JIANGSU CHANGJING ELECTRONICS TECHNOLOGY CO., LTD

Wide Input Voltage 1.5A Three Terminal Positive Voltage Regulator

CJ78 Series Three Terminal Voltage Regulator

1 Introduction

The CJ78 series is a group of three terminal positive voltage linear regulators with multiple fixed output voltages. Under the condition of good heat dissipation, it can provide output current up to 1.5A, and has the functions of internal short circuit protection, thermal shutdown protection and output transistor SOA protection, which make it relatively difficult to damage. Although designed as fixed voltage regulators without external components, these devices can be used with external components to obtain adjustable voltage and current. Therefore, the CJ78 series is widely used as fixed voltage regulators, including local (on card) regulators, to eliminate noise and power distribution problems associated with single point regulation.

2 Applications

- AC Inventors
- DC Motor Drivers
- Household Electric Appliances
- HVAC Systems
- Industrial Power Supplies
- SMPS Post Regulation
- Solar Energy String Inventors
- Test and Measurement Equipment

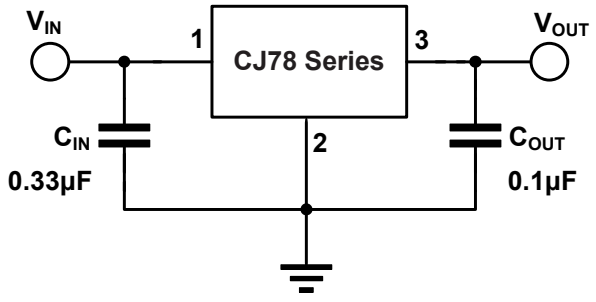


Figure 2-1. Fixed Output Voltage Regulator

3 Features

- Output Current:
  up to 1.5A at T_J = 25°C
- Available in Fixed 5.0V, 6.0V, 8.0V, 9.0V and 12V
- Output Voltage Tolerance:
  ±3% at T_J = 25°C
  ±5% over the Operating T_J
- Line Regulation:
  4.0 ~ 12mV (Typ.) at T_J = 25°C
- Load Regulation:
  9.0 ~ 14mV (Typ.) at T_J = 25°C
- Dropout Voltage:
  2.0V@1A (V_{OUT} = 5.0V)
- Power Supply Rejection Ratio:
  >55dB@120Hz (V_{OUT} = 5.0V)
- Operating Junction Temperature:
  -40 ~ 125°C
- Output Transistor SOA Protection
- Short Circuit Protection
- Thermal Shutdown Protection

4 Available Package

PART NUMBER	PACKAGE
CJ78 Series	TO-220-3L
	TO-220F
	TO-251-3L
	TO-251S
	TO-252-2L
	TO-263-2L

Note: For more detailed packaging information, see the part *Pin Configuration and Function* and the part *Mechanical Information*.

5 Orderable Information

MODEL	DEVICE	PACKAGE	OP T_J	ECO PLAN	MSL	PACKING OPTION	SORT
CJ78-5.0	CJ7805	TO-220-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-5.0	CJ7805	TO-220-3L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-6.0	CJ7806	TO-220-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-6.0	CJ7806	TO-220-3L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-8.0	CJ7808	TO-220-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-8.0	CJ7808	TO-220-3L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-9.0	CJ7809	TO-220-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-9.0	CJ7809	TO-220-3L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-12	CJ7812	TO-220-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-12	CJ7812	TO-220-3L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-5.0	CJ7805F	TO-220F	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-5.0	CJ7805F	TO-220F	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-9.0	CJ7809F	TO-220F	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-9.0	CJ7809F	TO-220F	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-12	CJ7812F	TO-220F	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 50 Units / Rail	Active
CJ78-12	CJ7812F	TO-220F	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tube 50 Units / Rail	Active

5 Orderable Information

MODEL	DEVICE	PACKAGE	OP $T_{J\ MAX}$	ECO PLAN	MSL	PACKING OPTION	SORT
CJ78-12	CJ7812	TO-251-3L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 80 Units / Rail	Active
CJ78-12	CJ7812	TO-251S	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tube 80 Units / Rail	Active
CJ78-5.0	CJ7805	TO-252-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-5.0	CJ7805	TO-252-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-6.0	CJ7806	TO-252-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-6.0	CJ7806	TO-252-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-8.0	CJ7808	TO-252-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-8.0	CJ7808	TO-252-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-9.0	CJ7809	TO-252-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-8.0	CJ7808	TO-252-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-12	CJ7812	TO-252-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active
CJ78-12	CJ7812	TO-252-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 2500 Units / Reel	Active

5 Orderable Information

MODEL	DEVICE	PACKAGE	OP $T_{J\ MAX}$	ECO PLAN	MSL	PACKING OPTION	SORT
CJ78-5.0	CJ7805	TO-263-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
CJ78-5.0	CJ7805	TO-263-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
CJ78-8.0	CJ7808	TO-263-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
CJ78-8.0	CJ7808	TO-263-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
CJ78-12	CJ7812	TO-263-2L	-40 ~ 125°C	RoHS & Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
CJ78-12	CJ7812	TO-263-2L	-40 ~ 125°C	RoHS & non Green	Level 3 168 HR	Tape and Reel 800 Units / Reel	Active
Others	-	-	-	-	-	-	Customized

Note:

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

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;

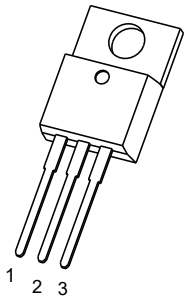
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

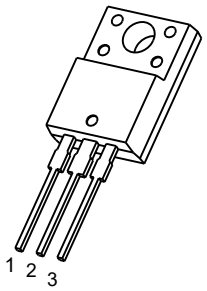
6.1 Pin Configuration and Function

Figure 6-1. CJ78 Series Package Top View

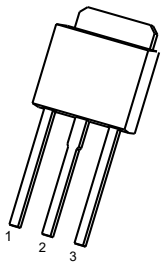
TO-220-3L



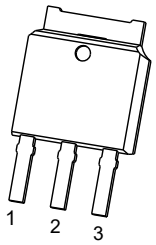
TO-220F



TO-251-3L

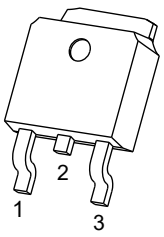


TO-251S

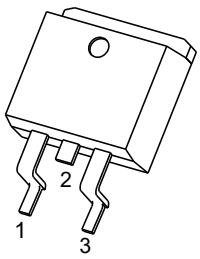


PIN NAME	CJ78 Series Package				I / O	DESCRIPTION
	TO-220-3L	TO-220F	TO-251-3L	TO-251S		
IN	1	1	1	1	I	Input to the device.
GND	2	2	2	2	-	Regulator ground.
OUT	3	3	3	3	O	Output of the regulator.

TO-252-2L



TO-263-2L

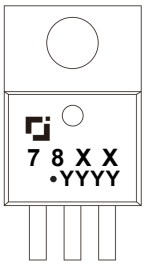
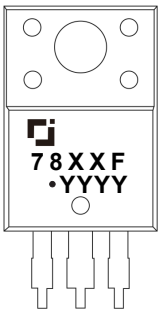
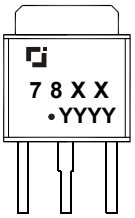
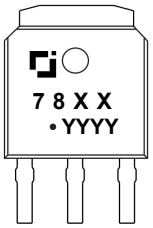
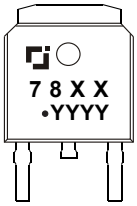
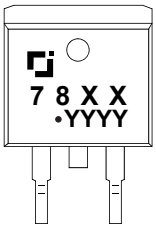


PIN NAME	CJ78 Series Package		I / O	DESCRIPTION
	TO-252-2L	TO-263-2L		
IN	1	1	I	Input to the device.
GND	2	2	-	Regulator ground.
OUT	3	3	O	Output of the regulator.

