1A Bipolar Linear Regulator

DESCRIPTION

DTC1117 is a series of low dropout three-terminal regulators with a dropout of 1.3V at 1A load current. DTC1117 features a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, Vout = 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V, and 12V, DTC1117 has an adjustable version, which can provide an output voltage from 1.25 to 12V with only two external resistors.
DTC1117 offers thermal shut down and current limit functions, to assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2%. Other output voltage accuracy can be customized on demand, such as ±1%

DTC1117 is available in SOT-89 power package.

FEATURES

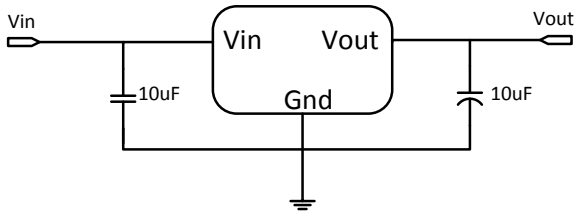
RoHS COMPLIANT

- Other than a fixed version and an adjustable version, output value can be customized on demand.
- Maximum output current is 1A
- Range of operation input voltage: Max 12V
- Standby current: 2mA (typ.)
- Line regulation: 0.1%/V (typ.)
- Load regulation: 10mV (typ.)
- Environment Temperature: -40°C~85°C

APPLICATIONS

- Power Management for Computer Mother Board, Graphic Card
- BLD Monitor and BLD TV
- DVD Decode Board
- ADSL Modem
- Post Regulators for Switching Supplies

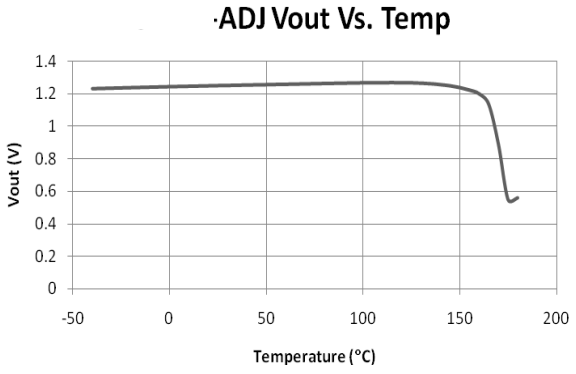
TYPICAL APPLICATION



Application circuit of DTC fixed version

NOTE: Input capacitor (Cin=10uF) and Output capacitor (Cout=10uF) are recommended in all application circuit. Tantalum or MLCC capacitor is recommended.

TYPICAL ELECTRICAL CHARACTERISTIC



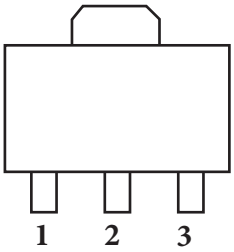
ORDERING INFORMATION

DTC1117-*F XX XX C*

Package Type:
C: SOT-89

Output Voltage:
12……1.2V
15……1.5V
18……1.8V
25……2.5V
33……3.3V
50……5.0V
AD: Adjustable Version

PIN CONFIGURATION



Pin Description:

Fixed Version

Pin No.	Symbol	Definition
1	GND	Ground
2	Vout	Output
3	Vin	Input

Adjustable Version

Pin No.	Symbol	Definition
1	Adj.	Adjustable
2	Vout	Output
3	Vin	Input

ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		15V①
Max Operating Junction Temperature(Tj)+		150°C
Ambient Temperature(Ta)		-40°C – 85°C
Package Thermal Resistance	SOT-223	20°C / W
	TO-252	10°C / W
Storage Temperature(Ts)		-40°C - 150°C
Lead Temperature & Time		260°C, 10S

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. 12V①
Operating Junction Temperature(Tj)	-20°C –125°C

① *Exceptional for DTC1117-12V, the maximum input voltage for DTC1117-12V is 20V.*

