800mA Fixed Output Voltage Linear Regulator

1 Features

- Rated Output Current: 0.8A
- Current Limit：1.15A
- Output Noise: 0.003% (10Hz to 10kHz)
- PSRR: 70 dB (300mA, 120Hz)
- Output Voltage Accuracy: ±1%
- On-chip Thermal Shutdown
- Maximum Quiescent Current: 5mA (Max)
- No External Components
- Compatible with Low ESR Ceramic Capacitor
- Operation Junction Temperature:-40 to 125°C
- RoHS Compliant and Halogen-Free

2 Applications

- USB devices
- TV and Monitors
- Add-on cards
- Mother Boards

3 Description

The GD30LD1117 is low dropout three-terminal regulators optimized for low voltage where transient response and minimum input voltage are critical. The device provides current-limit and thermal-shutdown features. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy of within ±1%. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

The GD30LD1117BSTR-I is available in fixed output voltage versions of 1.8V, 2.5V, 3.3V, 5.0V, and an adjustable output voltage version which can set the output voltage with two external resistors. The GD30LD1117BWTR is available in fixed output voltage version of 3.3V and 5.0V.

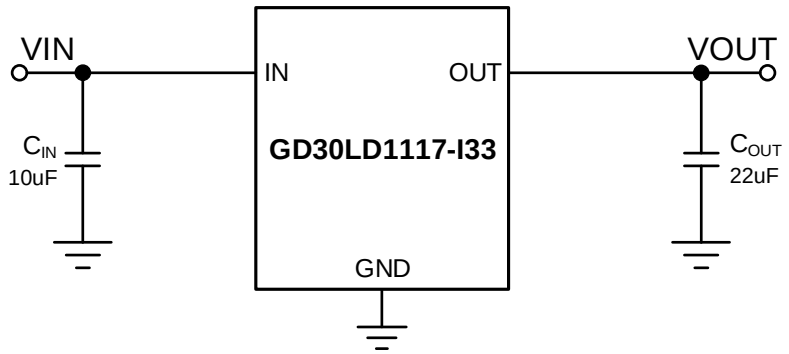
The GD30LD1117BSTR is available in the industry-standard SOT223 package, and GD30LD1117BWTR is SOT-89.

Device Information[1]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
GD30LD1117	SOT223	6.55 mm x 3.55 mm
	SOT89	4.50 mm x 2.45 mm

1. For all available packages, see the *Package Information* and *Ordering Information* at the end of data sheet.

Simplified Application Schematic



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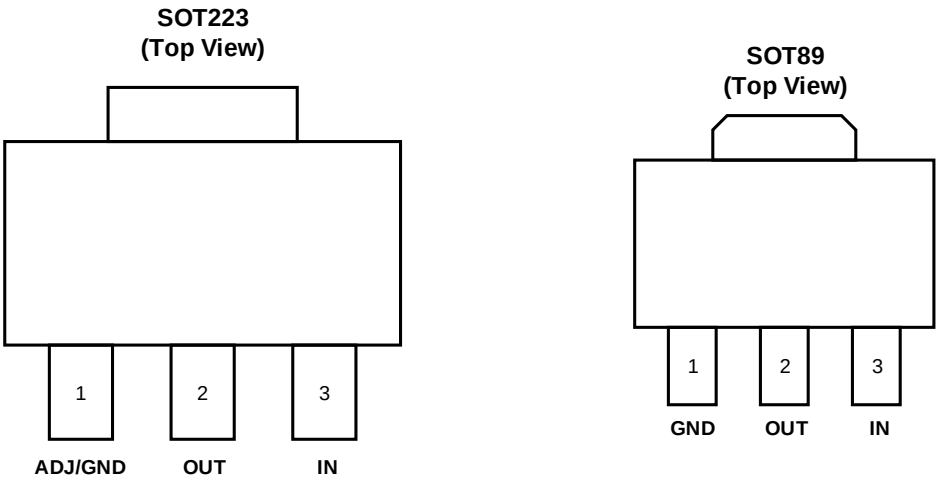
4 Device Overview

4.1 Pinout and Pin Assignment



4.2 Pin Description

PIN NUMBER			PIN TYPE[1]	FUNCTION
NAME	SOT223	SOT89		
ADJ/GND	1	1	G	Adjust pin for adjustable output option. Ground pin for fixed output option.
OUT	2	2	P	Output pin.
IN	3	3	P	Power supply input pin.