6 Pin Configuration and Marking Information

6.2 Marking Information

Figure 6-2. CJ78 Series Marking Information

			
TO-220-3L	**TO-220-F**	**TO-251-3L**	**TO-251S**
			
TO-252-2L	**TO-263-2L**		

"78XX" or "78XXF": Device code, the "XX" in the "78XX" or "78XXF" represents the output voltage, for example, if V_{OUT} = 5.0V, the "XX" is "05".

"•" Solid Dot: Green molding compound device. If none, the normal device.

"YYYY": Code.

7 Specifications

7.1 Absolute Maximum Ratings(1)

(over operating free-air temperature range, unless otherwise specified)

CHARACTERISTIC			SYMBOL	VALUE	UNITS
Maximum input voltage(2)			V_{IN}	35	V
Maximum power dissipation	CJ78 Series	TO-251-3L	$P_{D\ Max}$	Internally Limited(3)	W
		TO-251S			
		TO-220-3L			
		TO-220F			
		TO-252-2L			
		TO-263-2L			
Maximum junction temperature			$T_{J\ Max}$	150	°C
Storage temperature			T_{stg}	-65 ~ 150	°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(4)

PARAMETER	SYMBOL	MIN.	NOM.	MAX.	UNIT
Operating junction temperature	T_J	-40	-	125	°C
Operating ambient temperature	T_A	-	-(5)	-	°C

(4) CJ recommends that users should not exceed the rated value in the *Recommended Operating Conditions* for the application conditions of the equipment, so as to ensure the stability of normal operation and reliability of long-term operation of the equipment. Operation beyond the recommended rated conditions does not mean that the product will fail. The consumers need to evaluate the risks that may be caused by the operation of the product beyond the recommended rated conditions.

(5) It is necessary to ensure that the operating junction temperature of the equipment 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(6)	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 mode (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 mode (MM) is based on the JESD22-115-A test standard and uses a 200pF capacitor to discharge directly to each pin of the device.

7.4 Thermal Information

THERMAL METRIC(7)	SYMBOL	CJ78 Series			UNIT
Junction-to-ambient thermal resistance	$R_{\Theta JA}$	**TO-220-3L**	**TO-220F**	**TO-251-3L**	°C/W
		66.7	66.7	80.0	
		TO-251S	**TO-252-2L**	**TO-263-2L**	
		80.0	80.0	62.5	
Reference maximum power dissipation for continuous operation	$P_{D\ Ref}$	**TO-220-3L**	**TO-220F**	**TO-251-3L**	W
		1.50	1.50	1.25	
		TO-251S	**TO-252-2L**	**TO-263-2L**	
		1.25	1.25	1.60	

(7) T_A = 25°C, see the part *Notes* for more information about thermal metrics.

7 Specifications

7.5 Electrical Characteristics

CJ7805 (V_{IN} = 10V, I_{OUT} = 500mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.(8)	MAX.	UNIT
Output voltage	V_{OUT}	T_J = 25°C	4.85	5.00	5.15	V
		I_{OUT} = 5mA to 1A, V_{IN} = 7V to 20V, T_J = 0°C to 125°C	4.75	5.00	5.25	
Line regulation	ΔV_{OUT}	T_J = 25°C, V_{IN} = 7V to 25V	-	4	100	mV
		T_J = 25°C, V_{IN} = 8V to 12V	-	1.6	50	
Load regulation	ΔV_{OUT}	T_J = 25°C, I_{OUT} = 5mA to 1.5A	-	9	100	mV
		T_J = 25°C, I_{OUT} = 250mA to 750mA	-	4	50	
Quiescent current	I_Q	T_J = 25°C	-	5	8	mA
Quiescent current change	ΔI_Q	I_{OUT} = 5mA to 1A	-	0.03	0.5	mA
		V_{IN} = 7V to 25V	-	0.3	1.3	
Output voltage drift	$\Delta V_{OUT}/\Delta T$	I_{OUT} = 5mA	-	-1.1	-	mV/°C
Output noise voltage	V_N	f = 10Hz to 100kHz, T_J = 25°C	-	42	-	μV
Ripple rejection	RR	f = 120Hz, V_{IN} = 8V to 18V	62	73	-	dB
Dropout voltage(9)	V_{OUT}	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output resistance	R_{OUT}	f = 1kHz	-	10	-	mΩ
Short circuit current	I_{SC}	T_J = 25°C		230	-	mA
Peak current	I_{PK}	T_J = 25°C	-	2.2	-	A

Note:

(8) Pulse test technology is used to make T_J as close to T_A as possible. Thermal effects must be considered separately. Typical numbers are at 25°C and represent the most likely norm.

(9) The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 95% of V_{OUT}.

7 Specifications

7.5 Electrical Characteristics (continued)

CJ7806 (V_{IN} = 11V, I_{OUT} = 500mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.(8)	MAX.	UNIT
Output voltage	V_{OUT}	T_J = 25°C	5.82	6.00	6.18	V
		I_{OUT} = 5mA to 1A, V_{IN} = 8V to 21V, T_J = 0°C to 125°C	5.70	6.00	6.30	
Line regulation	ΔV_{OUT}	T_J = 25°C, V_{IN} = 8V to 25V	-	5	120	mV
		T_J = 25°C, V_{IN} = 9V to 13V	-	1.5	60	
Load regulation	ΔV_{OUT}	T_J = 25°C, I_{OUT} = 5mA to 1.5A	-	14	120	mV
		T_J = 25°C, I_{OUT} = 250mA to 750mA	-	4	60	
Quiescent current	I_Q	T_J = 25°C	-	4.3	8	mA
Quiescent current change	ΔI_Q	I_{OUT} = 5mA to 1A	-	-	0.5	mA
		V_{IN} = 8V to 25V	-	-	1.3	
Output voltage drift	$\Delta V_{OUT}/\Delta T$	I_{OUT} = 5mA	-	-0.8	-	mV/°C
Output noise voltage	V_N	f = 10Hz to 100kHz, T_J = 25°C	-	45	-	μV
Ripple rejection	RR	f = 120Hz, V_{IN} = 9V to 19V	59	75	-	dB
Dropout voltage(9)	V_{OUT}	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output resistance	R_{OUT}	f = 1kHz	-	10	-	mΩ
Short circuit current	I_{SC}	T_J = 25°C	-	550	-	mA
Peak current	I_{PK}	T_J = 25°C	-	2.1	-	A

Note:

(8) Pulse test technology is used to make T_J as close to T_A as possible. Thermal effects must be considered separately. Typical numbers are at 25°C and represent the most likely norm.

(9) The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 95% of V_{OUT}.

7 Specifications

7.5 Electrical Characteristics (continued)

CJ7808 (V_{IN} = 14V, I_{OUT} = 500mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.(8)	MAX.	UNIT
Output voltage	V_{OUT}	T_J = 25°C	7.76	8.00	8.24	V
		I_{OUT} = 5mA to 1A, V_{IN} = 10.5V to 23V, T_J = 0°C to 125°C	7.60	8.00	8.40	
Line regulation	ΔV_{OUT}	T_J = 25°C, V_{IN} = 10.5V to 25V	-	6	160	mV
		T_J = 25°C, V_{IN} = 11V to 17V	-	2	80	
Load regulation	ΔV_{OUT}	T_J = 25°C, I_{OUT} = 5mA to 1.5A	-	12	160	mV
		T_J = 25°C, I_{OUT} = 250mA to 750mA	-	4	80	
Quiescent current	I_Q	T_J = 25°C	-	4.3	8	mA
Quiescent current change	ΔI_Q	I_{OUT} = 5mA to 1A	-	-	0.5	mA
		V_{IN} = 10.5V to 25V	-	-	1.0	
Output voltage drift	$\Delta V_{OUT}/\Delta T$	I_{OUT} = 5mA	-	-0.8	-	mV/°C
Output noise voltage	V_N	f = 10Hz to 100kHz, T_J = 25°C	-	52	-	μV
Ripple rejection	RR	f = 120Hz, V_{IN} = 11.5V to 21.5V	55	72	-	dB
Dropout voltage(9)	V_{OUT}	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output resistance	R_{OUT}	f = 1kHz	-	10	-	mΩ
Short circuit current	I_{SC}	T_J = 25°C		450	-	mA
Peak current	I_{PK}	T_J = 25°C	-	2.2	-	A

Note:

(8) Pulse test technology is used to make T_J as close to T_A as possible. Thermal effects must be considered separately. Typical numbers are at 25°C and represent the most likely norm.

