tra Low Current Consumption 300mA CMOS Voltage Regulators

CJ6101 Series Low-dropout Regulators

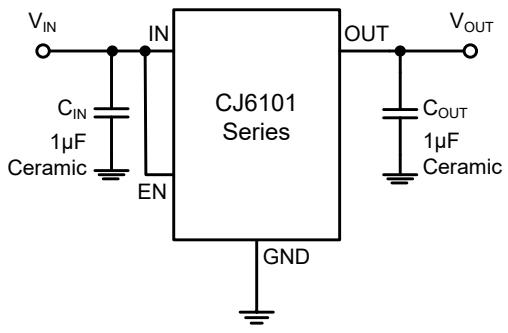
1 Introduction

The CJ6101 series is a group of low dropout positive voltage regulators with ultra-low quiescent power consumption manufactured by CMOS technology. It can provide 300mA output current, and can provide large output current even when the input and output voltage difference is very small. Because of their ultra-low quiescent current, the CJ6101 series are very suitable for battery powered equipment, such as RF applications and other systems requiring quiet voltage sources, to improve the efficiency of these systems and prolong the battery life of the device.

2 Available Packages

PART NUMBER	PACKAGE
CJ6101 Series	SOT-23-3L
	DFNWB1×1-4L
	SOT-23-5L

Note: For all available packages, please refer to the part *Orderable Information*.



Typical Application Circuits

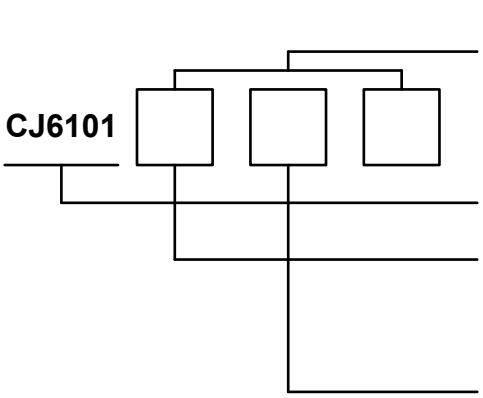
3 Features

- Input Voltage Range: 1.8V ~ 6.0V
- Fixed Output Voltage:
  Designed for 1.0V to 5.0V Output
- Output Voltage Tolerance:
  ±2% for Conventional Device
  ±1% can be Customized
- Output Current: 300mA
- Quiescent Current: 0.8μA (Typ.)
- Dropout Voltage:
  110mV@100mA (V_{OUT} = 3.3V)
- Power Supply Rejection Ratio:
  50dB@1kHz
- Low Output Noise:
  27×V_{OUT} μV_{RMS} (10Hz ~ 100kHz)
- Good Transient Response
- Integrated Fault Protection:
  Fold-back Current Limit
  Short-Circuit Protection

4 Applications

- Portable Consumer Equipments
- Radio Control Systems
- Laptop, Palmtops and PDAs
- Wireless Communication Equipments
- Portable Audio Video Equipments
- Ultra Low Power Micro-controller

5 Orderable Information



Package type.
A□M: SOT-23-3L
A□P: SOT-89-3L
B□F: DFNWB1×1 -4L
B□M: SOT-23-5L

Device serial number.

Enable function marking.
A: Normal device
B: With enable function

Output voltage.
18: Fixed output 1.8V
25: Fixed output 2.5V
28: Fixed output 2.8V
30: Fixed output 3.0V
33: Fixed output 3.3V
36: Fixed output 3.6V

Figure 5-1. Naming Conventions

MODEL	DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
3 Pins Packaged Products							
CJ6101-1.8	CJ6101A18M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-2.5	CJ6101A25M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-2.8	CJ6101A28M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.0	CJ6101A30M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.3	CJ6101A33M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.6	CJ6101A36M	SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
4 Pins Packaged Products							
CJ6101-1.8	CJ6101B18F	DFNWB1×1-4L	-40 ~ 85°C	RoHS & Green	Level 1 Infinite	Tape and Reel 10000 Units / Reel	Active
CJ6101-2.8	CJ6101B28F	DFNWB1×1-4L	-40 ~ 85°C	RoHS & Green	Level 1 Infinite	Tape and Reel 10000 Units / Reel	Active
CJ6101-3.0	CJ6101B30F	DFNWB1×1-4L	-40 ~ 85°C	RoHS & Green	Level 1 Infinite	Tape and Reel 10000 Units / Reel	Active
CJ6101-3.3	CJ6101B33F	DFNWB1×1-4L	-40 ~ 85°C	RoHS & Green	Level 1 Infinite	Tape and Reel 10000 Units / Reel	Active

5 Orderable Information

MODEL	DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
5 Pins Packaged Products							
CJ6101-1.8	CJ6101B18M	SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-2.8	CJ6101B28M	SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.0	CJ6101B30M	SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.3	CJ6101B33M	SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
CJ6101-3.6	CJ6101B36M	SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Active
Customized Products							
Output available from 1.0V to 5.0V		SOT-23-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Customized
		SOT-89-3L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 1000 Units / Reel	Customized
		DFNWB1×1-4L	-40 ~ 85°C	RoHS & Green	Level 1 Infinite	Tape and Reel 10000 Units / Reel	Customized
		SOT-23-5L	-40 ~ 85°C	RoHS & Green	Level 3 168 HR	Tape and Reel 3000 Units / Reel	Customized
Others	-	-	-	-	-	-	Customized

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by SZCJ .

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:

Active: Recommended for new products;

Customized: Products manufactured to meet the specific needs of customers;

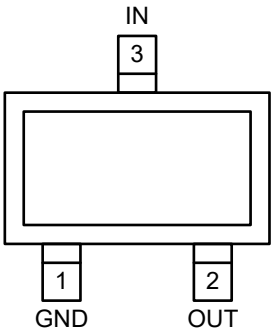
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;

NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;

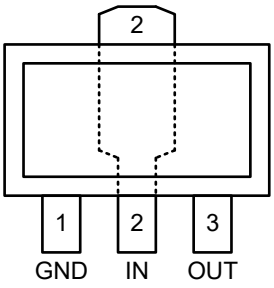
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

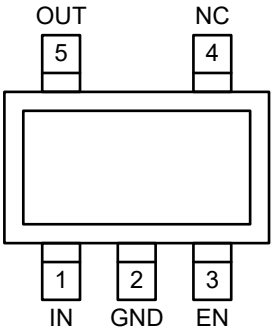
6.1 Pin Configuration



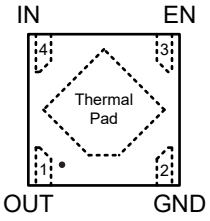
CJ6101AxxM
SOT-23-3L



CJ6101AxxP
SOT-89-3L



CJ6101BxxM
SOT-23-5L



CJ6101BxxF
DFNWB1×1-4L

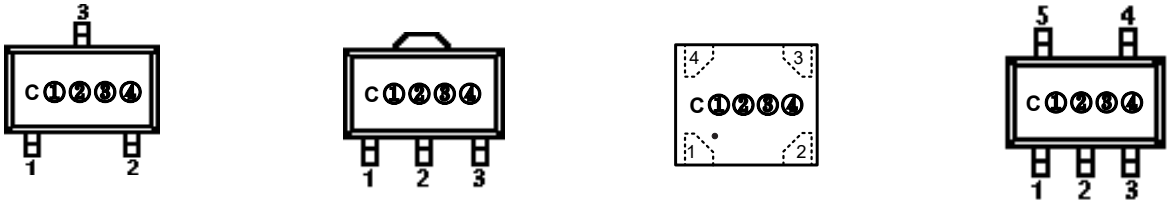
(Not to Scale)

6.2 Pin Function

PIN NAME	I / O	CJ6101 Series Pin Function
		DESCRIPTION
IN	I	Input to the device. Use the recommended value of the input capacitor and place it as close to the input of the device as possible to reduce the impedance of the input supply.
GND	-	Regulator ground.
EN	I	Enable pin. Driving this pin to logic high enables the device; driving this pin to logic low disables the device. Don't float this pin. If enable functionality is not required, this pin must be connected to IN.
NC	-	No internal connection. This pin can float, but when this pin is connected to GND, the device has better thermal performance.
OUT	O	Output of the regulator. An output capacitor is required for stability and help device obtain the best transient response. Use the capacitor with the recommended value and place it as close as possible to the output.
Thermal Pad	-	Connect the thermal pad to a large-area ground plane. The thermal pad is internally connected to GND.

6 Pin Configuration and Marking Information

6.3 Marking Information



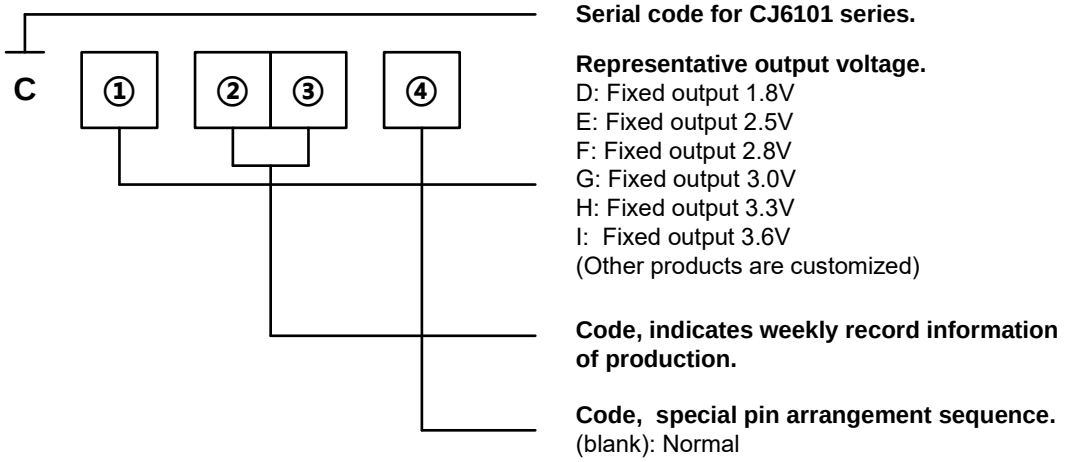


Figure 5-1. Marking Rule

Output Voltage	Marking Information for CJ6101 Series			
	3-Pins Packages		4-Pins Packages	5-Pins Packages
	SOT-23-3L	SOT-89-3L	DFNWB1×1-4L	SOT-23-5L
1.8V	CJ6101A18M: **CD**XX	-	CJ6101B18F: **CD**XX	CJ6101B18M: **CD**XX
2.5V	CJ6101A25M: **CE**XX	-	-	-
2.8V	CJ6101A28M: **CF**XX	-	CJ6101B28F: **CF**XX	CJ6101B28M: **CF**XX
3.0V	CJ6101A30M: **CG**XX	-	CJ6101B30F: **CG**XX	CJ6101B30M: **CG**XX
3.3V	CJ6101A33M: **CH**XX	-	CJ6101B33F: **CH**XX	CJ6101B33M: **CH**XX
3.6V	CJ6101A36M: **CI**XX	-	-	CJ6101B36M: **CI**XX

7 Specifications

7.1 Absolute Maximum Ratings

(T_A = 25°C, unless otherwise specified)(1)

CHARACTERISTIC			SYMBOL	VALUE	UNIT
Input voltage range(2)			V_{IN}	-0.3 ~ 7	V
Enable pin input voltage range(2)			V_{EN}	-0.3 ~ (V_{IN} + 0.3)	
Output voltage range(2)			V_{OUT}	-0.3 ~ (V_{IN} + 0.3)	
Maximum power dissipation	CJ6101 Series	SOT-23-3L	$P_{D\ Max}$	Internally Limited(3)	W
		SOT-89-3L			
		DFNWB1×1-4L			
		SOT-23-5L			
Maximum junction temperature			$T_{J\ Max}$	125	°C
Storage temperature			T_{stg}	-40 ~ 125	°C
Soldering temperature & time			T_{solder}	260°C, 10s	-

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

(2) All voltages are with respect to network ground terminal.