1. I = Input, P = Power, G = Ground.

5 Parameter Information

5.1 Absolute Maximum Ratings

Exceeding the operating temperature range(unless otherwise noted)[1]

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	Input Voltage		20	V
T_J	Operating Junction Temperature		150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)		260	°C
T_{STG}	Storage Temperature Range	−65	150	°C

1. The maximum ratings are the limits to which the device can be subjected without permanently damaging the device. Note that the device is not guaranteed to operate properly at the maximum ratings. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

5.2 Recommended Operation Conditions

SYMBOL[1]	PARAMETER	MIN	TYP	MAX	UNIT
V_{IN}	Input supply voltage range			18	V
T_J	Operating junction temperature	−40		125	°C

1. The device is not guaranteed to function outside of its operating conditions.

5.3 Electrical Sensitivity

SYMBOL	CONDITIONS	VALUE	UNIT
$V_{ESD(HBM)}$	Human-body model (HBM), ANSI/ESDA/JEDEC JS-001-2017[1]	±3000	V
$V_{ESD(CDM)}$	Charge-device model (CDM), ANSI/ESDA/JEDEC JS-002-2022[2]	±500	V

1. JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
2. JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

5.4 Electrical Characteristics

V_{IN} <10V, I_O = 10mA, T_J = 25°C, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{OUT} = 1.8V						
V_{OUT}	Output voltage	25°C	1.782	1.8	1.818	V
		−20°C to 125°C	1.764	3.3	1.836	
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} –V_O ≤ 10V		0.5	6	mV
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C			10	
V_{RLOAD}	Load Regulation	10mA ≤ I_O ≤ 0.8A		10	30	mV
I_Q	Quiescent Current			3.5	5	mA
I_{LIM}	Current limit		0.85	1.15		A
PSRR	Ripple Rejection	F = 120Hz,I_O = 300mA, V_{IN} –V_O = 3V,C_{OUT} = 22μF		70		dB

Electrical Characteristics (Continued)

V_{IN} <10V, I_O = 10mA, T_J = 25°C, unless otherwise noted.

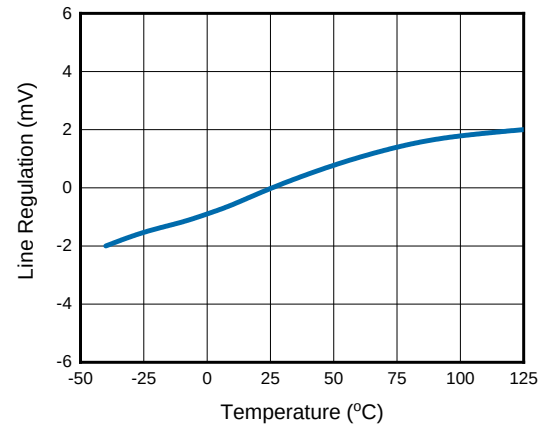
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{DROP}	Dropout Voltage	$\triangle V_O$ = 1%, I_O = 0.8A		1.2	1.3	V
No	Output Noise Voltage	10Hz≤f≤100kHz		0.003		%
T_{OTP}	Over temperature Protection			160		°C
T_{OTP_HYS}	Over temperature Hysteresis			16		°C
V_{OUT} = 2.5V						
V_{OUT}	Output voltage	25°C	2.475	2.5	2.525	V
		−20°C to 125°C	2.455	2.5	2.545	
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} –V_O ≤ 10V		0.5	6	mV
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C			10	
V_{RLOAD}	Load Regulation	10mA ≤ I_O ≤ 0.8A		10	30	mV
I_Q	Quiescent Current			3.5	5	mA
I_{LIM}	Current limit		0.85	1.15		A
PSRR	Ripple Rejection	F = 120Hz,I_O = 300mA, V_{IN} –V_O = 3V,C_{OUT} = 22μF		70		dB
V_{DROP}	Dropout Voltage	$\triangle V_O$ = 1%, I_O = 0.8A		1.2	1.3	V
No	Output Noise Voltage	10Hz≤f≤100kHz		0.003		%
T_{OTP}	Over temperature Protection			160		°C
T_{OTP_HYS}	Over temperature Hysteresis			16		°C
V_{OUT} = 3.3V						
V_{OUT}	Output voltage	25°C	3.267	3.3	3.333	V
		−20°C to 125°C	3.235	3.3	3.365	
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} –V_O ≤ 10V		0.5	6	mV
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C			10	
V_{RLOAD}	Load Regulation	10mA ≤ I_O ≤ 0.8A		10	30	mV
I_Q	Quiescent Current			3.5	5	mA
I_{LIM}	Current limit		0.85	1.15		A
PSRR	Ripple Rejection	F = 120Hz,I_O = 300mA, V_{IN} –V_O = 3V,C_{OUT} = 22μF		70		dB
V_{DROP}	Dropout Voltage	$\triangle V_O$ = 1%, I_O = 0.8A		1.2	1.3	V
No	Output Noise Voltage	10Hz≤f≤100kHz		0.003		%
T_{OTP}	Over temperature Protection			160		°C
T_{OTP_HYS}	Over temperature Protection Hysteresis			16		°C