(9) The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 95% of V_{OUT}.

7 Specifications

7.5 Electrical Characteristics (continued)

CJ7809 (V_{IN} = 16V, I_{OUT} = 500mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.(8)	MAX.	UNIT
Output voltage	V_{OUT}	T_J = 25°C	8.73	9.00	9.27	V
		I_{OUT} = 5mA to 1A, V_{IN} = 11.5V to 24V, T_J = 0°C to 125°C	8.55	9.00	9.45	
Line regulation	ΔV_{OUT}	T_J = 25°C, V_{IN} = 11.5V to 27V	-	7	180	mV
		T_J = 25°C, V_{IN} = 13V to 19V	-	2	90	
Load regulation	ΔV_{OUT}	T_J = 25°C, I_{OUT} = 5mA to 1.5A	-	12	180	mV
		T_J = 25°C, I_{OUT} = 250mA to 750mA	-	4	90	
Quiescent current	I_Q	T_J = 25°C	-	4.3	8	mA
Quiescent current change	ΔI_Q	I_{OUT} = 5mA to 1A	-	-	0.5	mA
		V_{IN} = 11.5V to 27V	-	-	1.0	
Output voltage drift	$\Delta V_{OUT}/\Delta T$	I_{OUT} = 5mA	-	-1	-	mV/°C
Output noise voltage	V_N	f = 10Hz to 100kHz, T_J = 25°C	-	60	-	μV
Ripple rejection	RR	f = 120Hz, V_{IN} = 12V to 22V	55	70	-	dB
Dropout voltage(9)	V_{OUT}	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output resistance	R_{OUT}	f = 1kHz	-	18	-	mΩ
Short circuit current	I_{SC}	T_J = 25°C		400	-	mA
Peak current	I_{PK}	T_J = 25°C	-	2.2	-	A

Note:

(8) Pulse test technology is used to make T_J as close to T_A as possible. Thermal effects must be considered separately. Typical numbers are at 25°C and represent the most likely norm.

(9) The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 95% of V_{OUT}.

7 Specifications

7.5 Electrical Characteristics (continued)

CJ7812 (V_{IN} = 19V, I_{OUT} = 500mA, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.(8)	MAX.	UNIT
Output voltage	V_{OUT}	T_J = 25°C	11.64	12.00	12.36	V
		I_{OUT} = 5mA to 1A, V_{IN} = 14.5V to 27V, T_J = 0°C to 125°C	11.40	12.00	12.60	
Line regulation	ΔV_{OUT}	T_J = 25°C, V_{IN} = 14.5V to 30V	-	12	240	mV
		T_J = 25°C, V_{IN} = 16V to 22V	-	4	120	
Load regulation	ΔV_{OUT}	T_J = 25°C, I_{OUT} = 5mA to 1.5A	-	10	240	mV
		T_J = 25°C, I_{OUT} = 250mA to 750mA	-	3	120	
Quiescent current	I_Q	T_J = 25°C	-	4.3	8	mA
Quiescent current change	ΔI_Q	I_{OUT} = 5mA to 1A	-	-	0.5	mA
		V_{IN} = 14.5V to 30V	-	-	1.0	
Output voltage drift	$\Delta V_{OUT}/\Delta T$	I_{OUT} = 5mA	-	-1	-	mV/°C
Output noise voltage	V_N	f = 10Hz to 100kHz, T_J = 25°C	-	75	-	μV
Ripple rejection	RR	f = 120Hz, V_{IN} = 15V to 25V	55	71	-	dB
Dropout voltage(9)	V_{OUT}	I_{OUT} = 1A, T_J = 25°C	-	2	-	V
Output resistance	R_{OUT}	f = 1kHz	-	18	-	mΩ
Short circuit current	I_{SC}	T_J = 25°C		350	-	mA
Peak current	I_{PK}	T_J = 25°C	-	2.2	-	A

Note:

(8) Pulse test technology is used to make T_J as close to T_A as possible. Thermal effects must be considered separately. Typical numbers are at 25°C and represent the most likely norm.

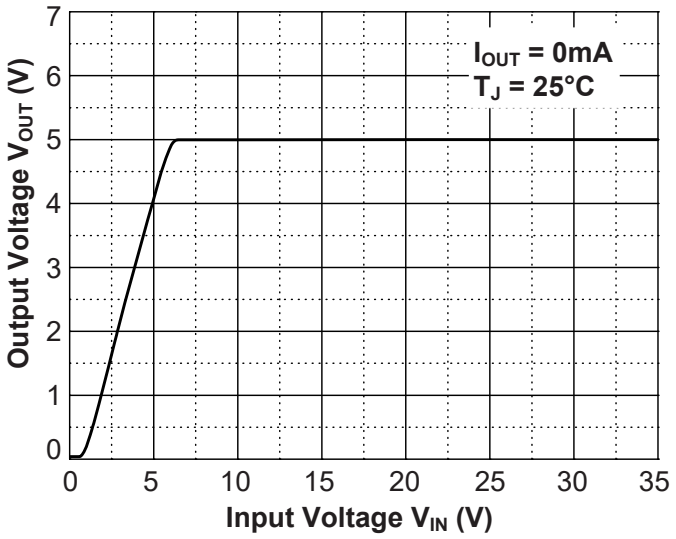
(9) The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 95% of V_{OUT}.