(3) Refer to *Thermal Information* for details.

7.2 Recommended Operating Conditions

PARAMETER	SYMBOL	MIN.	NOM.	MAX.	UNIT
Input voltage	V_{IN}	1.8	-	6.0	V
Operating ambient temperature(4)	T_A	-40	-	85	°C

(4) It is necessary to ensure that the operating junction temperature of the device does not exceed the rated value of the recommended operating conditions when using the device for design.

7 Specifications

7.3 ESD Ratings

ESD RATINGS		SYMBOL	VALUE	UNIT
Electrostatic discharge(5)	Human body model	$V_{ESD-HBM}$	2000	V
	Machine model	V_{ESD-MM}	200	

(6) ESD testing is conducted in accordance with the relevant specifications formulated by the Joint Electronic Equipment Engineering Commission (JEDEC). The human body model (HBM) electrostatic discharge test is based on the JESD22-114D test standard, using a 100pF capacitor and discharging to each pin of the device through a resistance of 1.5kΩ. The electrostatic discharge test in mechanical model (MM) is based on the JESD22-A115-A test standard and uses a 200pF capacitor to discharge directly to each pin of the device.

7.4 Thermal Information

THERMAL METRIC(6)	SYMBOL	CJ6101 Series		UNIT
Junction-to-ambient thermal resistance	$R_{\Theta JA}$	**SOT-23-3L**	**SOT-89-3L**	°C/W
		155.0	-	
		DFNWB1×1-4L	**SOT-23-5L**	
		222.6	155.0	
Junction-to-case thermal resistance	$R_{\Theta JC}$	**SOT-23-3L**	**SOT-89-3L**	°C/W
		66.5	-	
		DFNWB1×1-4L	**SOT-23-5L**	
		114.7	64.6	
Reference maximum power dissipation for continuous operation	$P_{D\ Ref}$	**SOT-23-3L**	**SOT-89-3L**	W
		0.38	-	
		DFNWB1×1-4L	**SOT-23-5L**	
		0.45	0.40	

(6) Thermal metric is measured in still air with T_A = 25°C and installed on a 1 in^2 FR-4 board covered with 2 ounces of copper.

7 Specifications

7.5 Electrical Characteristics

CJ6101 Series (V_{IN} = V_{OUT} +1V, C_{IN} = 1.0μF, C_{OUT} = 1.0μF, T_A = 25°C , unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS		MIN.	TYP.(7)	MAX.	UNIT
Input voltage	V_{IN}	-		1.8	-	6	V
DC output tolerance(8)	-	T_A = 25°C, I_{OUT} = 1mA		-2	-	2	%
				-1(9)	-	+1(9)	
Output current	I_{OUT}	T_J = 25°C		300	500	-	mA
Output current limit	$I_{OUT\ Limit}$	V_{OUT} = 0.5 × $V_{OUT(Normal)}$, V_{IN} = 5.0V		350	550	750	mA
Quiescent current	I_Q	I_{OUT} = 0mA		-	0.8	1.5	μA
Dropout voltage	V_{DO}(10)	V_{OUT} < 1.5V	I_{OUT} = 100mA	-	400	-	mV
		V_{OUT} = 1.5 to 2.0V		-	200	-	
		V_{OUT} > 2.0V		-	110	-	
Line regulation	LNR(11)	V_{IN} = V_{OUT} +1V to 6V, I_{OUT} = 10mA		-	0.05	0.3	%/V
Load regulation	ΔV_{LOAD}	V_{IN} = V_{OUT} +1V, I_{OUT} = 1 to 100mA		-	10	-	mV
Output voltage temperature characteristics	TR(12)	I_{OUT} = 10mA, T_A = -40 to 85°C		-	100	-	ppm/°C
Short current	I_{Short}	OUT short to GND		-	100	-	mA
Standby current	I_{STBY}	EN = GND		-	-	0.1	μA
Power supply rejection ratio	PSRR	I_{OUT} = 50mA	f = 100Hz	-	60	-	dB
			f = 1kHz	-	50	-	
			f = 10kHz	-	40	-	
			f = 100kHz	-	35	-	
EN high	$V_{EN\ H}$	V_{IN} = V_{OUT} +1V		1.5	-	V_{IN}	V
EN low	$V_{EN\ L}$	V_{IN} = V_{OUT} +1V		-	-	0.3	V
Auto-discharge resistance	$R_{Discharge}$	V_{IN} = 5V, V_{OUT} = 3.0V, EN = GND		-	100	-	Ω

7 Specifications

7.5 Electrical Characteristics (continued)

Note:

(8) Typical numbers are at 25°C and represent the most likely norm.

(9) The effective output voltage range, which refers to the tolerance range that the output voltage may reach when the input voltage is equal to the output voltage plus 1V and the output current maintains a certain value.

(10) Products with ±1% output tolerance can be customized.

(11) Test the difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of $V_{OUT\ Normal}$.

(12) The line regulation is calculated by the following formula:

$$LNR = \frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$$

where, ΔV_{OUT} is the variation of the output voltage, ΔV_{IN} is the variation of the input voltage.

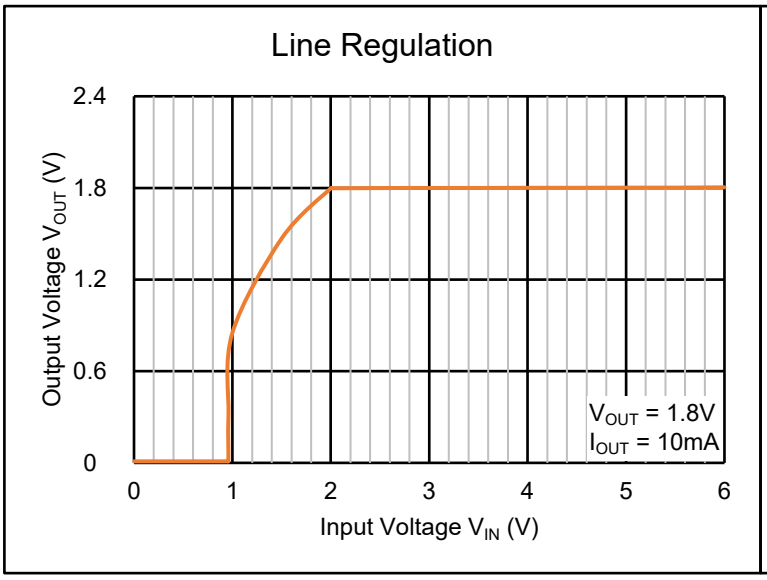
(13) The output voltage temperature characteristics (TR) is calculated by the following formula:

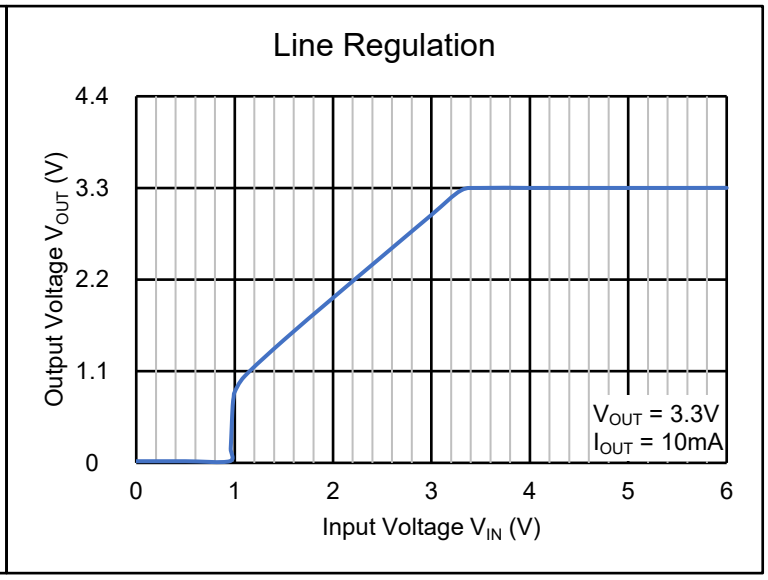
$$TR = \frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T}$$

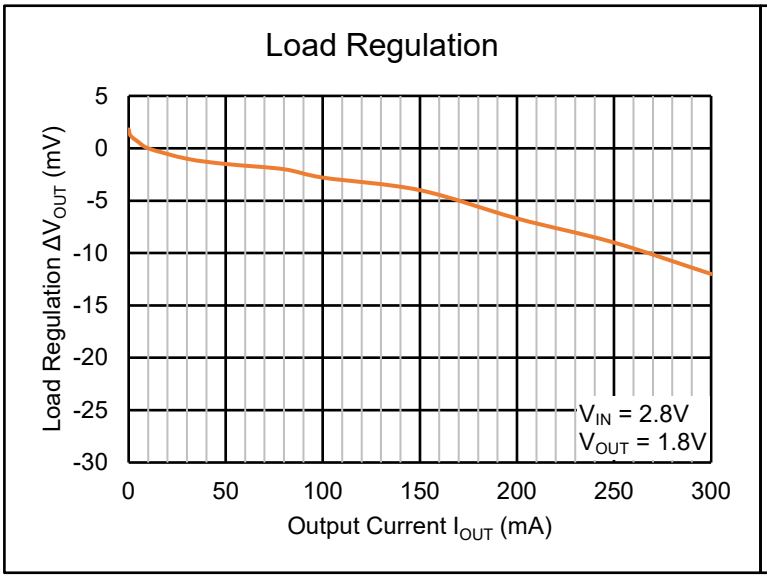
where, ΔV_{OUT} is the variation of the output voltage, ΔT is the variation of the ambient temperature.