Electrical Characteristics (Continued)

V_{IN} <10V, I_O = 10mA, T_J = 25°C, unless otherwise noted.

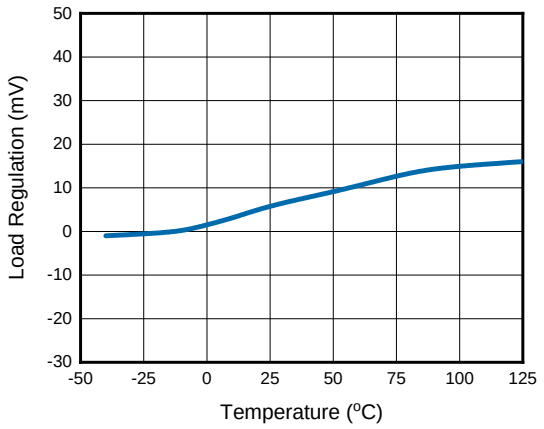
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{OUT} = 5V						
V_{OUT}	Output voltage	25°C	4.950	5.0	5.050	V
		−20°C to 125°C	4.900	5.0	5.10	
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} –V_O ≤ 10V		0.5	6	mV
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C			10	
V_{RLOAD}	Load Regulation	10mA ≤ I_O ≤ 0.8A		10	30	mV
I_Q	Quiescent Current			3.5	6	mA
I_{LIM}	Current limit		0.9	1.15		A
PSRR	Ripple Rejection	F = 120Hz,I_O = 300mA, V_{IN} –V_O = 3V,C_{OUT} = 22μF		70		dB
V_{DROP}	Dropout Voltage	△V_O = 1%, I_O = 0.8A		1.2	1.3	V
No	Output Noise Voltage	10Hz≤f≤100kHz		0.003		%
T_{OTP}	Over temperature Protection			160		°C
T_{OTP_HYS}	Over temperature Protection Hysteresis			16		°C
V_{OUT} ADJ						
V_{REF}	Reference voltage	1.5V ≤ V_{IN} –V_O ≤ 10V, 25°C	1.238	1.250	1.262	V
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C	1.225	1.250	1.270	
V_{RLINE}	Line Regulation	1.5V ≤ V_{IN} –V_O ≤ 10V, 25°C		0.001	0.1	%
		1.5V ≤ V_{IN} –V_O ≤ 10V, −20°C to 125°C			0.2	
V_{RLOAD}	Load Regulation	10mA ≤ I_O ≤ 0.8A		0.4	1	mV
I_{ADJ}	Adjust Pin Cuurent	1.5V ≤ V_{IN} –V_O ≤ 10V		60	120	μA
△ I_{ADJ}	Adjust Pin Cuurent Change			0.2	0.5	μA
I_{MIN}	Minimum Load Current	1.5V ≤ V_{IN} –V_O ≤ 10V		1.7	5	mA
I_{LIM}	Current limit		0.9	1.15		A
PSRR	Ripple Rejection	F = 120Hz,I_O = 300mA, V_{IN} –V_O = 3V,C_{OUT} = 22μF		70		dB
V_{DROP}	Dropout Voltage	△V_O = 1%, I_O = 0.8A		1.2	1.3	V
No	Output Noise Voltage	10Hz≤f≤100kHz		0.003		%
T_{OTP}	Over temperature Protection			160		°C
T_{OTP_HYS}	Over temperature Protection Hysteresis			16		°C