7 Specifications

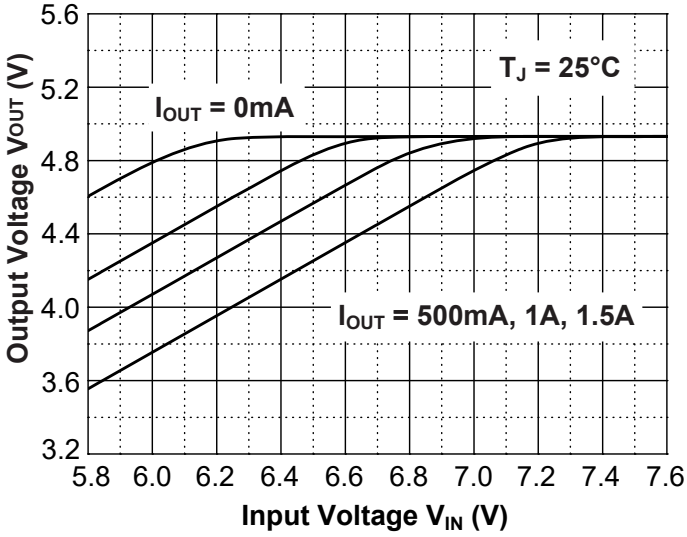
7.6 Typical Characteristics

CJ7805 (V_{OUT} = 5.0V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

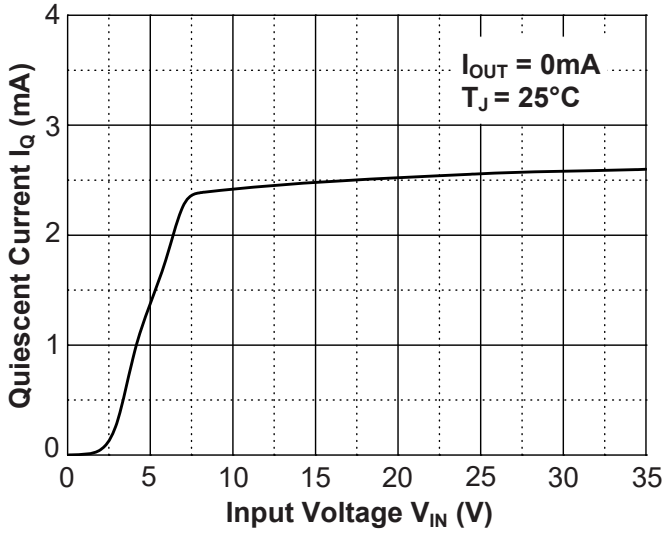
Output Characteristics



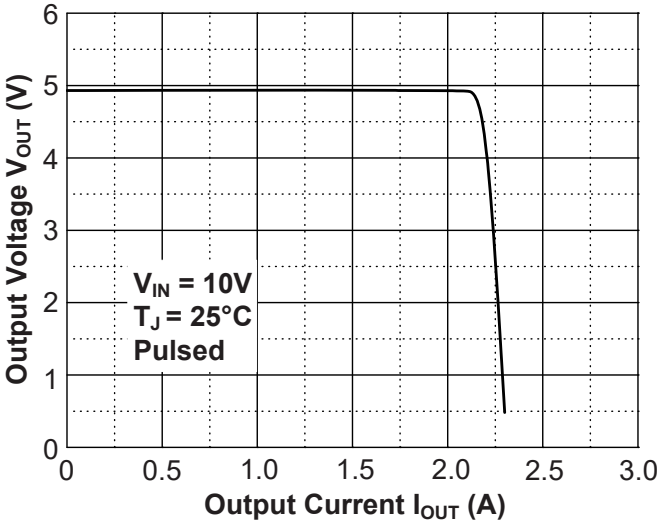
Dropout Characteristics



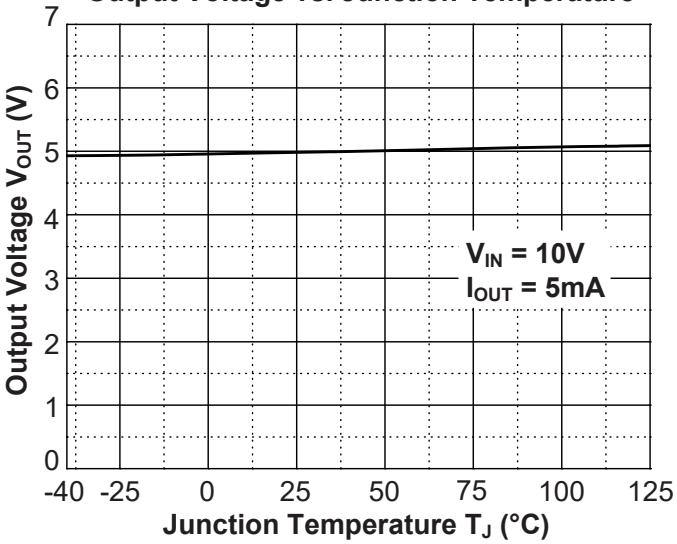
Quiescent Current



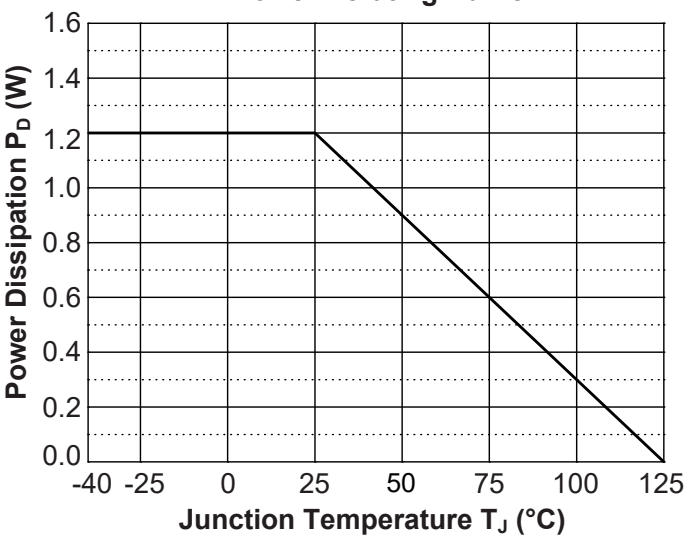
Current Cut-off Grid Voltage



Output Voltage vs. Junction Temperature



Power Derating Curve

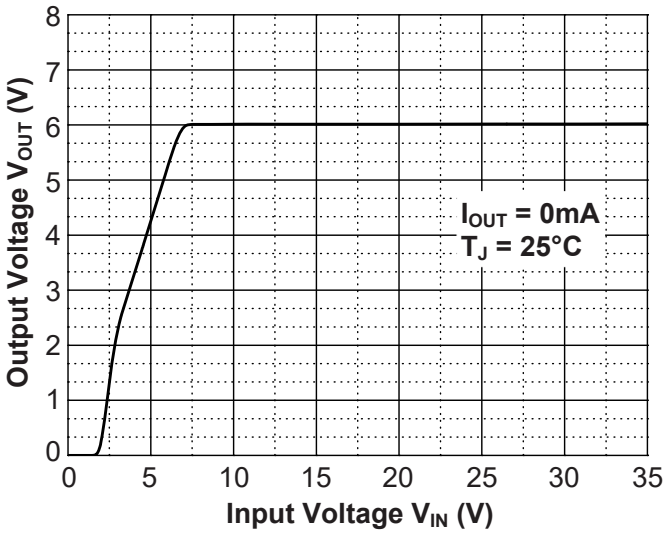


7 Specifications

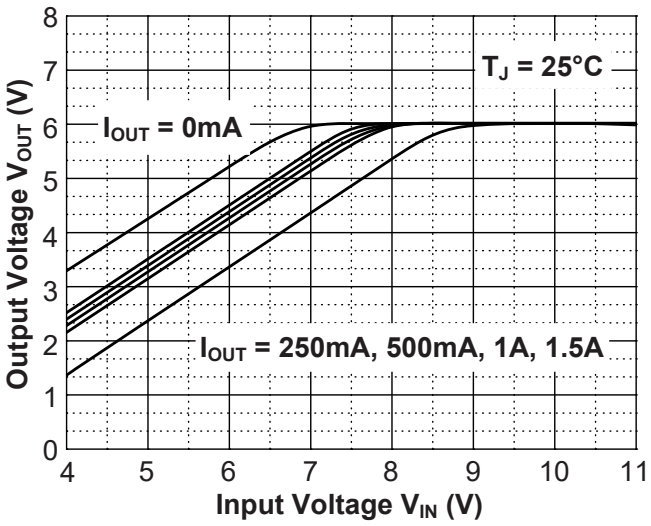
7.6 Typical Characteristics (continued)