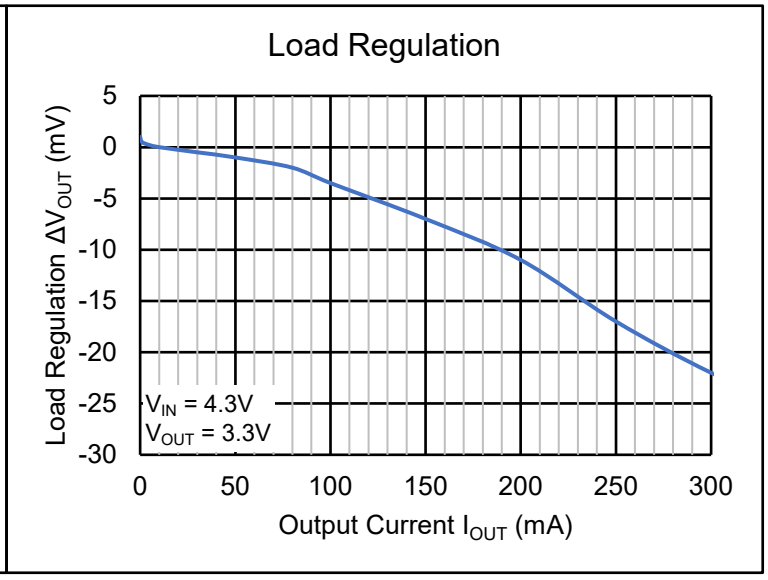
7.6 Typical Characteristics

CJ6101 Series (C_{IN} = 1.0μF, C_{OUT} = 1.0μF, T_A = 25°C, unless otherwise specified)







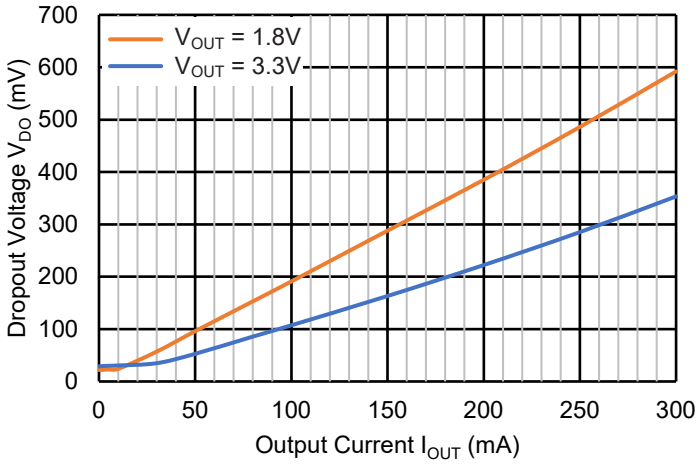


7 Specifications

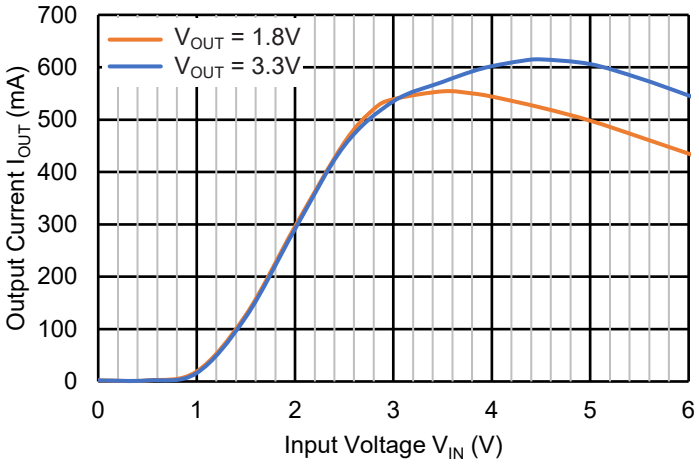
7.6 Typical Characteristics (continued)

CJ6101 Series (C_{IN} = 1.0μF, C_{OUT} = 1.0μF, T_A = 25°C, unless otherwise specified)

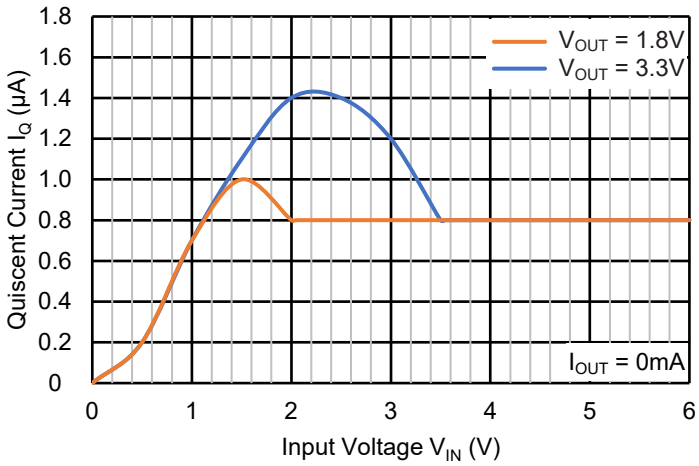
Dropout Voltage



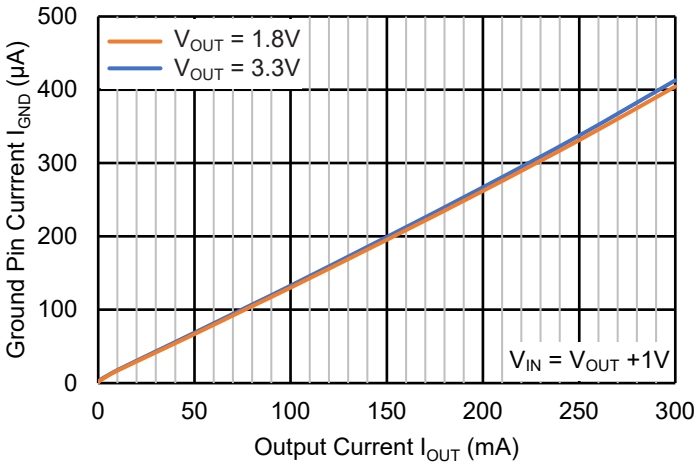
Output Current Limit



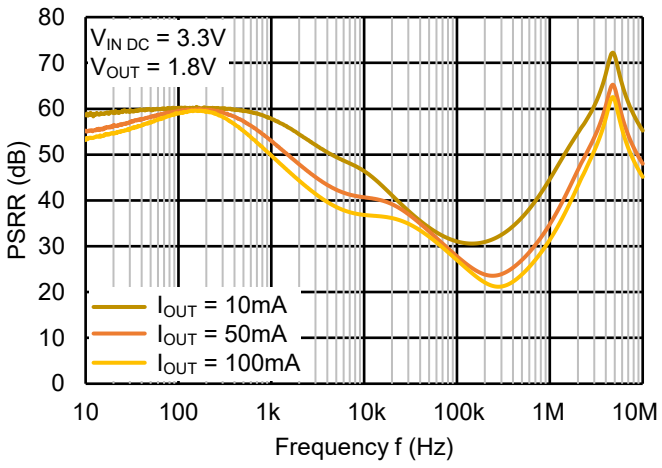
Quiscent Current



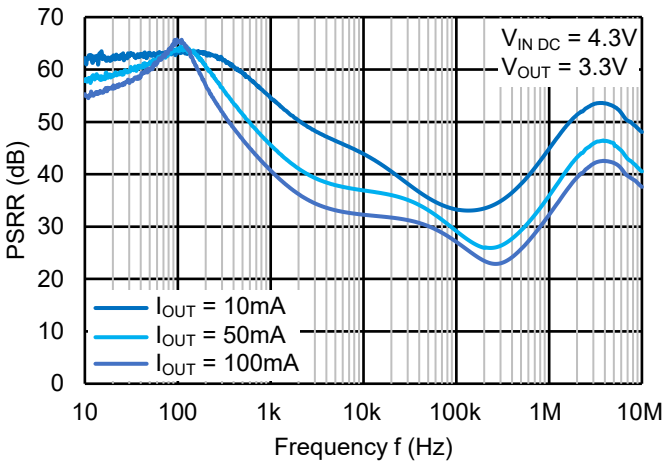
Ground Pin Current



Power Supply Rejection Ratio



Power Supply Rejection Ratio



7 Specifications

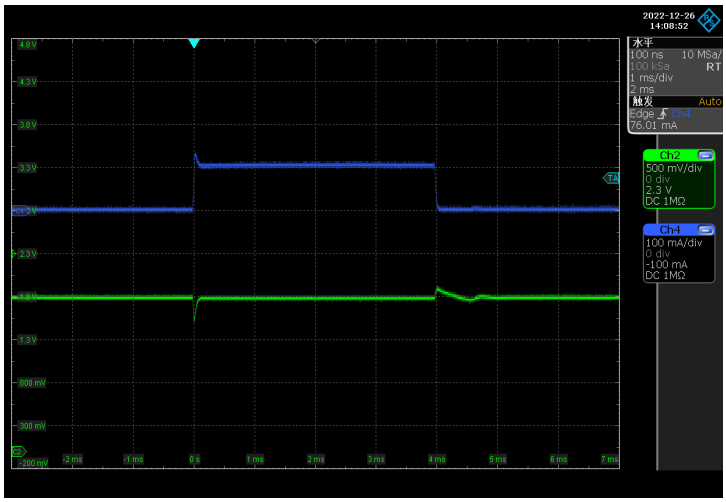
7.6 Typical Characteristics (continued)

CJ6101 Series (C_{IN} = 1.0μF, C_{OUT} = 1.0μF, T_A = 25°C, unless otherwise specified)

