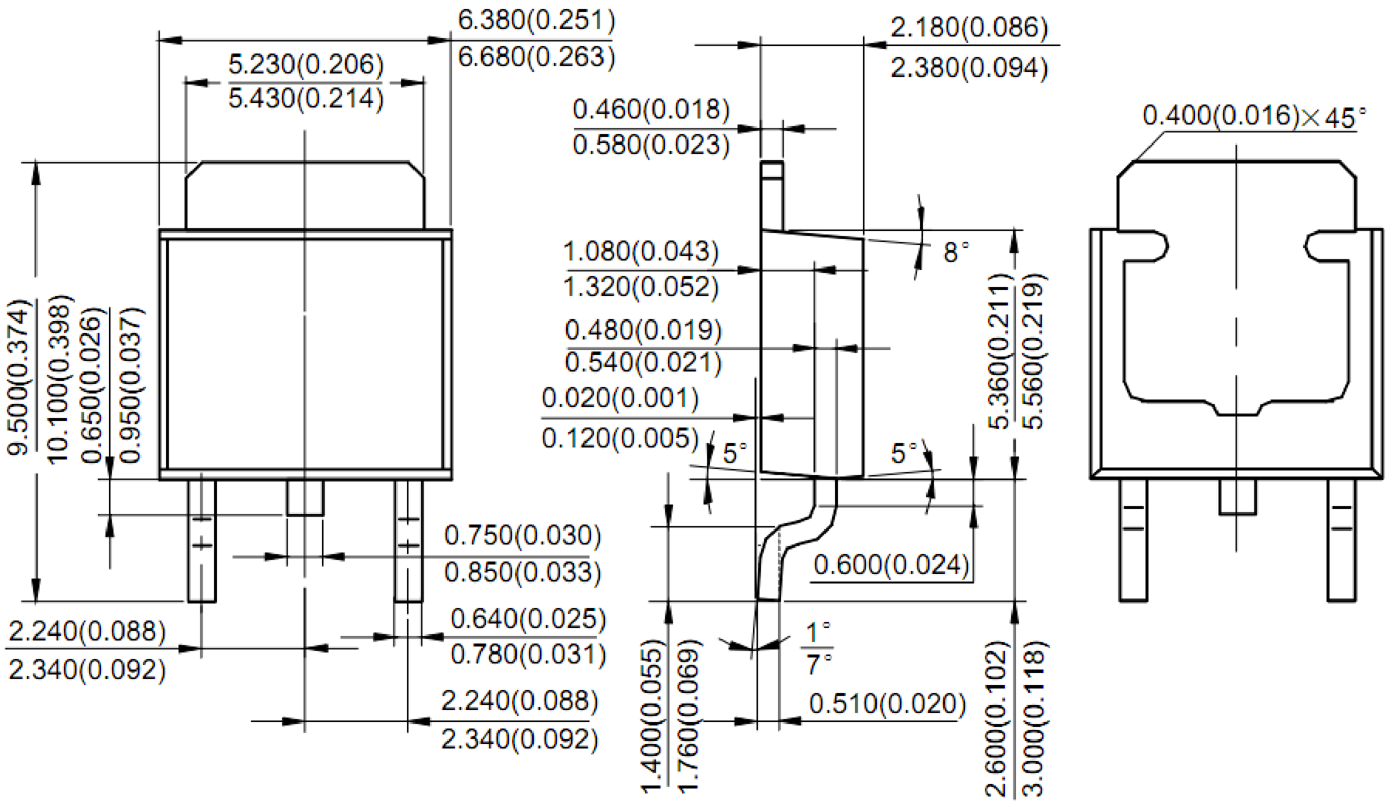


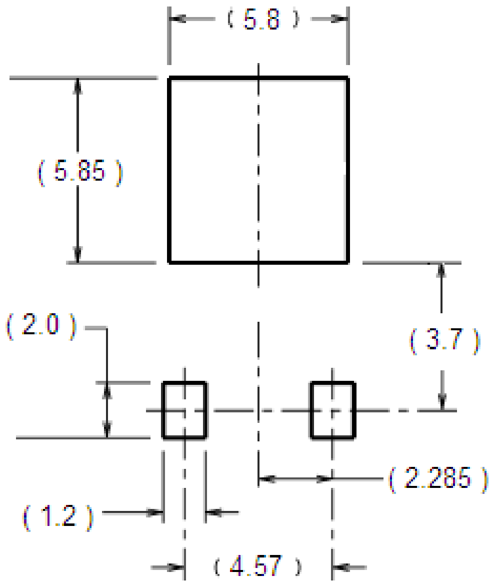
Packaging Information

- **SOT223**



● **TO252-2L**





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1.2A 3-Terminal Positive Voltage Regulator ME7805

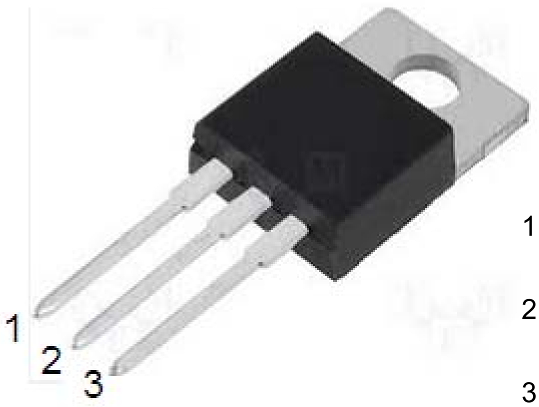
General Description

ME7805 is three-terminal positive regulators. One of these regulators can deliver up to 1.2A of output current. The internal limiting and thermal -shutdown features