5.5 Typical Characteristics



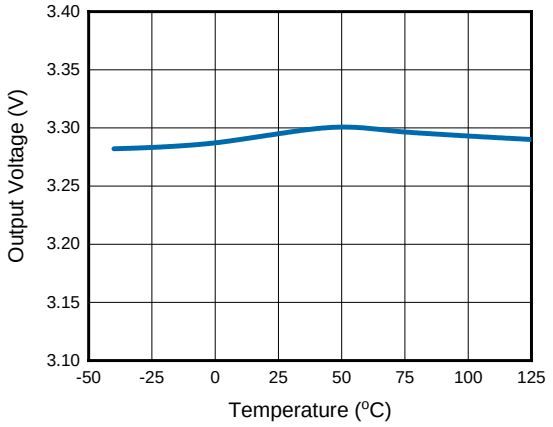
V_{IN} = 4.8V to 13.3V, V_{OUT} = 3.3V, I_{OUT} = 10mA

Figure 1. Line Regulation vs. Temperature



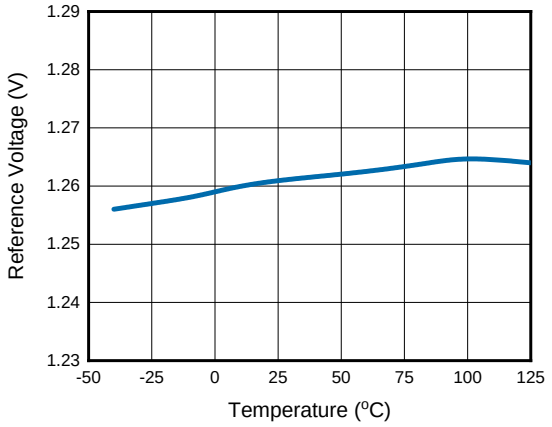
V_{IN} = 5V, V_{OUT} = 3.3V, I_{OUT} = 10mA to 0.8A

Figure 2. Load Regulation vs. Temperature



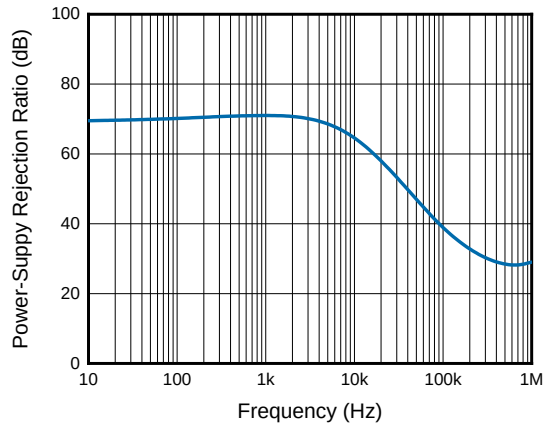
V_{IN} = 5V, V_{OUT} = 3.3V, I_{OUT} = 10mA

Figure 3. Output Voltage vs. Temperature



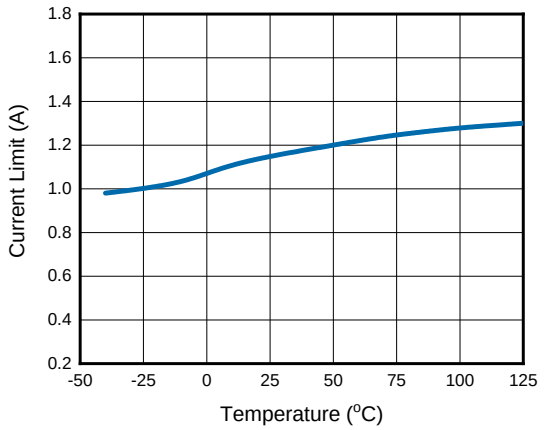
V_{IN} = 5V, V_{OUT} = ADJ, I_{OUT} = 10mA