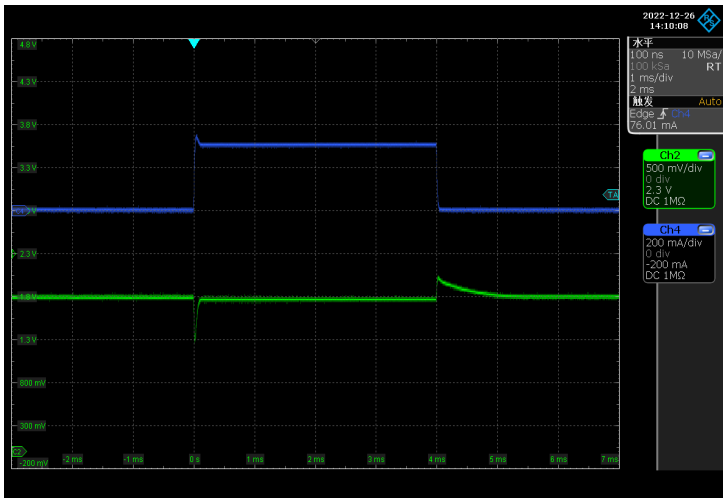
Load Transient

V_{OUT} = 1.8V, V_{IN} = V_{EN} = V_{OUT} +1V, CH_2: V_{OUT}, CH_4: I_{OUT}

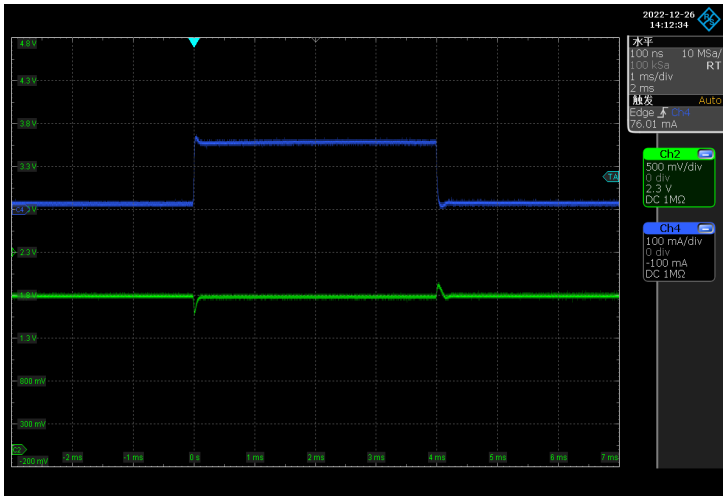
I_{OUT} = 0 ~ 100mA



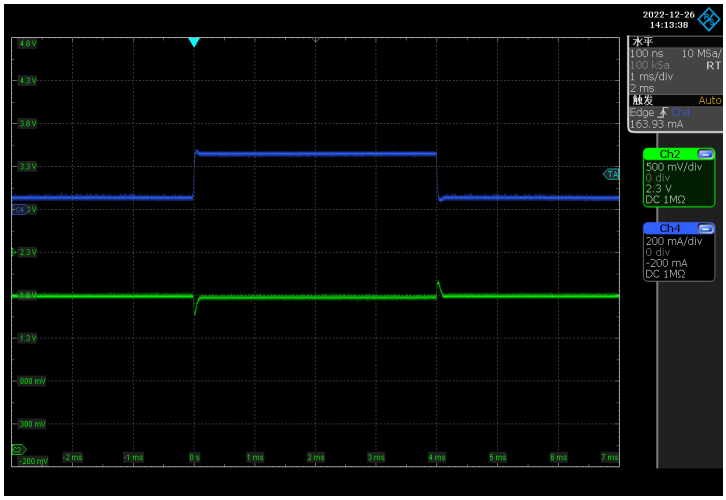
I_{OUT} = 0 ~ 300mA



I_{OUT} = 10 ~ 150mA

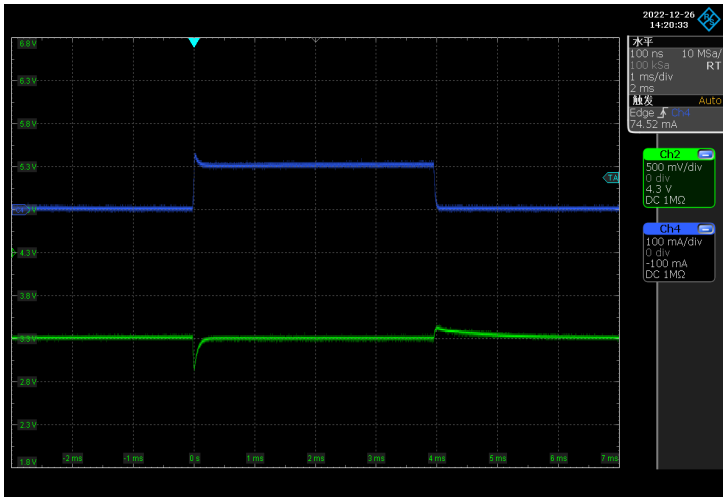


I_{OUT} = 50 ~ 250mA

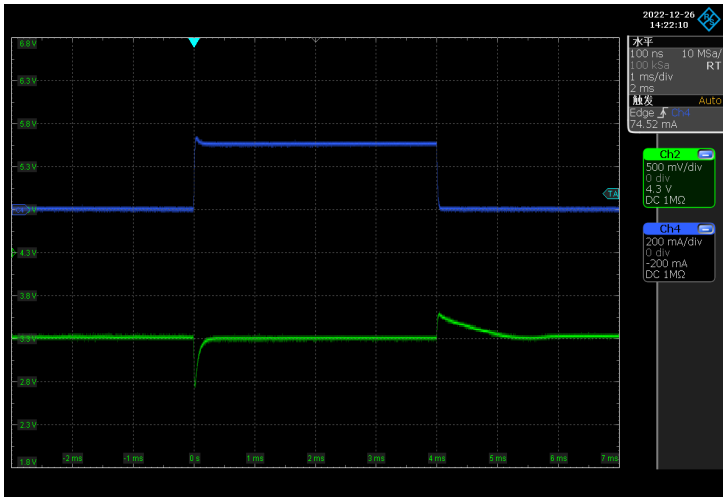


V_{OUT} = 3.3V, V_{IN} = V_{EN} = V_{OUT} +1V, CH_2: V_{OUT}, CH_4: I_{OUT}

I_{OUT} = 0 ~ 100mA



I_{OUT} = 0 ~ 300mA

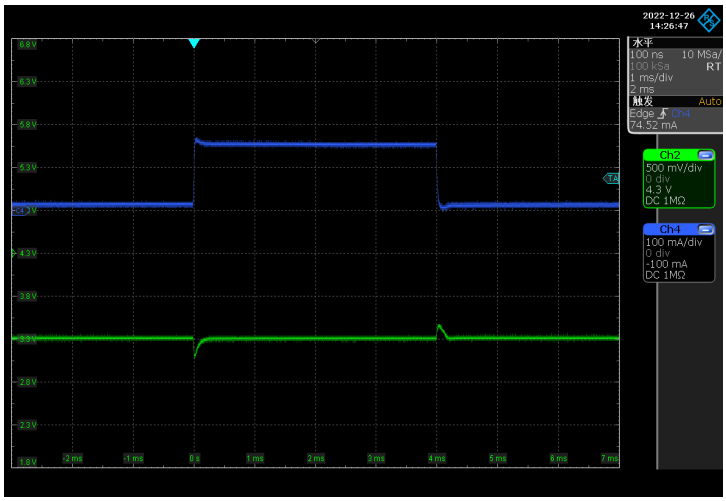


7 Specifications

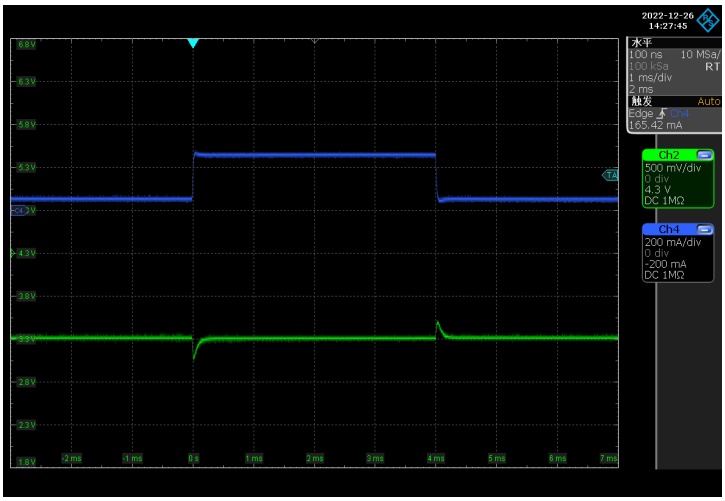
7.6 Typical Characteristics (continued)

CJ6101 Series (C_{IN} = 1.0μF, C_{OUT} = 1.0μF, T_A = 25°C, unless otherwise specified)