of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor Combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.

Features

- ●Output Current of 1.2A
- ●Output Voltages of 5V±5% over the temperature range
- ●Thermal Overload Protection
- ●Short Circuit Protection
- ●Output transistor safe area protection
- ●No external components
- ●Package：TO-220

Pin Configuration



1. Input
2. GND
3. Output

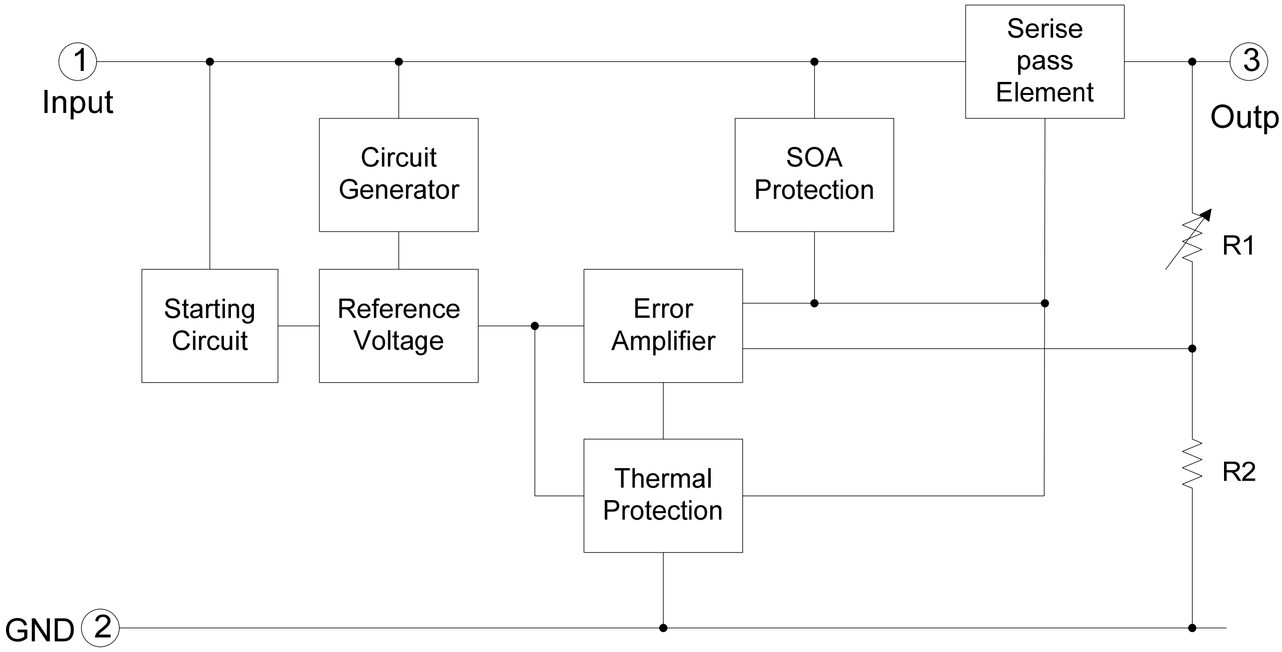
Maximum Ratings(Ta=25℃)