CJ7806 (V_{OUT} = 6.0V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

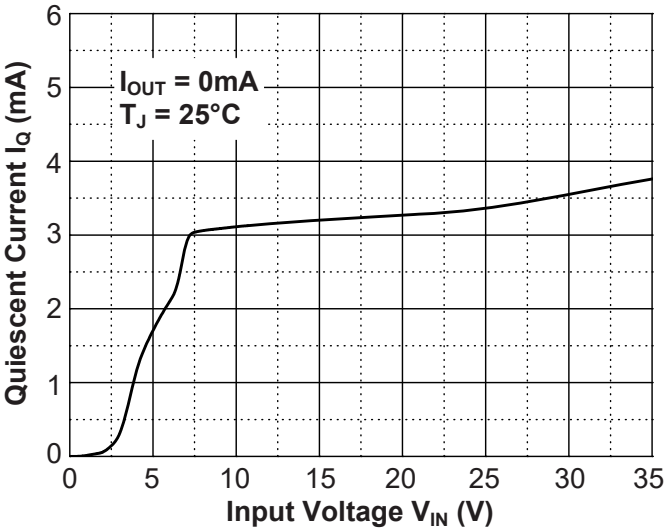
Output Characteristics



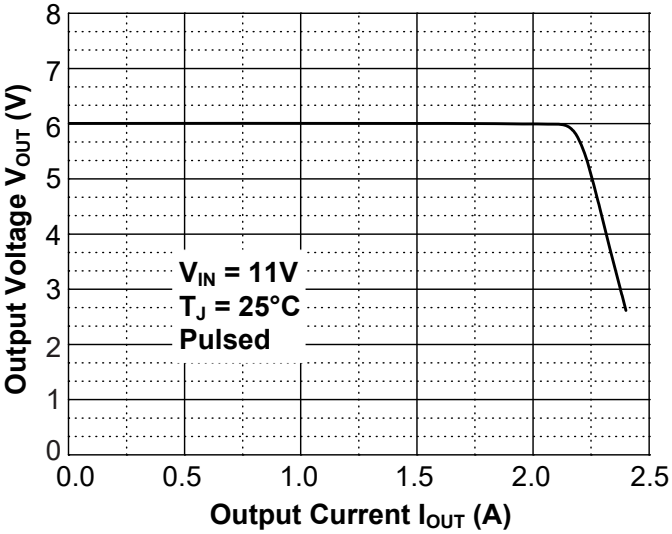
Dropout Characteristics



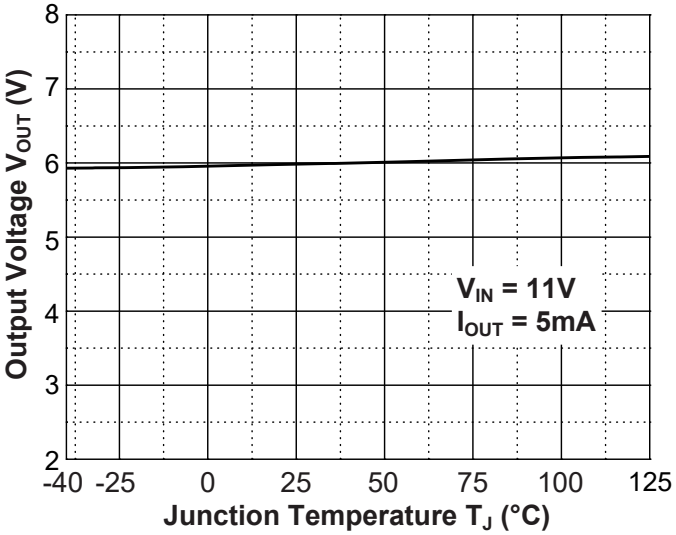
Quiescent Current



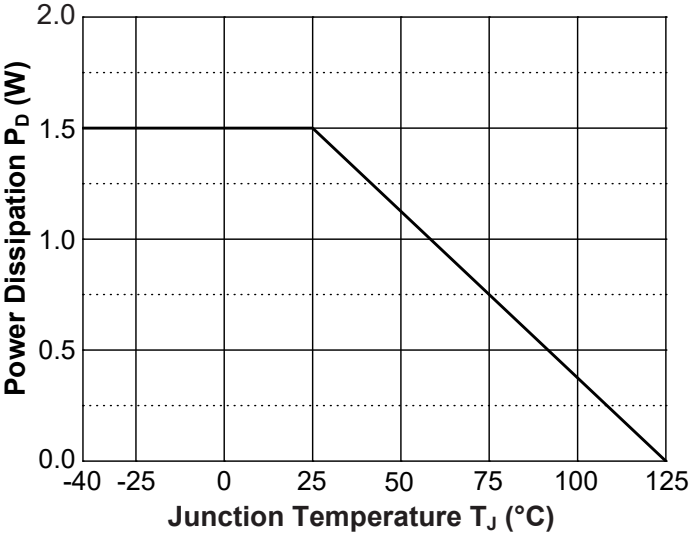
Current Cut-off Grid Voltage



Output Voltage vs. Junction Temperature



Power Derating Curve

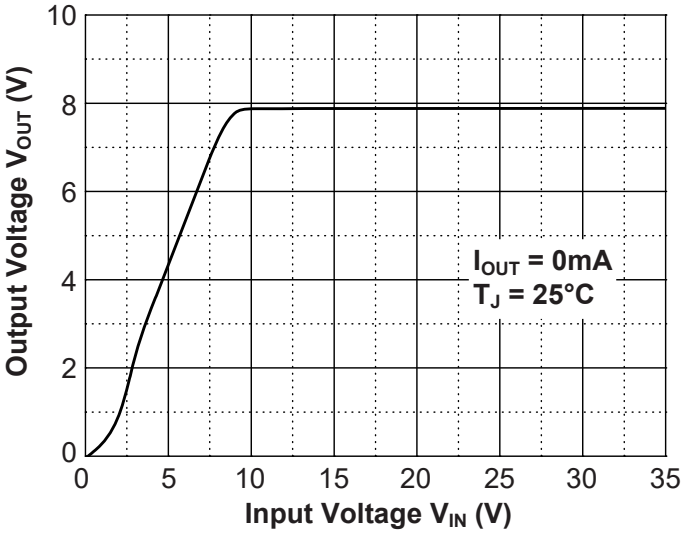


7 Specifications

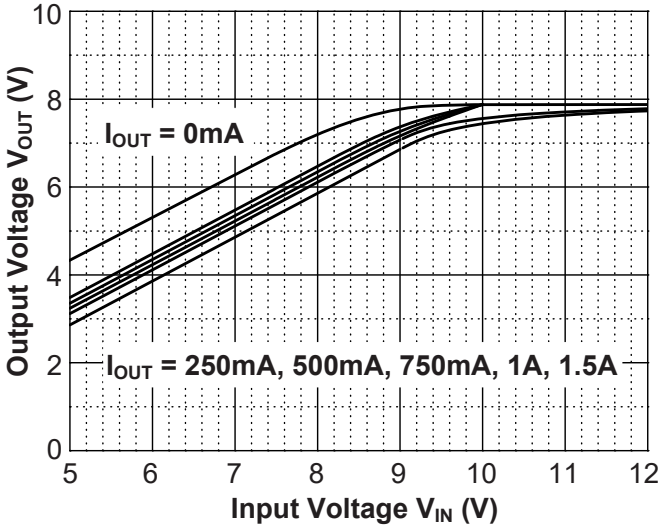
7.6 Typical Characteristics (continued)