I_{OUT} = 10 ~ 150mA



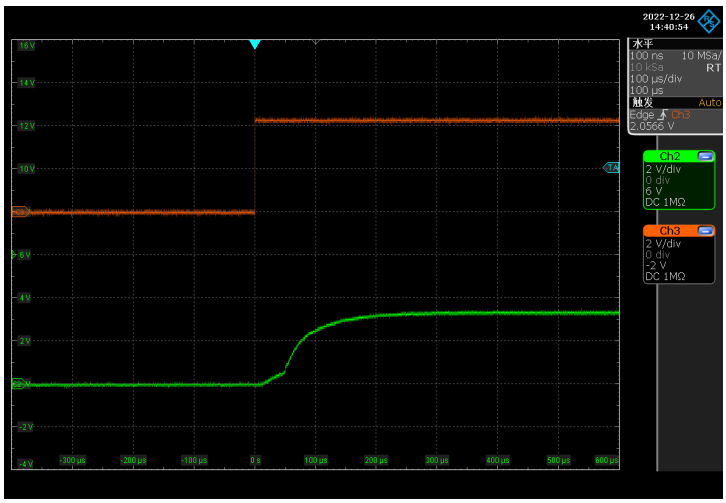
I_{OUT} = 50 ~ 250mA



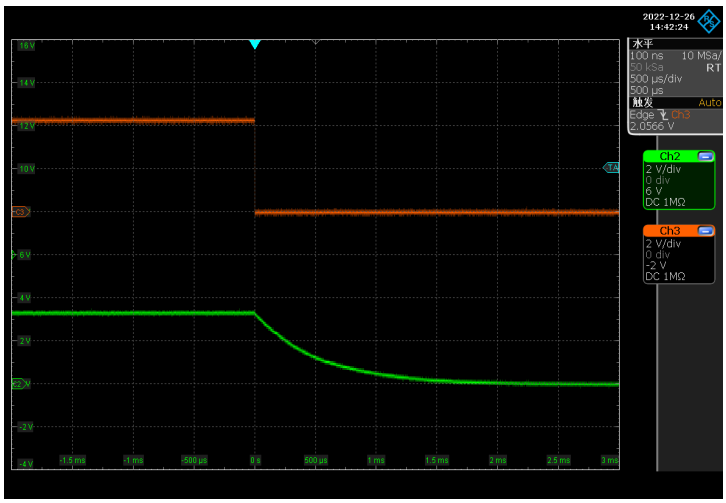
EN High & EN Low

V_{IN} = V_{OUT} + 1V, V_{EN} = 0 ~ (V_{OUT} + 1)V, I_{OUT} = 0mA, CH_2: V_{OUT}, CH_3: V_{EN}

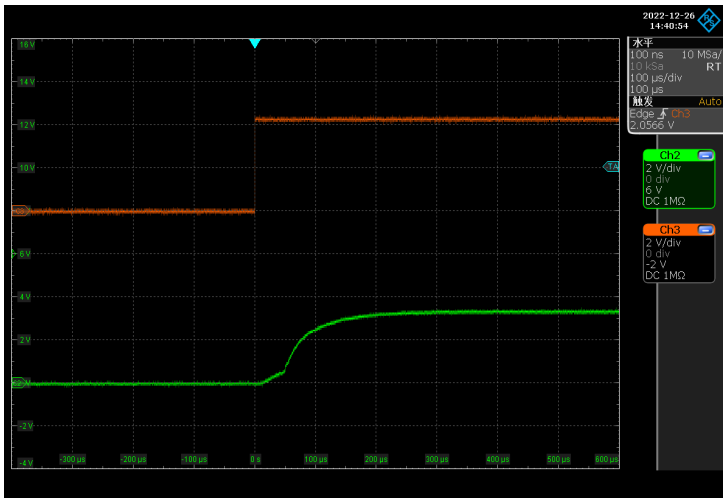
V_{OUT} = 1.8V, EN High



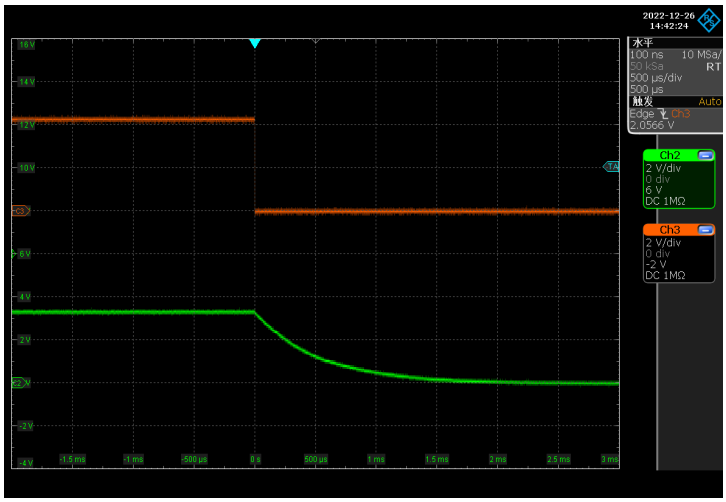
V_{OUT} = 1.8V, EN Low



V_{OUT} = 3.3V, EN High



V_{OUT} = 3.3V, EN Low

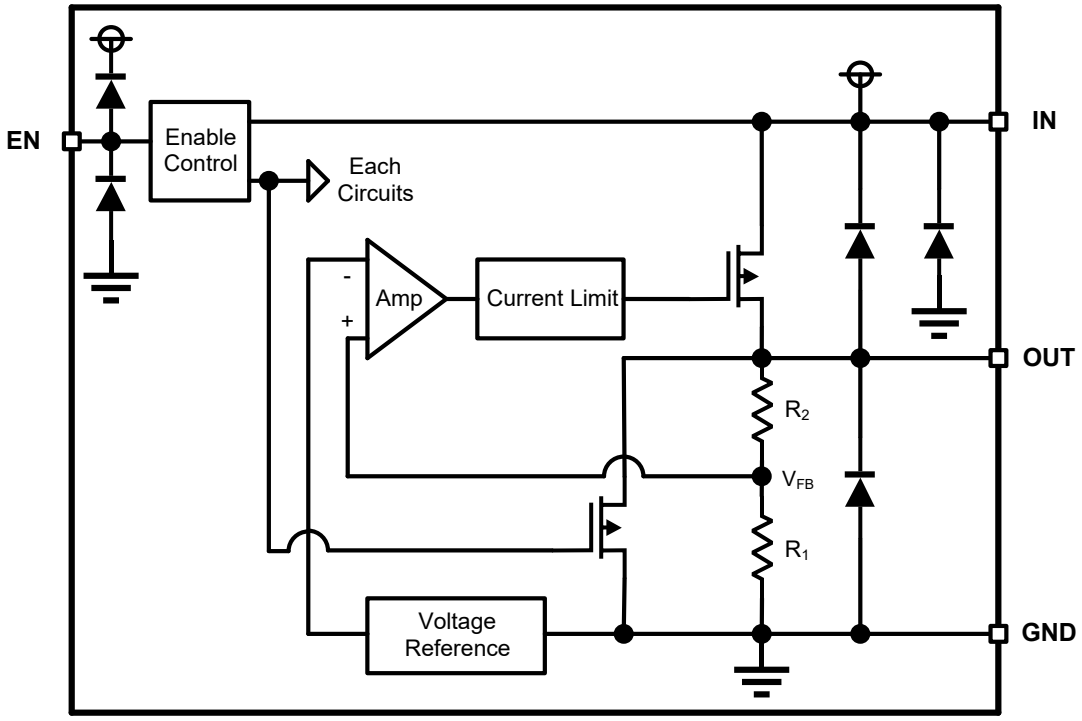


8 Detailed Description

8.1 Description

The CJ6101 series is a group of linear voltage regulators with ultra-low power consumption and low voltage difference. After optimization, it has excellent transient performance. These features make the device ideal for most battery powered applications. This low dropout linear regulator provides built-in current limiting, short circuit protection and thermal shutdown protection functions.

8.2 Functional Block Diagram



The internal feedback resistors R_1 and R_2 form a voltage divider circuit to compare the V_{FB} input error amplifier with the reference voltage. The internal regulator tube (PMOS) will control its conduction degree through the grid voltage provided by the error amplifier output, which will make the output voltage V_{OUT} not affected by temperature changes or input voltage changes to a certain extent, thus maintaining the stability of the device output voltage.

8 Detailed Description

8.3 Feature Description

Power Supply Input

When the input voltage is lower than the rated range of the data sheet, the device will lose the regulation function of stabilizing the output voltage, that is, it is unable to maintain the output voltage within the rated range. At this time, compared with normal operation, the quiescent current of the device may exceed the rated range, and the transient response performance may be seriously degraded.

When the input voltage is higher than the rated range of the data sheet, the device may cause irreversible damage or failure due to exceeding the maximum rated range of electrical stress.

For the rated input voltage of the device, see *Recommended Operating Conditions*.

Output Current

When the circuit design is appropriate, the CJ6101 series can reach the maximum load capacity of at least 300mA. According to the power dissipation of the package and the effective connection thermal resistance with the environment, selecting the appropriate package for the circuit design can make the device emit more heat energy.

Enable Control

The enable pin of the device (EN) is active at high level. When the voltage of the EN is greater than the EN logic high voltage ($V_{EN\ H}$), the device will be enabled and maintain the normal output. When the voltage of the EN is lower than the EN logic low voltage ($V_{EN\ L}$), the internal circuit of the device will be disabled and the output will be turned off, the device, the device will be in the standby mode until EN is turned to high level again. The $V_{EN\ H}$ and $V_{EN\ L}$ can be found in the *Electrical Characteristics*.

Normal startup waveform and startup slope rate control can be ensured when the device starts from any low voltage lower than $V_{EN\ L}$, but the discharge time of output capacitor must be taken into account. EN can not be float, if EN is not required to control the output voltage independently, connect EN to IN.

Dropout Voltage

Dropout voltage (V_{DO}) refers to the minimum voltage difference between input and output (V_{IN} - V_{OUT}) to make the device output voltage reach the rated range at rated current. When the dropout voltage condition required by the device is reached, the internal MOSFET will be fully turned on, at this time, the MOSFET is equivalent to a switch for regulation.

The V_{DO} increases with the increase of load current. Since V_{IN} - V_{OUT} must be no less than the V_{DO}, the V_{DO} indirectly specifies the minimum input voltage of devices under different load current conditions. If the V_{IN} - V_{OUT} is less than the V_{DO}, the performance of the device may deteriorate (see *Operation in Dropout Mode* for details)..

Auto-discharge Function

The device has an automatic discharge mechanism. When the enabling control of the device is turned off, a pull-down MOSFET inside the device (see *Functional Block Diagram*) will connect a resistor to the ground to release the charge in the output capacitor, so as to turn off the whole device circuit. Refer to *Electrical Characteristics* for the value of automatic discharge resistance ($R_{Discharge}$). Do not rely on the active discharge circuit for discharging a large amount of output capacitance after the input supply has collapsed because reverse current can possibly flow from the output to the input. This reverse current flow can cause damage to the device. Limit reverse current to no more than 5% of the device rated current for a short period of time.

8 Detailed Description

8.3 Feature Description (continued)

Built-in Current Limit & Short Circuit Protection

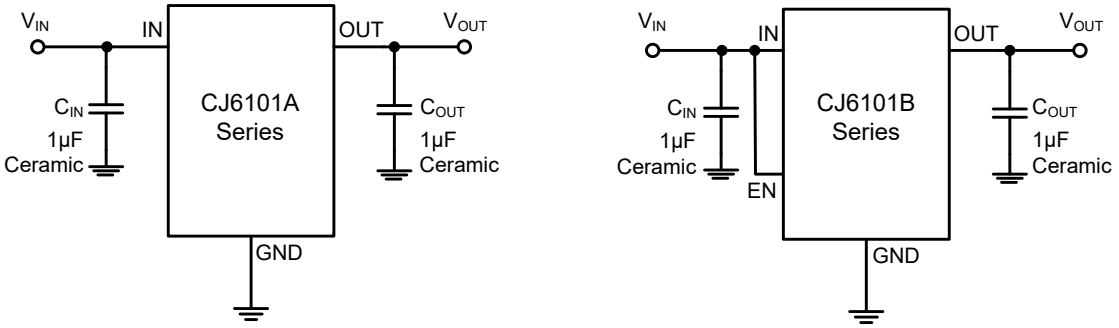
The CJ6101 series has an internal current limiting circuit, which can protect the device by limiting the load current value in case of instantaneous high load current. When the current limiting is triggered, the output voltage is not regulated. If the out pin of the regulator is short circuited, the internal current limiting circuit will be triggered, the output current of the device will maintain at a relatively small value to protect the device. The typical value of short current I_{Short} can be found in *Electrical Characteristics*. The current limiting state will continue until the load current drops to the normal range.

In order to ensure the normal operation of current limit, the inductance of input and load shall be minimized. Continuous operation under current limit is not recommended.

The current limit mode of the CJ6101 series is fold-back current limit. Using electronic load to test the starting characteristics may cause the device to fail to start normally.

9 Application and Implementation

9.1 Typical Application Circuit



9.2 Application Information

Selection of Bypass Capacitances

It is recommended to use 1μF input and output ceramic capacitors to keep the device stable, and the position of the capacitor should be as close to the pin of the chip as possible.

Ceramic capacitors with low equivalent series resistance (ESR) are recommended. In such application scenarios, chip multilayer ceramic capacitor (MLCC) is a good choice, but the appropriate type of capacitor must be selected. Ceramic capacitors with X7R-, X5R- and C0G- rated dielectric materials can provide relatively good capacitance stability for the equipment in the temperature range. However, due to the large change of Y5V- capacitance value, Y5V- capacitor is not recommended. However, no matter which kind of ceramic capacitor is selected, the effective capacitance may vary with the working voltage and temperature.