ELECTRICAL CHARACTERISTICS+

Tj=25°c

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference Voltage	DTC1117ADJ 10mA≤Iout≤1A , Vin=3.25V	1.225	1.25	1.275	V
Vout	Output Voltage	DTC1117-1.2V 0≤Iout≤1A , Vin=3.2V	1.176	1.2	1.224	V
		DTC1117-1.5V 0≤Iout≤1A , Vin=3.5V	1.47	1.5	1.53	V
		DTC1117-1.8V 0≤Iout≤1A , Vin=3.8V	1.764	1.8	1.836	V
		DTC1117-2.5V 0≤Iout≤1A , Vin=4.5V	2.45	2.5	2.55	V
		DTC1117-3.3V 0≤Iout≤1A , Vin=5.3V	3.234	3.3	3.366	V
		DTC1117-5.0V 0≤Iout≤1A , Vin=7.0V	4.9	5	5.1	V
		DTC1117-12.0V 0≤Iout≤1A , Vin=14V	11.76	12	12.24	V
ΔVout	Line Regulation	DTC1117-1.2V Iout=10mA, 2.7V≤Vin≤10V		0.1	0.2	%/V
		DTC1117-ADJ Iout=10mA, 2.75V≤Vin≤12V		0.1	0.2	%/V
		DTC1117-1.5V out=10mA, 3.0V≤Vin≤12V		0.1	0.2	%/V
		DTC1117-1.8V Iout=10mA, 3.3V≤Vin≤12V				
		DTC1117-2.5V Iout=10mA, 4.0V≤Vin≤12V		0.1	0.2	%/V
		DTC1117-3.3V Iout=10mA, 4.8V≤Vin≤12V		0.1	0.2	%/V
		DTC1117-5.0V Iout=10mA, 6.5V≤Vin≤12V		0.1	0.2	%/V
		DTC1117-12.0V Iout=10mA, 13.5V≤Vin≤20V		0.1	0.2	+%/V
ΔVout	Load Regulation	DTC1117-1.2V Vin =2.7V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-ADJ Vin =2.75V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-1.5V Vin=3.0V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-1.8V Vin=3.3V, 10mA≤Iout≤1A				
		DTC1117-2.5V Vin=4.0V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-3.3V Vin=4.8V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-5.0V Vin=6.5V, 10mA≤Iout≤1A		10	30	mV
		DTC1117-12.0V Vin=13.5V, 10mA≤Iout≤1A		10	30	mV