Figure 4. Reference Voltage vs. Temperature



V_{IN} = V_{OUT} + $2V_{DC}$, V_{OUT} = ADJ, I_{OUT} = 100mA

Figure 5. PSRR vs. Frequncey



V_{IN} = V_{OUT} + 1.5V, V_{OUT} = ADJ

Figure 6. Current Limit vs. Temperature

6 Functional Description

6.1 Block Diagram

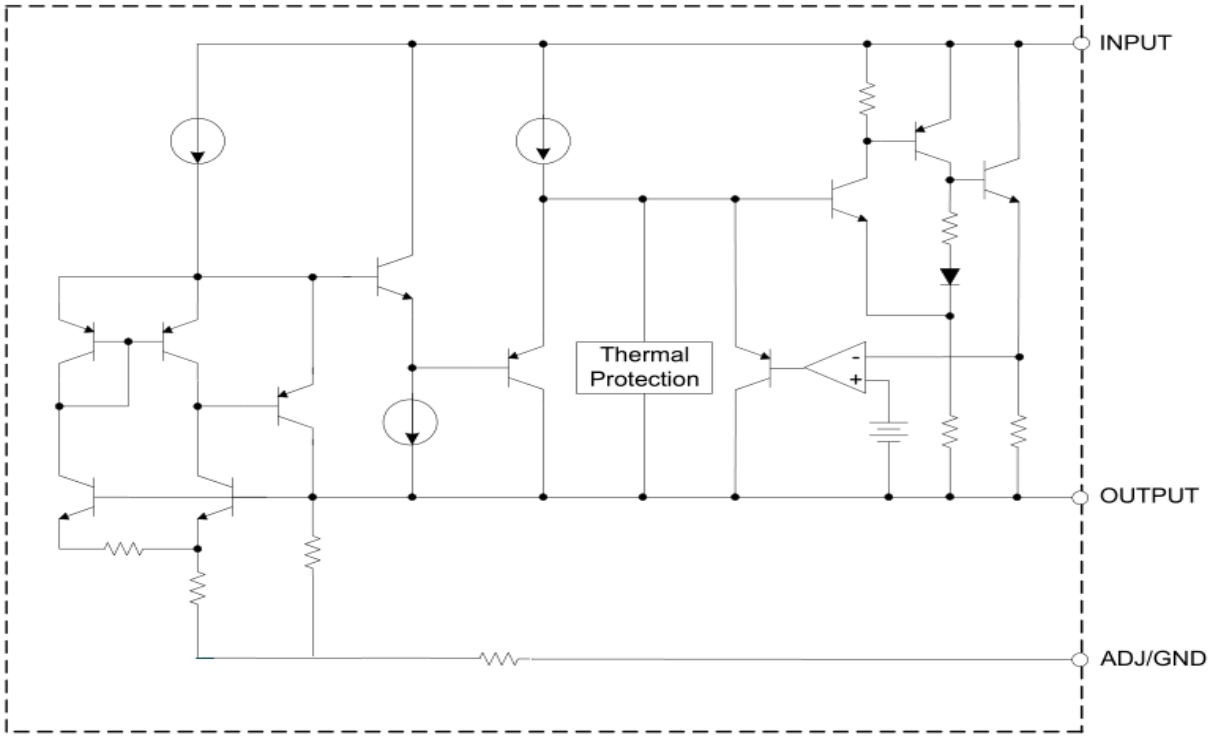


Figure 7. GD30LD1117 Functional Block Diagram

7 Application Information

7.1 Typical Application Circuit

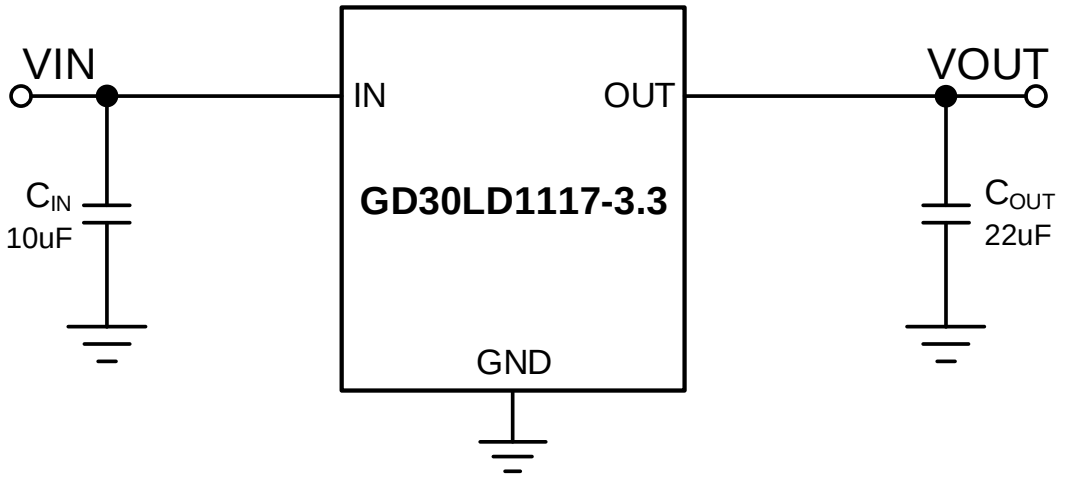
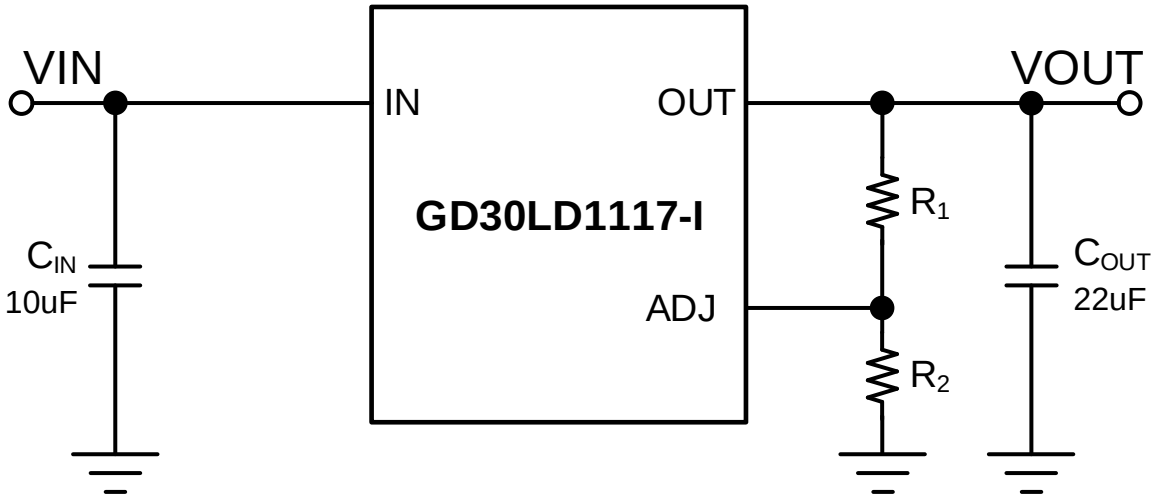