In general, the use of appropriate input capacitors can help offset reactive input sources and improve transient response, input ripple and PSRR. If the power impedance is greater than 0.5Ω, it is recommended to use input capacitors. Higher value capacitors may be required if large, fast rise time load or line transients are expected, or if the device is located a few inches from the input power supply.

Also, the dynamic performance of the device can be improved by using a suitable output capacitor.

Transient Response

Transient response refers to the change of system output from initial state to stable state under the action of typical signal input. For LDO, the designer should pay attention to the possible impact of linear transient response and load transient response on the system: linear transient response refers to the transient response of output to change when the input voltage changes, while load transient response refers to the transient response of output to change when the output current changes. The specific phenomenon is that the output voltage of the device will have a short spike, especially when the input voltage or output current changes greatly in a short time. This change is not only related to the performance of the chip itself, but also related to the change of output current, change rate and output capacitance:

1. When the output current increases, the output voltage of the device will decrease to a certain extent, and the larger output current will provide a higher current discharge path for the output capacitor, which will affect the peak value generated by the transient spike and reduce the peak value;
2. The output current or input voltage changes relatively slowly, and the output change of the device is relatively small, affecting the spike caused by the change;
3. The use of large input and output capacitors can reduce the spike caused by transient response to a certain extent to improve the transient performance, but large output capacitors can also affect the response time of devices.

For the selection of bypass capacitance value, refer to the *Section of Bypass Capacitances* selection.

9 Application and Implementation

9.2 Application Information (continued)

Operation in Dropout Mode

The CJ6101 series is internally integrated with a P-MOSFET to achieve low dropout voltage. The voltage difference between the input and the output (V_{IN} - V_{OUT}) of the device must not be lower than the corresponding dropout voltage (V_{DO}) to ensure that the output voltage tolerance is within the rated range of the data sheet. The dropout voltage will increase with the increase of load current. When the V_{IN} - V_{OUT} is less than the V_{DO}, the P-MOSFET inside the device is in a linear state, the resistance from the input pin to the output pin is equal to the resistance from the drain to the source of the P-MOSFET, and the device functions like a resistor. When operating in this state, the response time of the error amplifier inside the device will be limited, which will seriously degrade the transient performance of the device, when the external circuit has a transient change, the deviation of the output voltage will become larger than the normal operating state. In addition, the PSRR and noise performance of the device will be worse than that under normal operating conditions.

Recommended Continuous Operating Areas

As an LDO, the working area of CJ6101 series is limited by dropout voltage, output current, junction temperature and input voltage under continuous working condition. The recommended areas for continuous operation are shown in Figure 9-1:

A. The LDO input and output voltage difference V_{IN} - V_{OUT} must meet the dropout voltage V_{DO} conditions. See *Dropout Voltage* for more details.
B. Rated output current range I_{Rated}.
C. The actual junction temperature T_J of LDO shall not exceed the rated junction temperature. The product of voltage difference and current at both ends of LDO is power consumption, which determines the actual working junction temperature of LDO, so the curve is not linear.

In addition, the working area of CJ6101 series is limited by the rated $V_{IN\ MIN}$ and $V_{IN\ MAX}$.

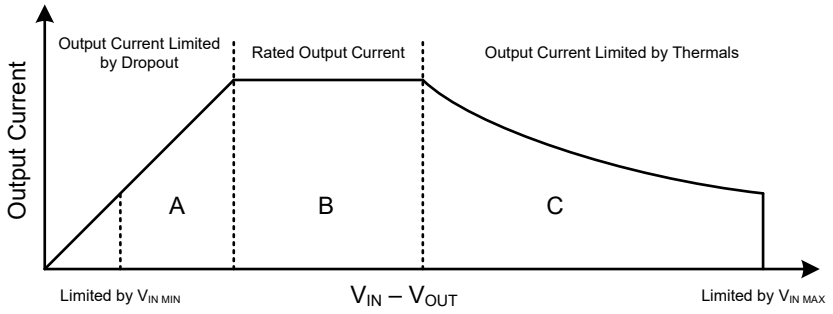


Figure 9-1. Region Description for Continuous Operation

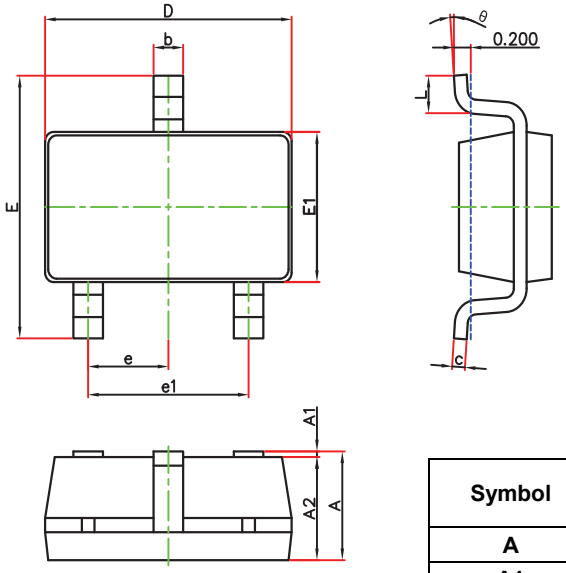
NOTE

The application information in this section is not part of the data sheet component specification, and SZCJ makes no commitment or statement to guarantee its accuracy or completeness. Customers are responsible for determining the rationality of corresponding components in their circuit design and making tests and verifications to ensure the normal realization of their circuit design.

10 Mechanical Information

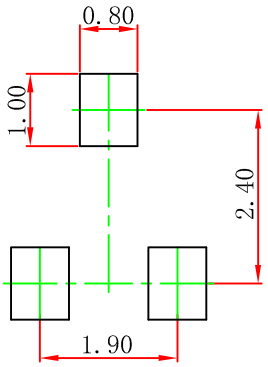
10.1 SOT-23-3L Mechanical Information

SOT-23-3L Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-23-3L Suggested Pad Layout



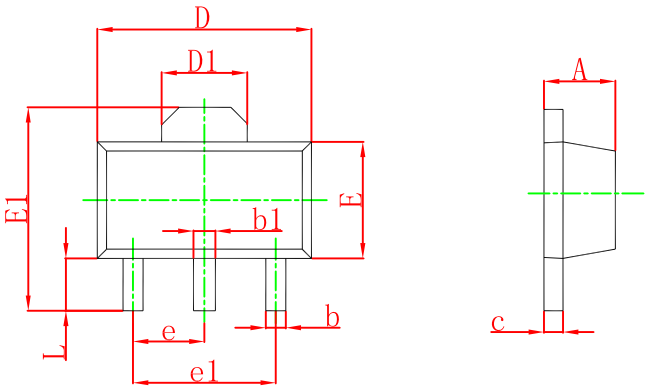
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purpose only.

10 Mechanical Information

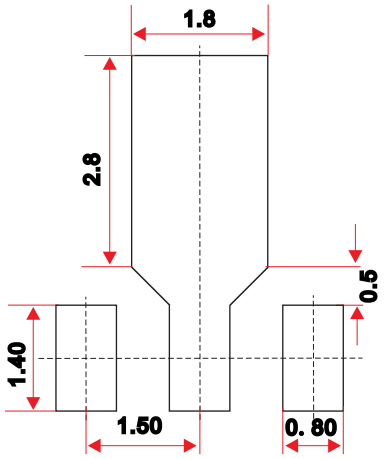
10.2 SOT-89-3L Mechanical Information

SOT-89-3L Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

SOT-89-3L Suggested Pad Layout



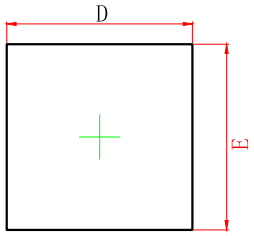
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purpose only.

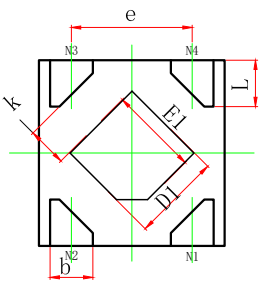
10 Mechanical Information

10.3 DFNWB1×1-4L Mechanical Information

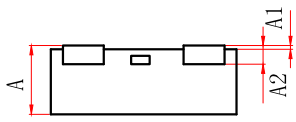
DFNWB1×1-4L Outlines Dimensions



TOP VIEW



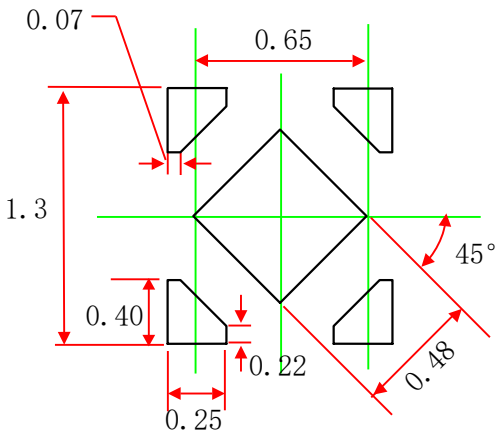
BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.320	0.400	0.013	0.016
A1	0.000	0.050	0.000	0.002
A2	0.100 REF.		0.004 REF.	
D	0.950	1.050	0.037	0.041
E	0.950	1.050	0.037	0.041
D1	0.430	0.530	0.017	0.021
E1	0.430	0.530	0.017	0.021
k	0.150MIN.		0.006MIN.	
b	0.180	0.280	0.007	0.011
e	0.650TYP.		0.026TYP.	
L	0.200	0.300	0.008	0.012

DFNWB1×1-4L Suggested Pad Layout



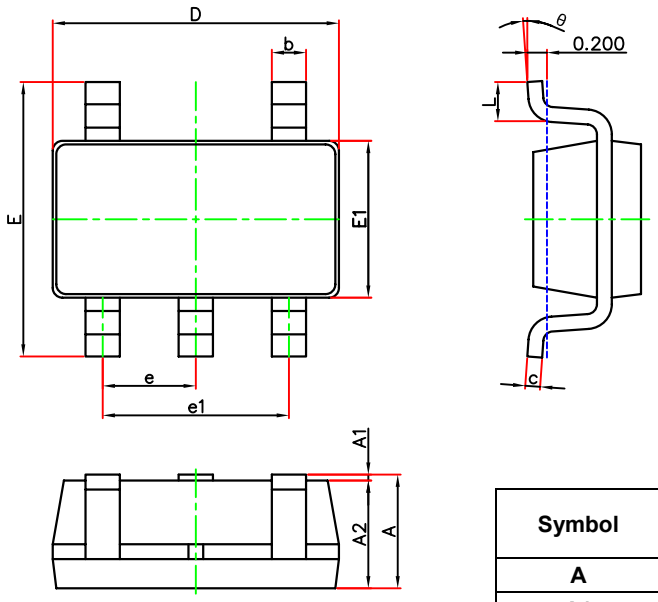
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purpose only.