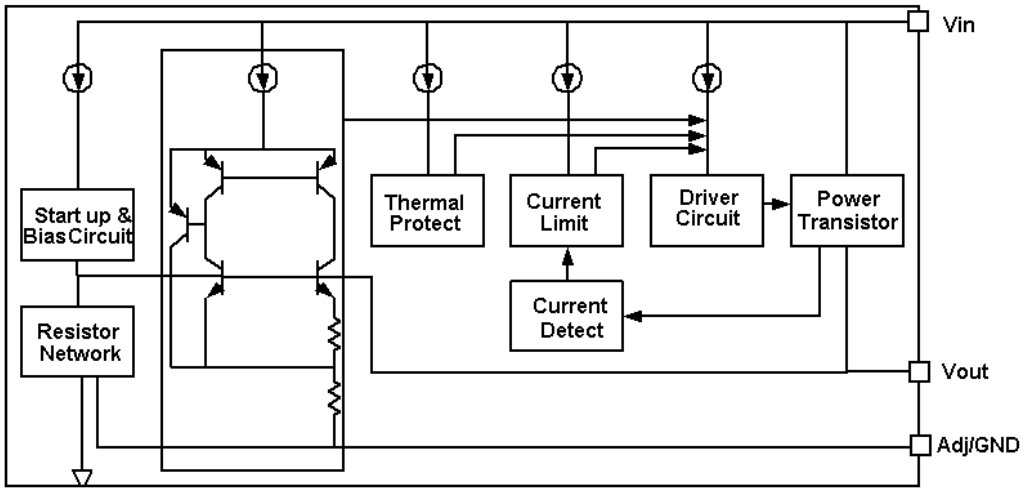
ELECTRICAL CHARACTERISTICS continued

+ Tj=25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vdrop	Dropout Voltage	Iout=100mA		1.23	1.3	V
		Iout=1A		1.3	1.5	V
Ilimit	Current Limit	Vin-Vout=2V, Tj=25°C	1			A
SVR	Supply Voltage Rejection	f = 120Hz, VIN – VOUT = 3V + 1VPP Ripple		60		dB
Imin	Minimum Load Current	DTC1117-ADJ	4	6	10	mA
Iq	Quiescent Current	DTC1117-1.2V, Vin =10V	1	2	5	mA
		DTC1117-1.5V, Vin =11V	1	2	5	mA
		DTC1117-1.8V, Vin =12V	1	2	5	mA
		DTC1117-2.5V,Vin =12V	1	2	5	mA
		DTC1117-3.3V, Vin =12V	1	2	5	mA
		DTC1117-5.0V, Vin =12V	1	2	5	mA
		DTC1117-12.0V, Vin =20V	1	2	5	mA
IAdj	Adjust Pin Current	DTC1117-ADJ Vin =5V, 10mA≤Iout≤1A	35	55	120	uA
Ichange	Iadj change	DTC1117-ADJ Vin =5V, 10mA≤Iout≤1A		0.2	10	uA
ΔV/ΔT	Temperature coefficient			±100		ppm

Note1: All test are conducted under ambient temperature 25°C andwithin a short period of time 20ms
Note2: Load current smaller than minimum load current of DTC ADJ will lead to unstable or oscillation output.

BLOCK DIAGRAM



DETAILED DESCRIPTION

DTC1117 is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, current limit, power transistors and its driver circuit and so on.

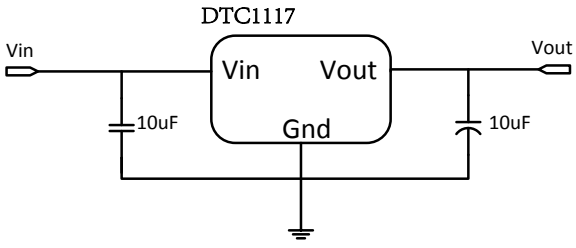
The thermal shut down modules can assure chip and its application system working safety when the junction temperature is larger than 140°C.

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100 ppm/°C. And the accuracy of output voltage is guaranteed by trimming technique.

TYPICAL APPLICATION

DTC1117 has an adjustable version and six fixed versions (1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V and 12V)

Fixed Output Voltage Version



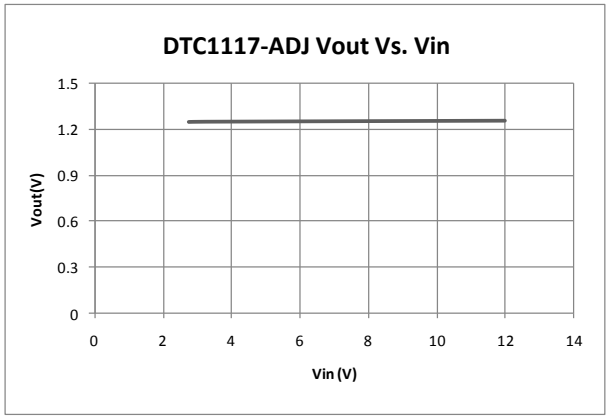
Application circuit of DTC1117 fixed version

1) *Recommend using 10uF tan capacitor or MLCC capacitor as bypass capacitor (C1) for all application circuit.*
2) *Recommend using 10uF tan capacitor MLCC capacitor to assure circuit stability.*
3) *Capacitor ESR range: 3mΩ ~ 22Ω*

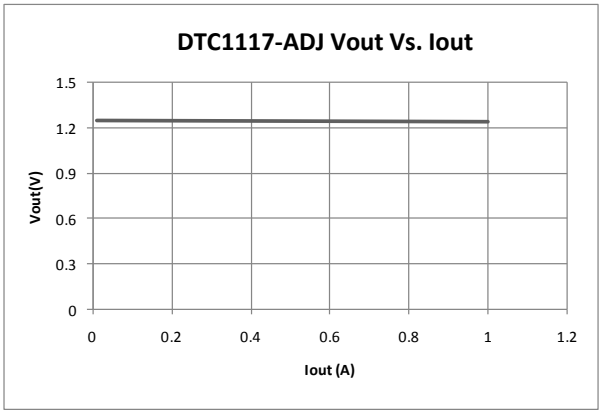
TYPICAL PERFORMANCE CHARACTERISTICS

T=25° C unless specified.