CJ7808 (V_{OUT} = 8.0V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

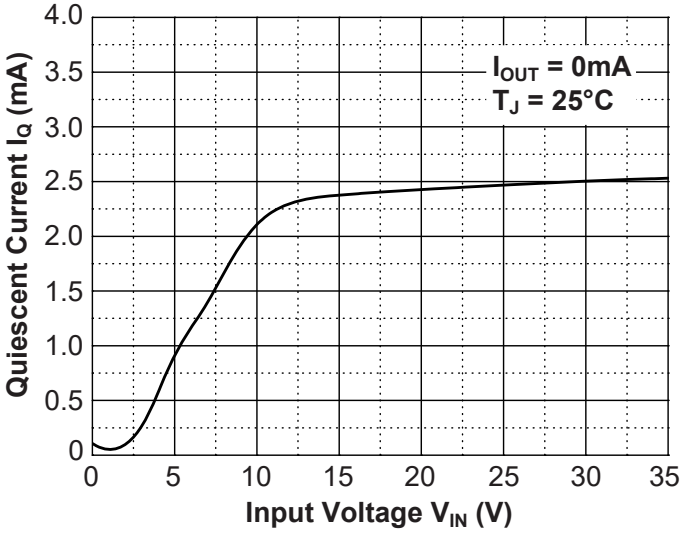
Output Characteristics



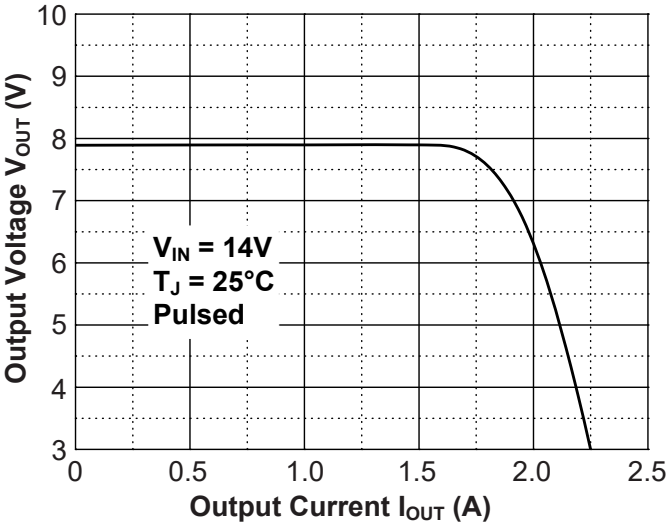
Dropout Characteristics



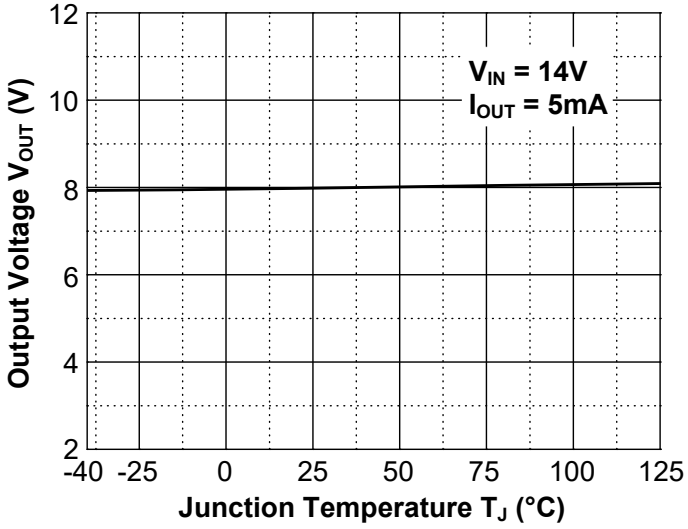
Quiescent Current



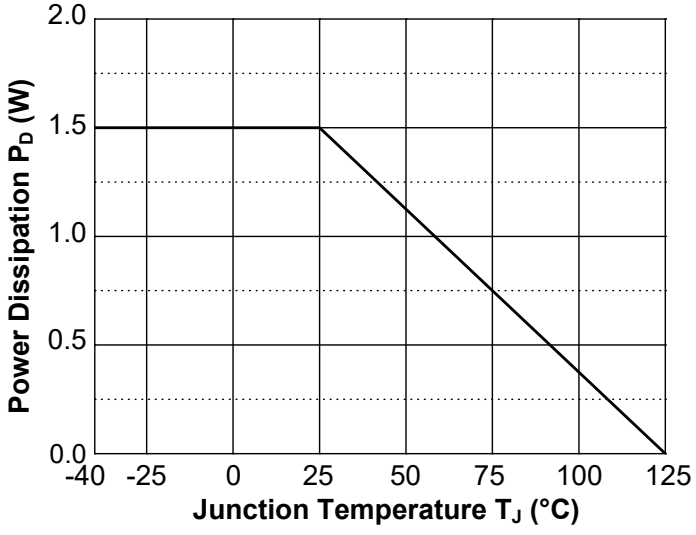
Current Cut-off Grid Voltage



Output Voltage vs. Junction Temperature



Power Derating Curve

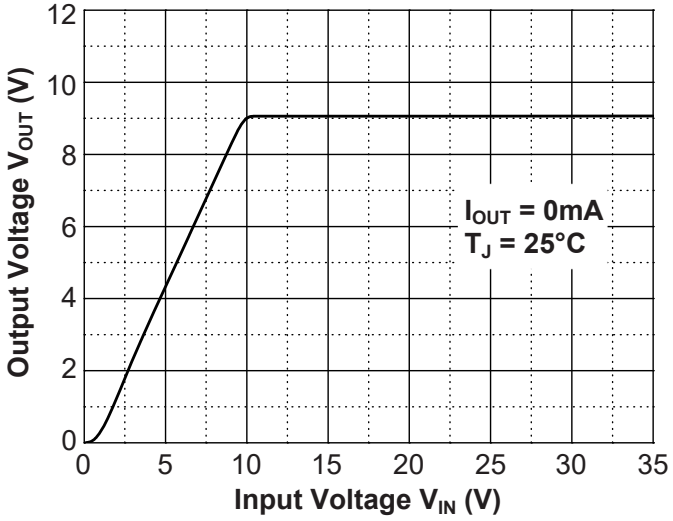


7 Specifications

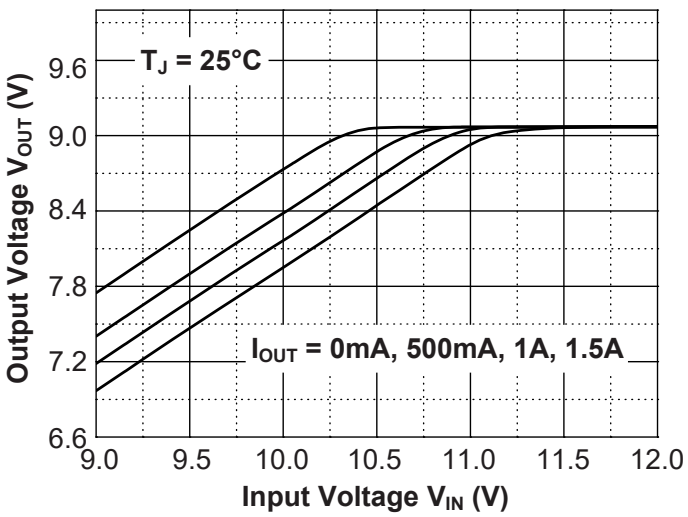
7.6 Typical Characteristics (continued)