10 Mechanical Information

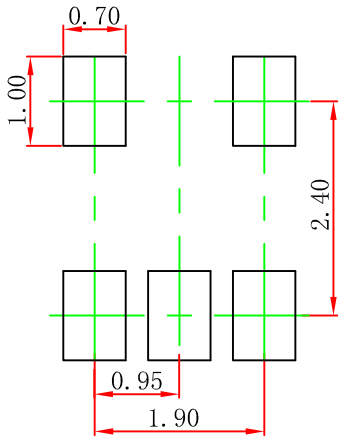
10.4 SOT-23-5L Mechanical Information

SOT-23-5L Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-23-5L Suggested Pad Layout



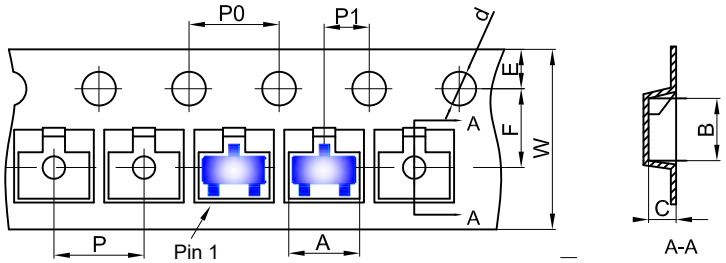
Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purpose only.

11 Packaging Information

11.1 SOT-23-3L Tape and Reel Information

SOT-23-3L Embossed Carrier Tape

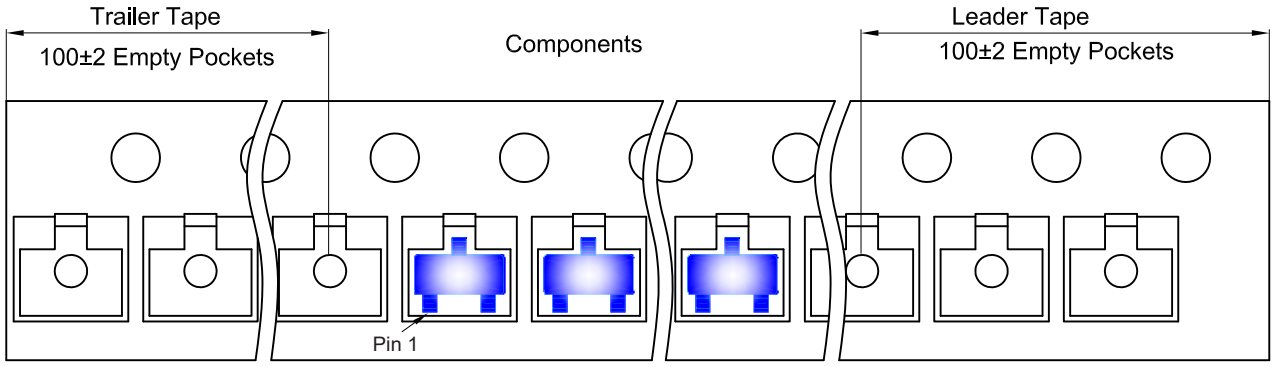


Packaging Description:

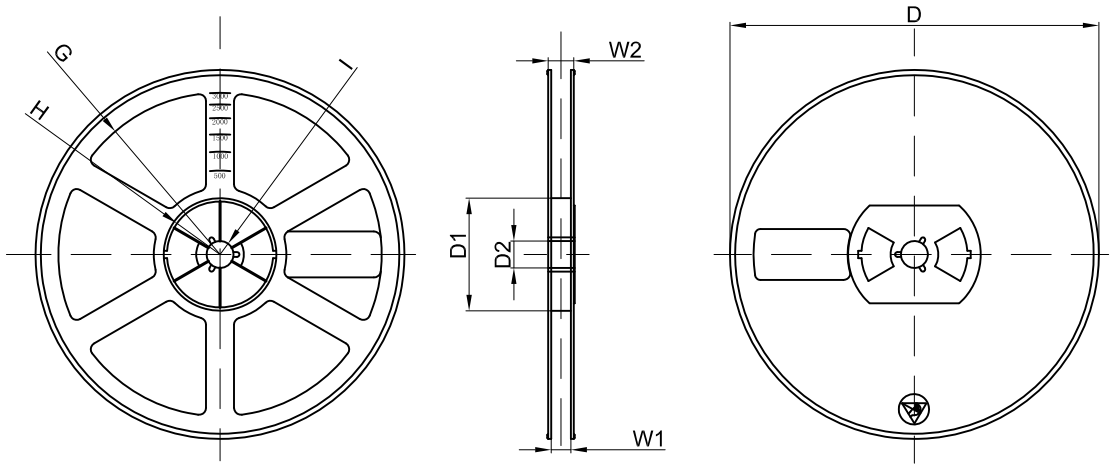
SOT-23-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 18.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23-3L	3.18	3.28	1.32	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23-3L Tape Leader and Trailer



SOT-23-3L Reel



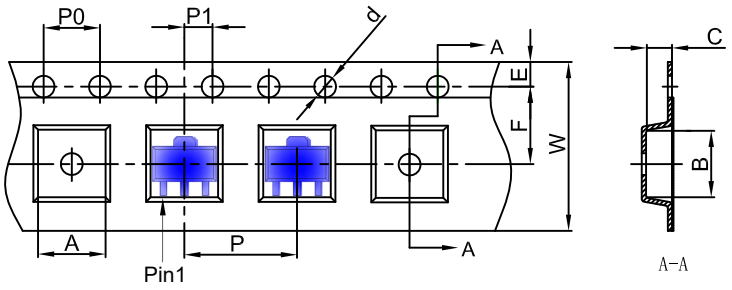
Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø180.00	60.00	13.00	R78.00	R25.60	R6.50	9.50	13.10

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	30,000 pcs	203×203×195	120,000 pcs	438×438×220	

11 Packaging Information

11.2 SOT-89-3L Tape and Reel Information

SOT-89-3L Embossed Carrier Tape

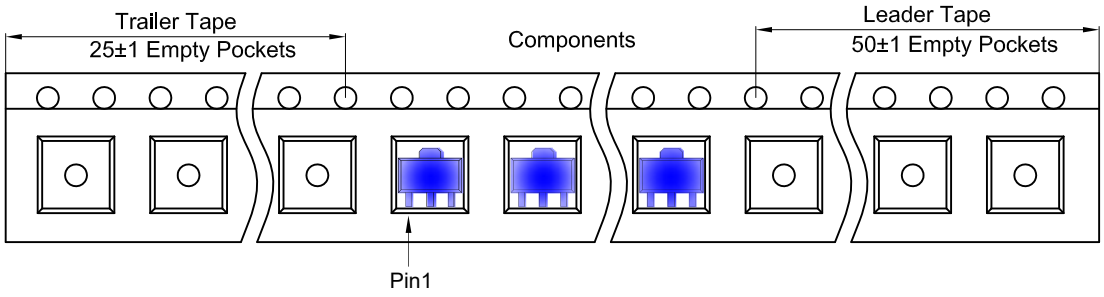


Packaging Description:

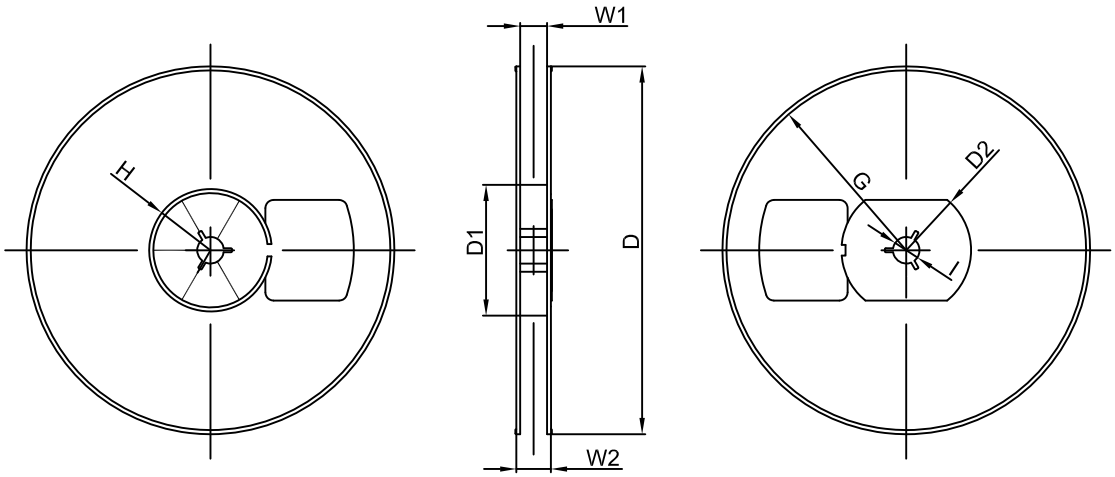
SOT-89-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 1,000 units per 7" or 18.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-89-3L	4.85	4.45	1.85	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-89-3L Tape Leader and Trailer



SOT-89-3L Reel



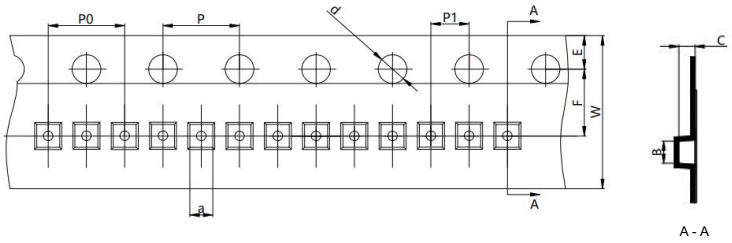
Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø180.00	60.00	R32.00	R86.50	R30.00	Ø13.00	13.20	16.50

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
1000 pcs	7 inch	10,000 pcs	203×203×195	40,000 pcs	438×438×220	