Figure 8. Reference Design Schematic of Fixed-Output



$$V_{OUT} = V_{REF}x(1+R_2/R_1)+I_{ADJ}xR_2$$

Figure 9. Reference Design Schematic of Adjust-Output

8 Layout Guidelines and Example

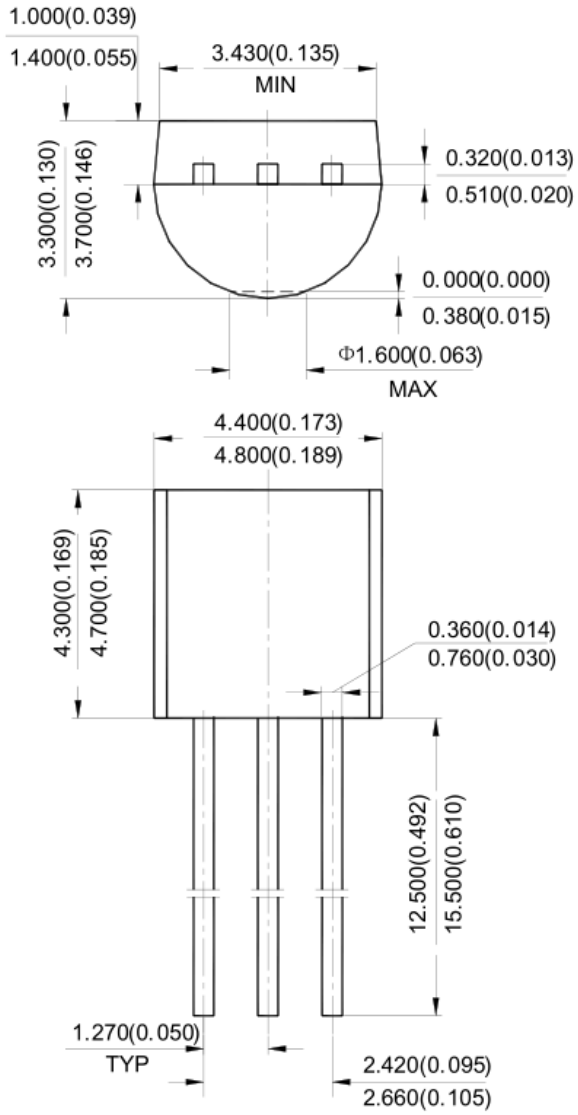
By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the GD30LD1117 ground pin using as wide and as short of a copper trace as is practical.

Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.

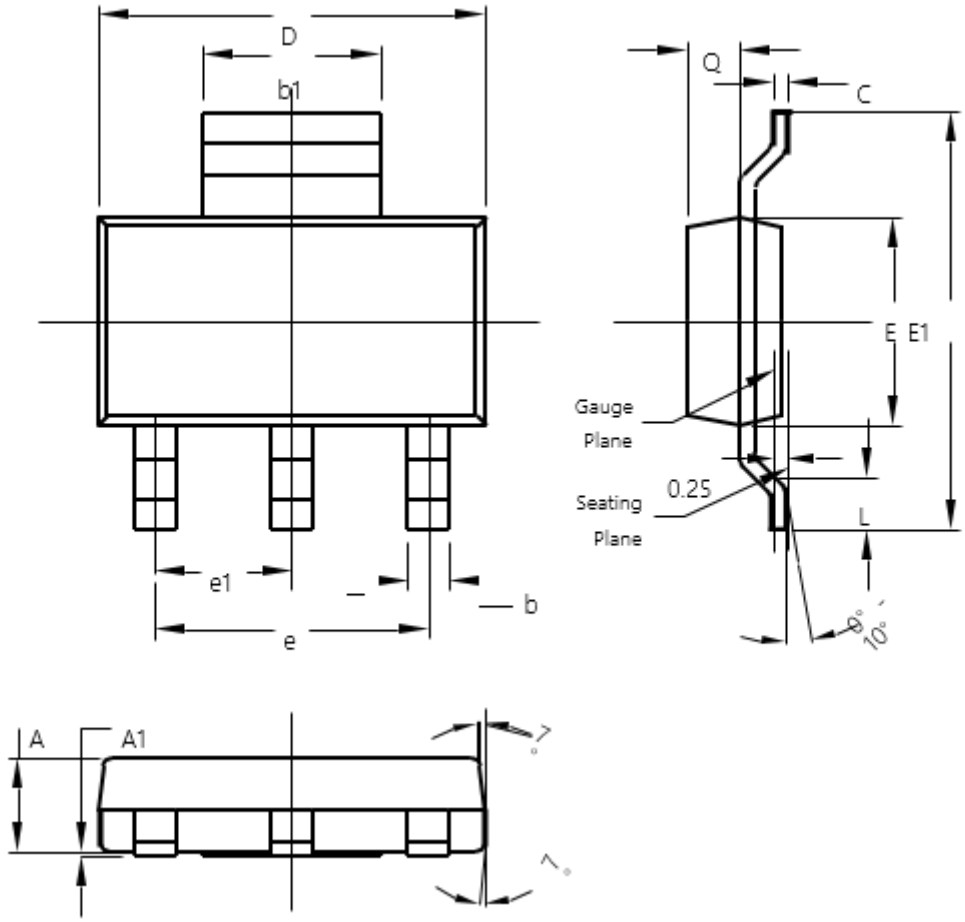
9 Package Information

9.1 Outline Dimensions

TO-92(Bulk Packing)