Parameter	Rating	Unit
Input supply voltage : VIN	35	V
MAX. Output current:Iout	1200	mA
Maximum junction temperature: T_j	-25～125	℃
Storage temperature :T_{str}	-65～150	℃
Soldering temperature and time	+260（Recommended 10S）	℃

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.

Block Diagram



Electrical Characteristics

(Cin =0.33μF, Co =0.1μF,0≤Tj≤125^{O}C, unless otherwise noted)

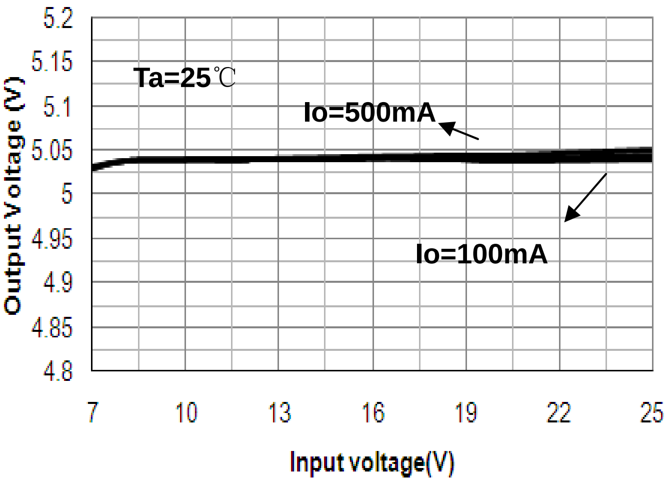
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	I_O=500mA, VIN=10V	4.8	5.0	5.25	V
		I_O=1mA～1A,Po≤15W VIN=8V～20V	4.65	5.0	5.35	
Line Regulations	LNR	VIN=7V～25V,I_O=500mA	-	3	50	mV
		VIN=8V～25V,I_O=500mA	-	1	25	
Load Regulation	LDR	VIN=10V,I_O=5mA-1.2A	-	-	100	mV
		VIN=10V,I_O=250mA-750mA	-	-	25	
Dropout Voltage	V_{DIF}	Tj=25^{O}C,Io=100mA	-	2	-	V
Output noise Voltage	V_N	f=10Hz to 100KHz	-	10	-	μV/Vo
Ripple Rejection	PSRR	Tj=25^{O}C,f=120Hz,Io=40mA VIN=8V～20V	-	68	-	dB
Quiescent Current	I_Q	VIN=10V,I_{OUT}=500mA	-	-	6.0	mA
Quiescent Current Change	ΔI_Q	VIN=14.5V～30V,I_O=500mA	-	-	0.8	mA
		VIN=10V,I_O=5mA～1A,	-	-	0.5	

LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

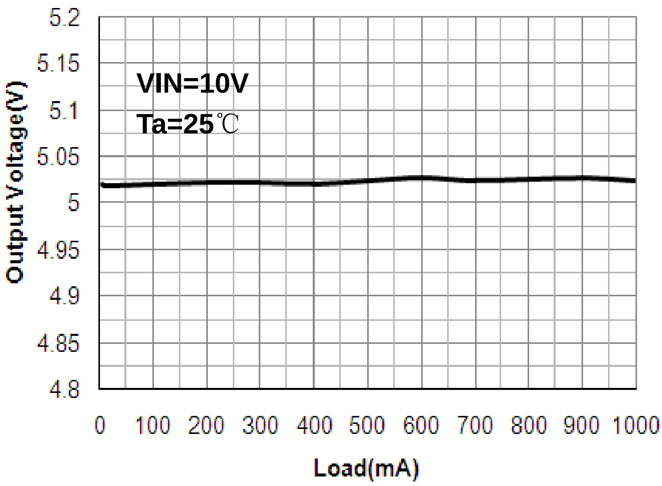
LDR: Load Regulation.The change in output voltage for a change in load current at constant chip temperature.

Type Characteristics

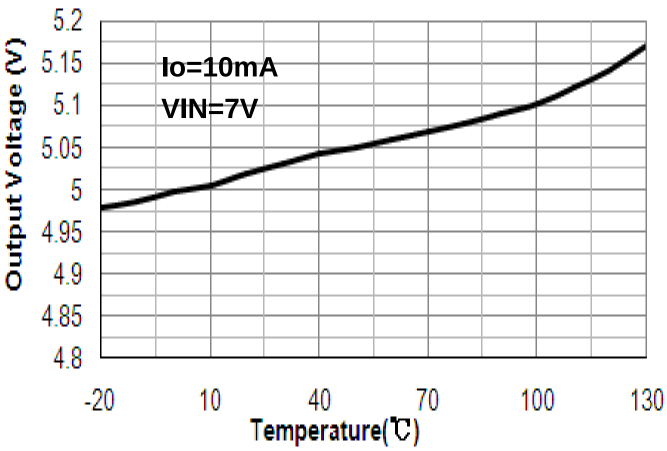
Output Voltage vs. Input voltage



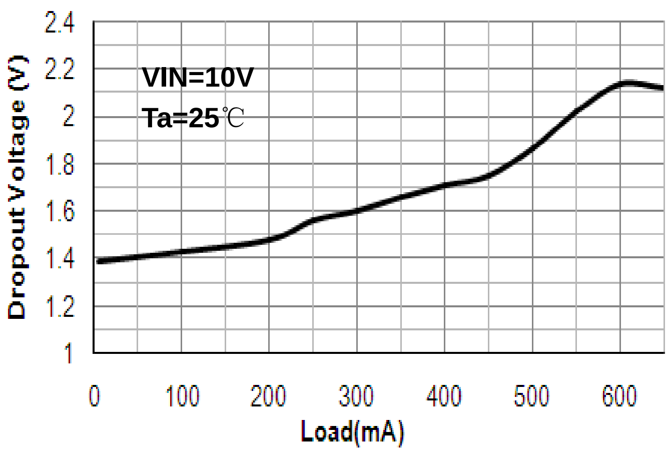
Output Voltage vs. Load



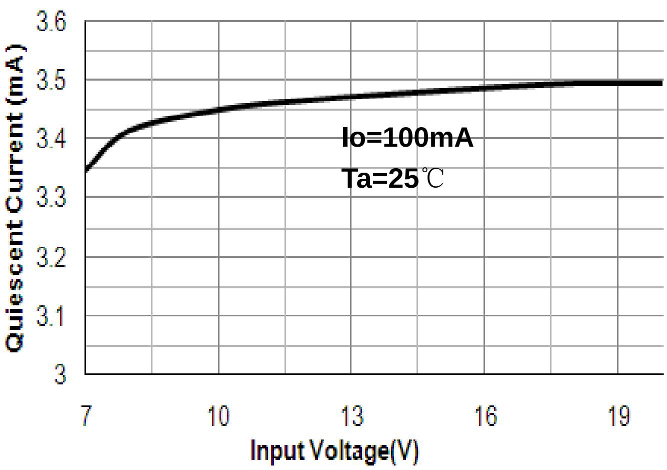
Output Voltage vs. Temperature



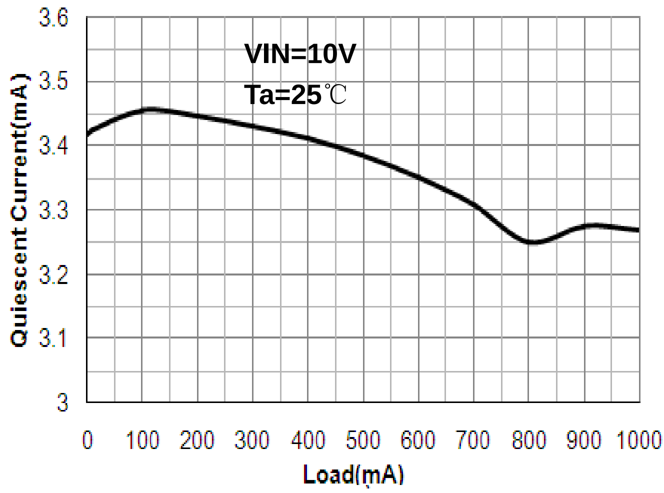
Dropout Voltage vs. Load



Quiescent Current vs. Input Voltage



Quiescent Current vs. Load



Operation Description