11 Packaging Information

11.3 DFNWB1×1-4L Tape and Reel Information

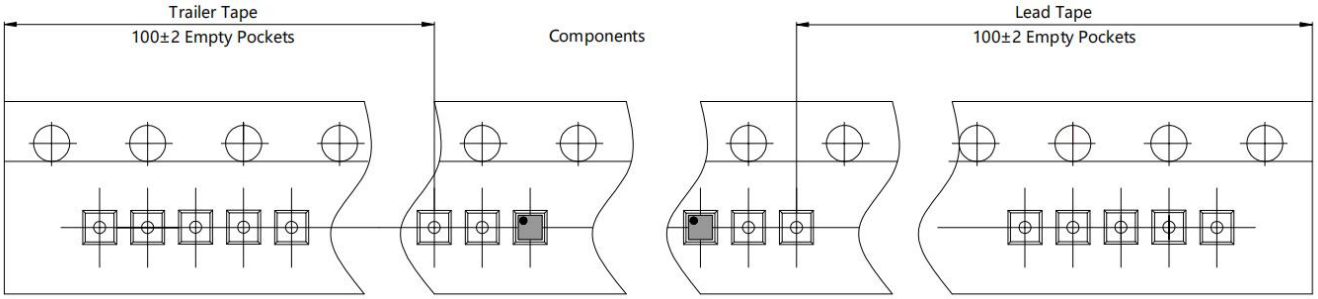
DFNWB1×1-4L Embossed Carrier Tape



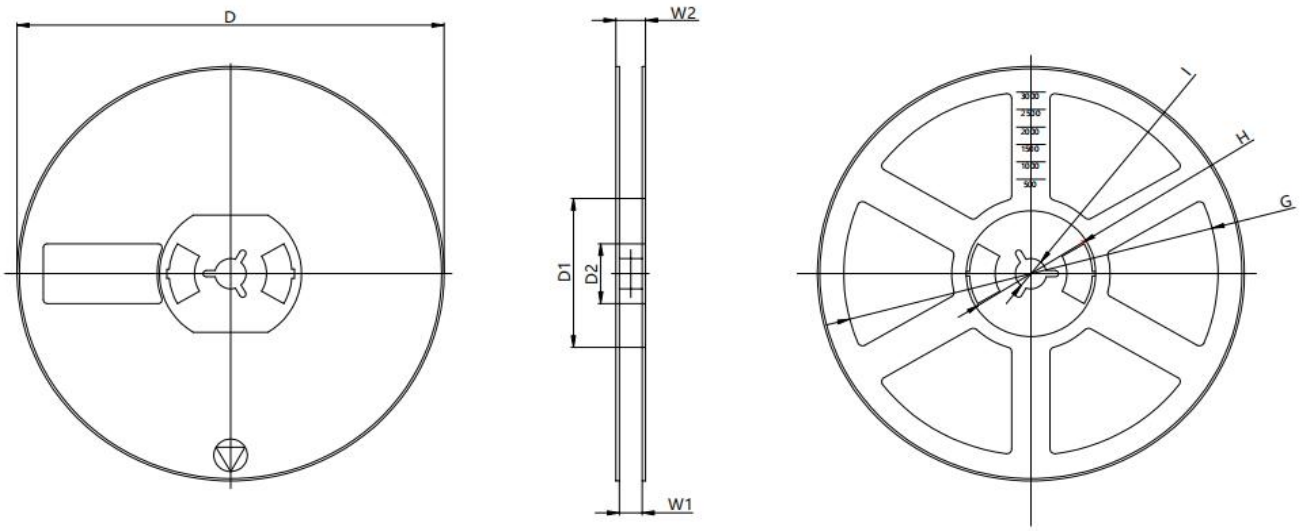
Packaging Description:
DFNWB1×1-4L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled)polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7"or 18.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
DFNWB1×1-4L	1.12	1.13	0.50	1.55	1.75	3.5	4.00	4.00	2.00	8.00

DFNWB1×1-4L Tape Leader and Trailer



DFNWB1×1-4L Reel



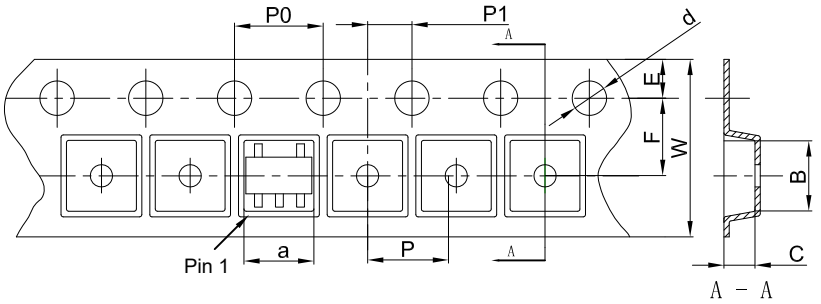
Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7''Dia	Ø 178.00	54.5	13.5	R78.0	R25.6	R6.75	9.6	12.3

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
10,000 pcs	7 inch	100,000pcs	210×208×205	400,000 pcs	440×440×230	

11 Packaging Information

11.4 SOT-23-5L Tape and Reel Information

SOT-23-5L Tape and Reel Information

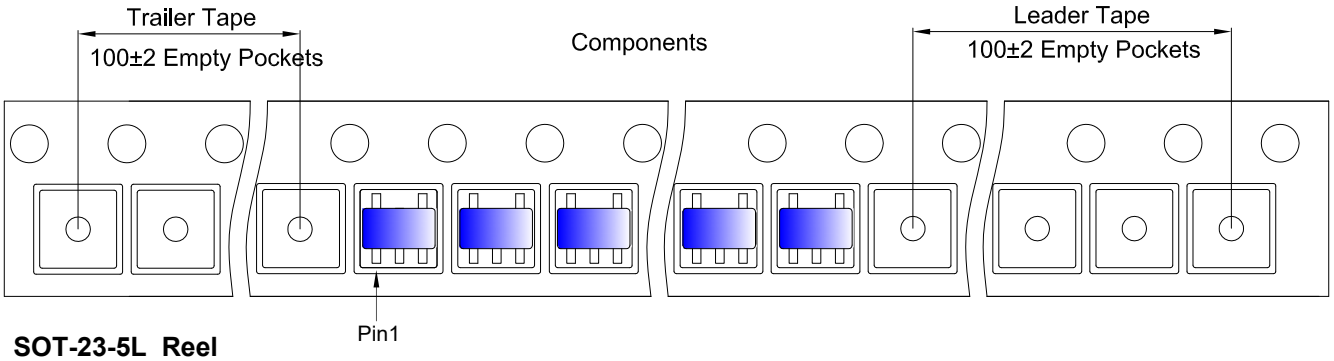


Packaging Description:

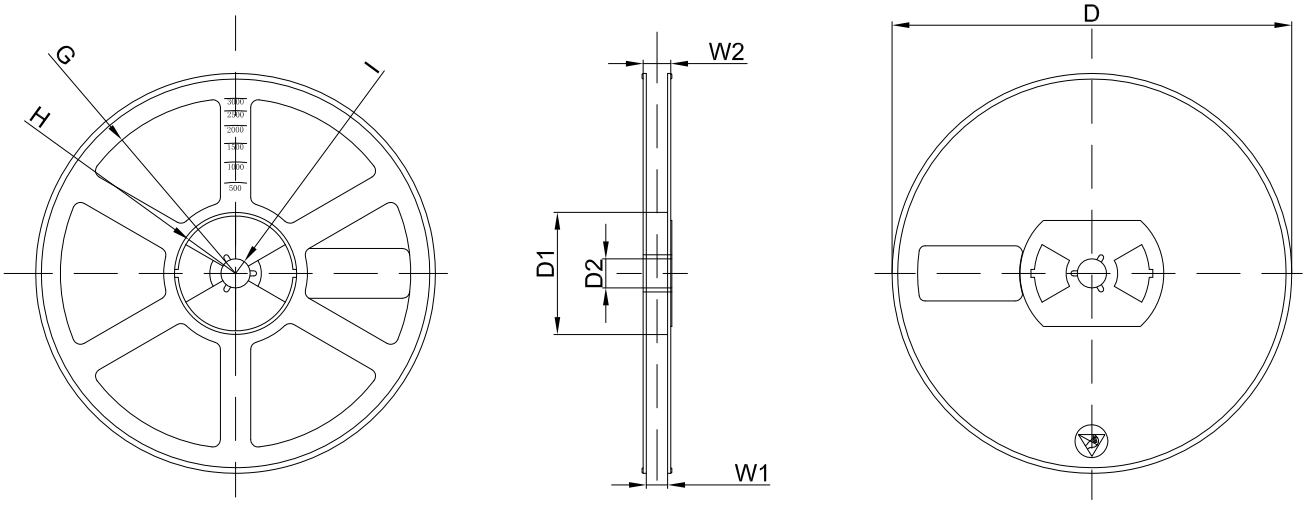
SOT-23-5L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 18.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
SOT-23-5L	3.17	3.23	1.37	Ø1.55	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23-5L Tape Leader and Trailer



SOT-23-5L Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø180.00	60.00	13.00	R78.00	R25.60	R6.50	9.50	13.10

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	30,000 pcs	203×203×195	120,000 pcs	438×438×220	

12 Notes and Revision History

12.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of SZCJ -- ***https:www.szcjsemi.com*** for more details.

12.2 Notes

Electrostatic Discharge Caution



This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

12.3 Revision History

January, 2023: changed from rev - 2.5 to rev - 2.6:

- Removed description of thermal shutdown;
- Page 7, Thermal Information, updated the $R_{\Theta JA}$.

October, 2023: changed rev - 2.4 to rev - 2.5:

- Page 1, changed section 2 from "Naming Conventions" to "Available Packages";
- Page 2, Orderable Information, added the Naming Conventions, simplified customized product information;
- Page 5, Marking Information, added the figure of the marking rule;
- Page 6, Recommended Operating Conditions, removed note 4;
- Page 12, Typical Characteristics, removed the charts of the "SCP" and "Power On";
- Page 28, Notes, removed the notes of the thermal metric.

December, 2022: changed from rev - 2.3 to rev - 2.4:

- Changed the data sheet layout to SZCJ format;
- Page 4 ~ 5, Pin Configuration and Marking Information, added the schematic diagram corresponding to the package;
- Page 6, Pin Configuration and Marking Information, added Pin Function and the Marking Information sections;
- Page 10 ~ 14, Typical Characteristics, added the CJ6101-1.8V device;
- Page 16 ~ 17, Detailed Description, added and modified the content of the text;
- Page 18 ~ 19, Application Information, added and modified the content of the text;
- Page 24, added the Packing Information section.

December, 2022: changed from rev - 2.2 to rev - 2.3:

- Page 2, Orderable Information, added new device "CJ6101A25M".

June, 2022: changed from rev - 2.1 to rev - 2.2:

- Page 2, added the ECO PLAN and MSL into Orderable Information;
- Page 3, added the description of the Orderable Information;
- Page 8 ~ 12, added the description of "V_{OUT} = 3.3V" into "CJ6101 Series".

12 Notes and Revision History

12.3 Revision History

April, 2022: changed from rev - 2.0 to rev - 2.1:

- Page 2, added orderable information;
- Page 4, note (4) and (5), changed CJ to SZCJ .

March, 2022: updated CJ6101 series rev - 2.0.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. SZCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

Any person who purchases or uses SZCJ products for design shall: 1. Select products suitable for circuit application and design; 2. Design, verify and test the rationality of circuit design; 3. Procedures to ensure that the design complies with relevant laws and regulations and the requirements of such laws and regulations. SZCJ makes no warranty or representation as to the accuracy or completeness of the information contained in this data sheet and assumes no responsibility for the application or use of any of the products described in this data sheet.

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