TO-92(Ammo Packing)



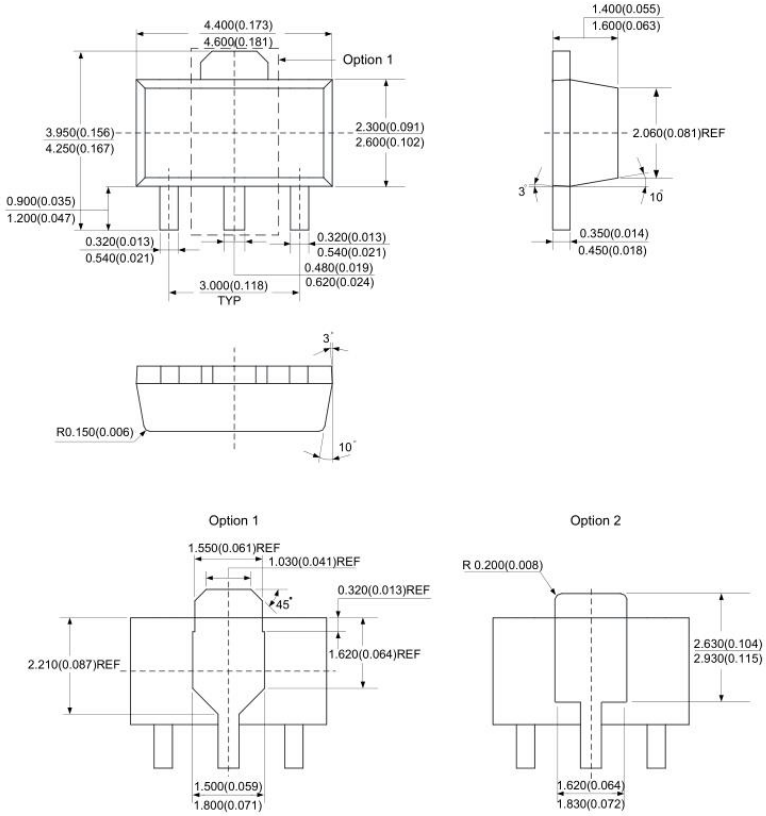
NOTES:

1. All dimensions are in millimeters.
2. Package dimensions does not include mold flash, protrusions, or gate burrs.
3. Refer to the Table 1 *SOT223 dimensions(mm)*.

Table 1. SOT223 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.55	1.60	1.65
A1	0.01	0.05	0.15
b	0.60	0.70	0.80
b1	2.90	3.10	3.00
c	0.20	0.25	0.30
D	6.45	6.50	6.55
E	3.45	3.50	3.55
E1	6.90	7.00	7.10
e		4.60	
e1		2.30	
L	0.85	0.95	1.05
Q	0.84	0.89	0.94

SOT-89



NOTES(Continued):

1. All dimensions are in millimeters.
2. Package dimensions does not include mold flash, protrusions, or gate burrs.

10 Ordering Information

Ordering Code	Package Type	ECO Plan	Packing Type	MOQ	OP Temp(°C)
GD30LD1117BSTR-I	SOT223	Green	Tape & Reel	4000	−40°C to +125°C
GD30LD1117BSTR-I18	SOT223	Green	Tape & Reel	4000	−40°C to +125°C
GD30LD1117BSTR-I25	SOT223	Green	Tape & Reel	4000	−40°C to +125°C
GD30LD1117BSTR-I33	SOT223	Green	Tape & Reel	4000	−40°C to +125°C
GD30LD1117BSTR-I50	SOT223	Green	Tape & Reel	4000	−40°C to +125°C
GD30LD1117BWTR-I33	SOT89	Green	Tape & Reel	1000	−40°C to +125°C
GD30LD1117BWTR-I50	SOT89	Green	Tape & Reel	1000	−40°C to +125°C

11 Revision History

REVISION NUMBER	DESCRIPTION	DATE
1.0	Initial release and device details	2024

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