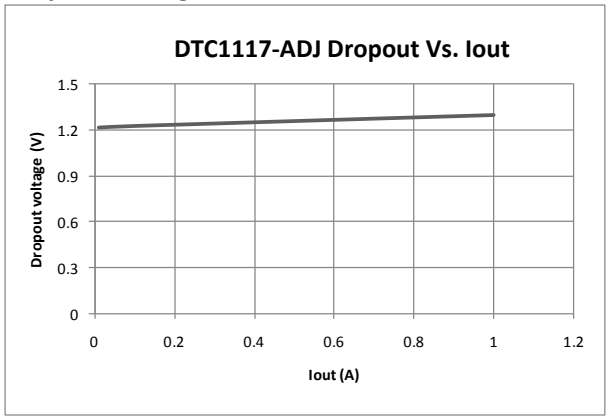
Line Regulation



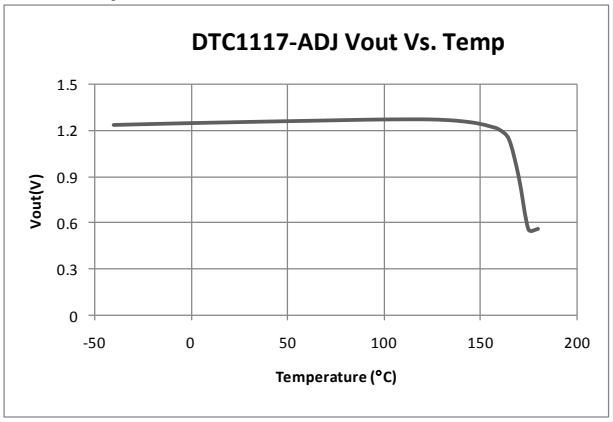
Load Regulation



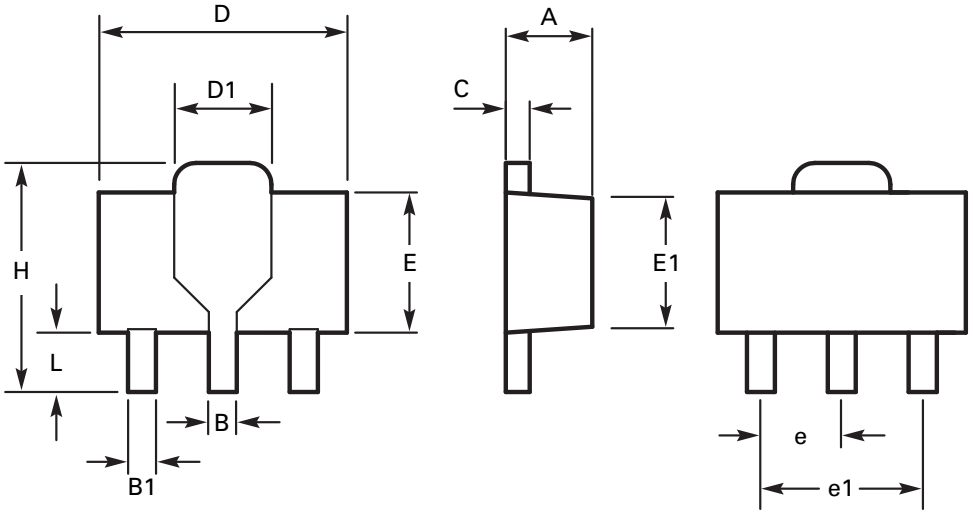
Dropout Voltage



Thermal performance with OTP



Package outline - SOT89



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
B	0.44	0.56	0.017	0.022	E1	2.13	2.29	0.084	0.090
B1	0.36	0.48	0.014	0.019	e	1.50 BSC		0.059 BSC	
C	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	H	3.94	4.25	0.155	0.167
D1	1.62	1.83	0.064	0.072	L	0.89	1.20	0.035	0.047

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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