ME7805 is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33μFor larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Typical Application Circuit

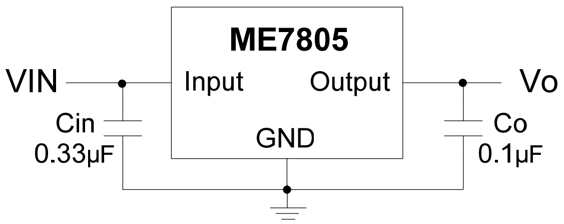


Fig.1 Fixed Output Regulator

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

- Cin is required if regulator is located an appreciable distance from power supply filter.
- Co is not needed for stability; however, it does improve transient response.

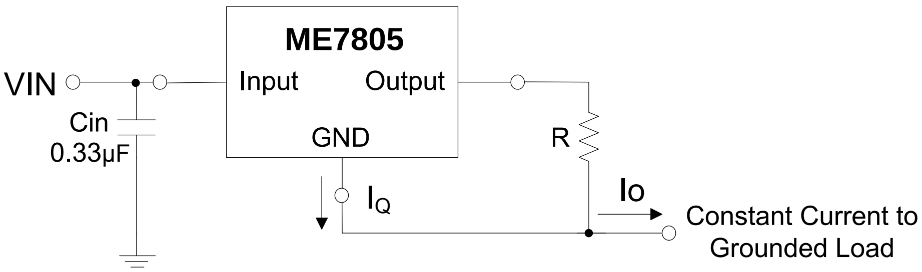


Fig.2 Constant Current Regulator

The ME7805 regulatorcan also be used as a current source when connected as Fig.2. In order to minimize dissipation the ME7805 is chosen in this application. Resistor R determines the current as follows:

$$I_O = \frac{5V}{R} + I_Q$$

$I_Q \cong 3.2mA$ over line and load changes

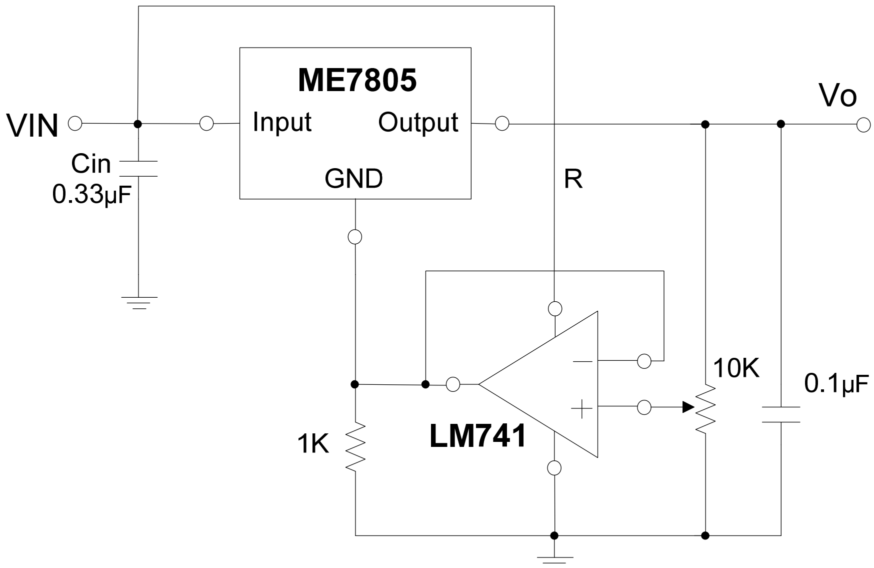
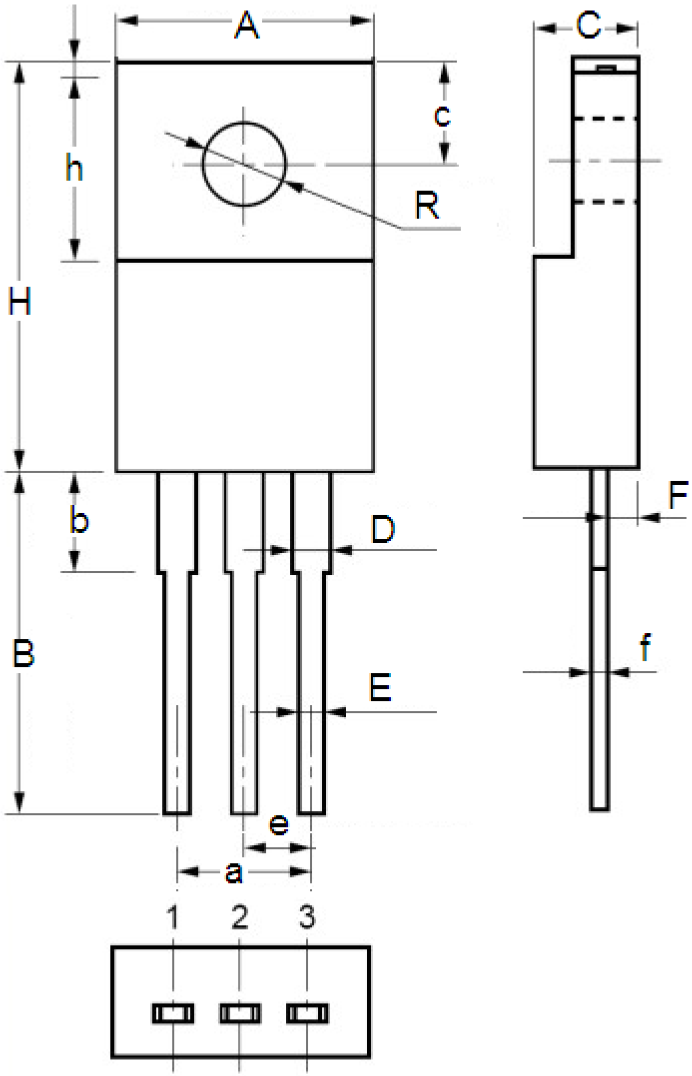


Fig.3 Adjustable Output Regulator

The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtainable with this arrangement is 2.0 V greater than the regulator voltage.

Package Information

Package Type:TO-220



Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	9.8	10.2	0.386	0.4016
a	4.58	5.58	0.1803	0.2197
B	13.5	14.5	0.5315	0.5709
b	4.0		0.1575	
C	4.0	4.4	0.1575	0.1732
c	4.0	4.4	0.1575	0.1732
D	1.3	1.5	0.0512	0.059
E	0.7	0.9	0.0276	0.0354
F	1.1	1.5	0.0433	0.059
f	0.4	0.7	0.0157	0.0246
H	16.4	17	0.6457	0.6693
h	7.3	7.7	0.2874	0.3031
R	Φ3.0	Φ3.2	Φ0.1181	Φ0.126

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