CJ7809 (V_{OUT} = 9.0V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

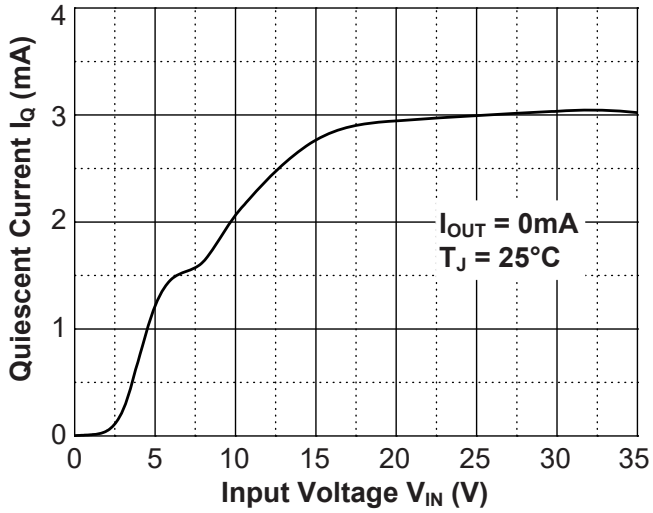
Output Characteristics



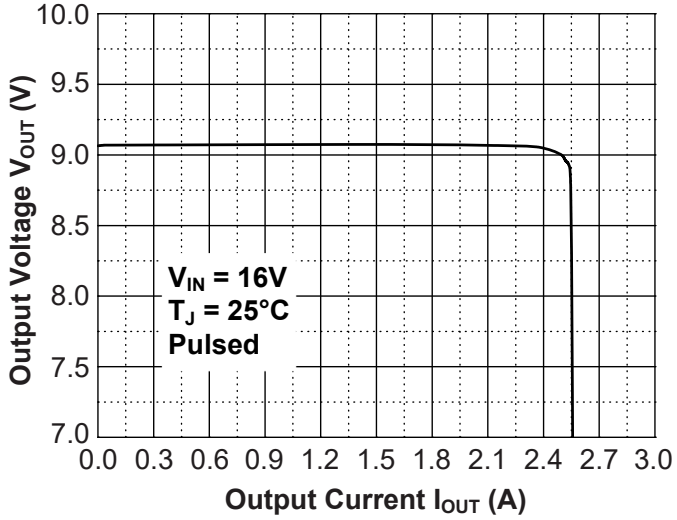
Dropout Characteristics



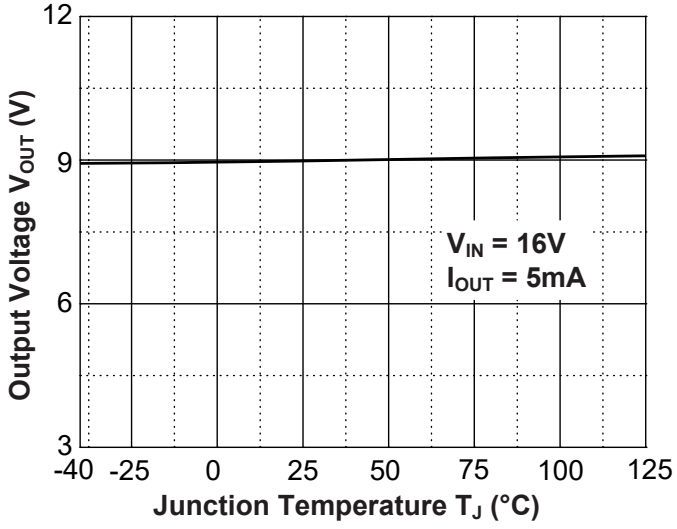
Quiescent Current



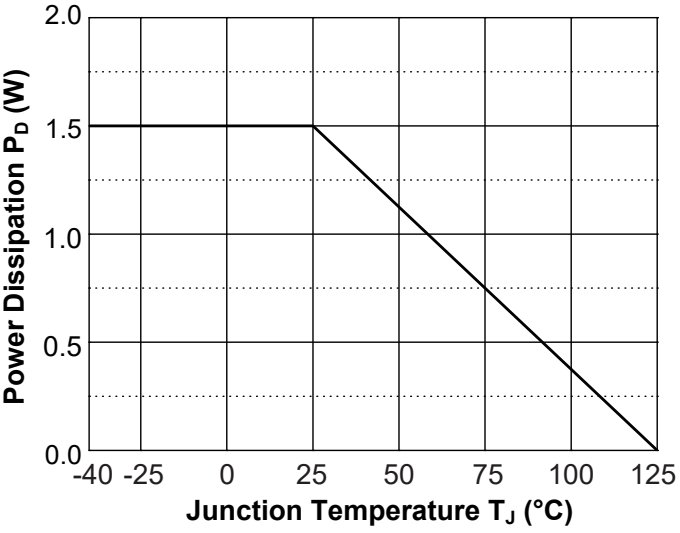
Current Cut-off Grid Voltage



Output Voltage vs. Junction Temperature



Power Derating Curve

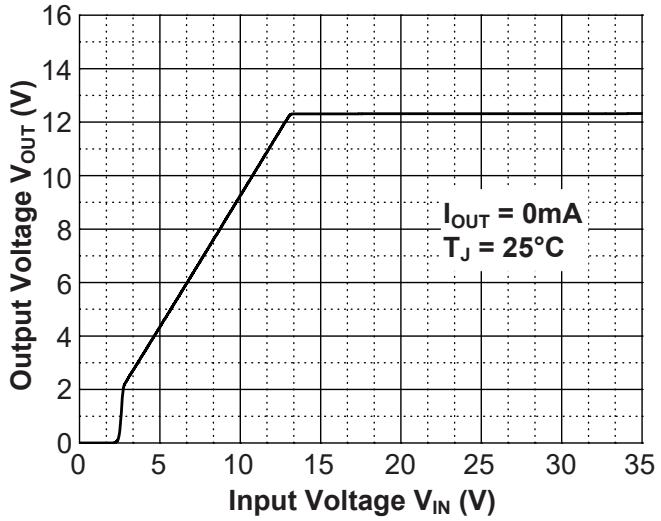


7 Specifications

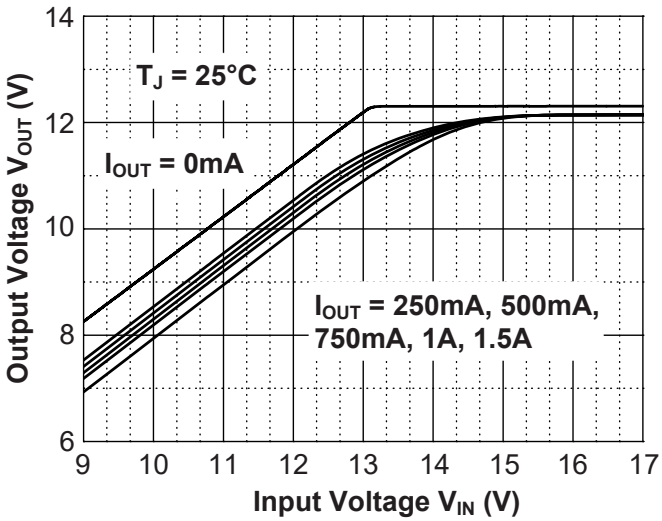
7.6 Typical Characteristics (continued)

CJ7812 (V_{OUT} = 12V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF, T_J = 25°C, unless otherwise specified)

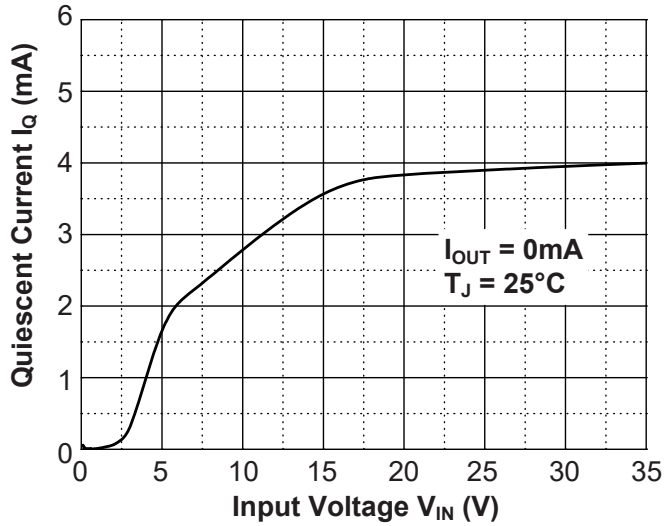
Output Characteristics



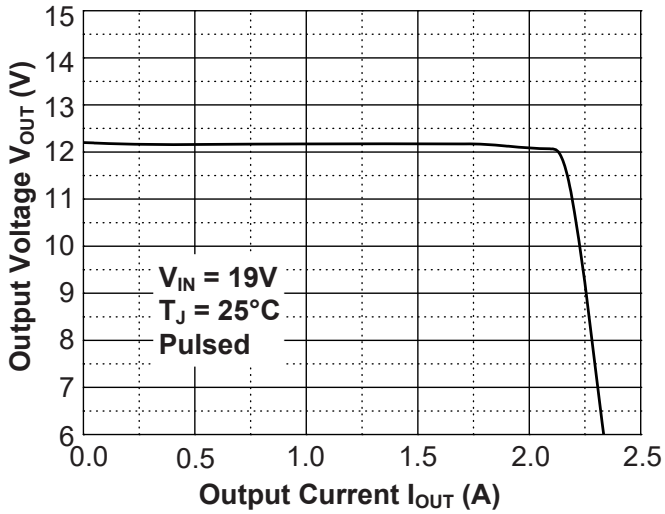
Dropout Characteristics



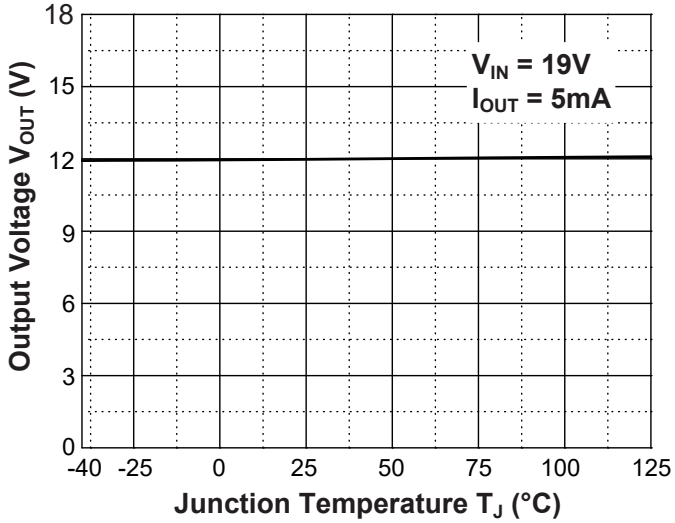
Quiescent Current



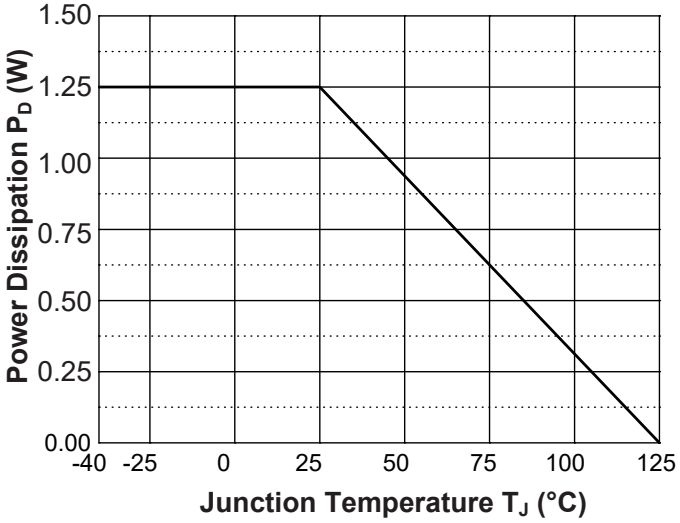
Current Cut-off Grid Voltage



Output Voltage vs Junction Temperature



Power Derating Curve

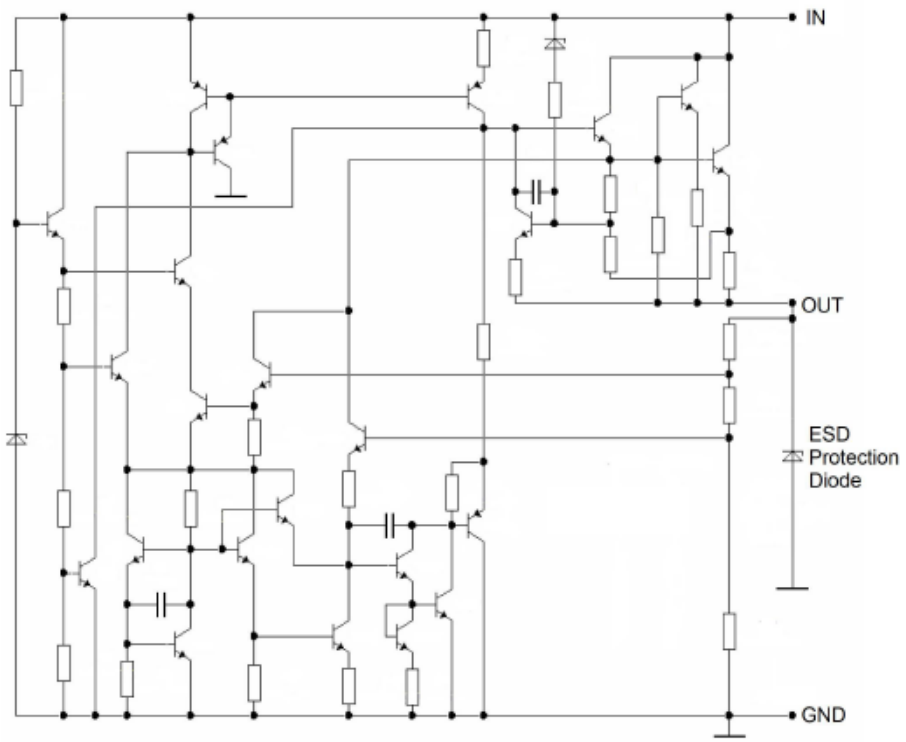


8 Detailed Description

8.1 Description

The CJ78 series is a group of fixed output positive voltage regulators. It integrates short-circuit protection, thermal overload protection and safe working area protection of output transistor, which makes it relatively difficult to be damaged. By setting the resistance value of peripheral resistance, the CJ78 series can also be used as adjustable voltage output regulator.

8.2 Representative Schematic Diagram



8.3 Feature Description

Input Voltage

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. 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.

Built-in Current Limit & Short Circuit Protection

The CJ78 series has built-in current limit and short circuit protection mechanism. When the output current of the device is too high, the output of the device will be shut down. When the output of the device is short circuited to ground, the output of the device will also be shut down and the output current will be maintained within a certain range.

8 Detailed Description

8.3 Feature Description (continued)

Thermal Shutdown Protection

The CJ78 series has thermal shutdown protection mechanism. When the junction temperature exceeds the rated temperature range for normal operation in the data sheet, the device will enter the thermal shutdown state. At this time, the output voltage of the device will be reduced to prevent catastrophic damage to the chip due to accidental heat. When the junction temperature decreases and no longer remains too high, the device will release the thermal shutdown and output normally. To ensure reliable operation, please limit the junction temperature to the specified range of *Recommended Operating Conditions* in the data sheet. Applications that exceed the recommended temperature range may cause the equipment to exceed its operating specifications.

Although the internal protection circuitry of the device is designed to protect against thermal overall conditions, this circuitry is not intended to replace proper heat sinking. Continuously running the device into thermal shutdown or above the maximum recommended junction temperature reduces long-term reliability.

Output Current

Due to the internal integration of thermal shutdown protection, in the case of large output current, the device may enter the thermal shutdown state because the junction temperature is higher than the rated value in the data sheet. Therefore, the appropriate package should be selected for circuit design according to the heat dissipation power consumption of the package and the effective connection thermal resistance with the environment, so as to make the device emit more heat energy, so as to ensure the maximum load current capacity of the device. If the circuit design is appropriate and the device has good heat dissipation conditions, the CJ78 series can output a current of up to 1.5A.

9 Application and Implementation

9.1 Risk Alert and Precautions

The CJ78 series is designed for thermal protection, output short circuit protection and output transistor SOA protection. However, like any IC regulator, precautions are necessary to reduce the possibility of accidental damage to the regulator. The following describes the possible causes of unit damage or failure:

Electrostatic Discharge (ESD)

Electrostatic discharge (ESD) is a common near-field hazard source. It comes from many sources, such as human body, mechanical equipment and electronic components themselves. ESD can cause phenomena such as high voltage and instantaneous high current in a very short time, resulting in damage or failure of the device due to electric shock.

Instantaneous Electrical Surge

In some applications, a short duration but high energy spike may occur in the circuit, including peak voltage and surge current. They may cause unstable operation of the regulator, accelerated aging and potential hazards, and even damage or malfunction of the regulator. These peaks are usually more likely to occur in hot-plug, switch inductance, heavy-load, and other types of circuits.

Precautions for ESD and Electrical Surge

In the practical application of the circuit, adopting the following suggestions can reduce the possibility of device failure due to the above reasons to a certain extent.

1. Place a TVS between the IN and GND of the voltage regulator to absorb the peak voltage that may be generated due to ESD or other reasons. As shown in Figure 9-1;
2. Place a resistor with appropriate resistance in series before the IN of the voltage regulator, which can help the voltage regulator share part of the energy in case of surge. The resistance value of the resistance should not be too large. The specific resistance value depends on the application of the circuit. Generally, the resistance value of this resistance does not exceed 20Ω. As shown in Figure 9-2.

For the CJ78 series, it is recommended that the input voltage should not exceed 17V and the peak voltage should not exceed 35V. **When the input voltage is greater than 17V, or the peak voltage that may be greater than 35V may appear in the practical circuit, it is recommended to adopt the circuit layout shown in Figure 9-2 in the circuit design.**

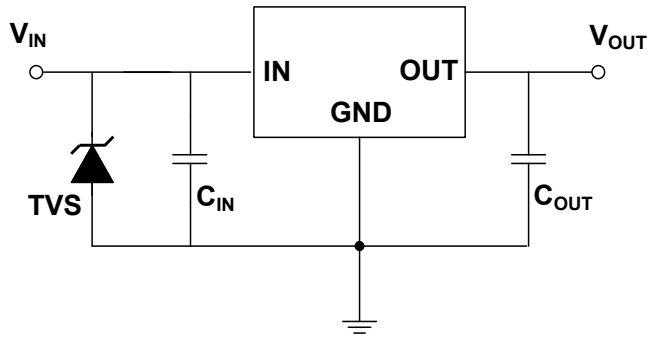


Figure 9-1. TVS is used at IN

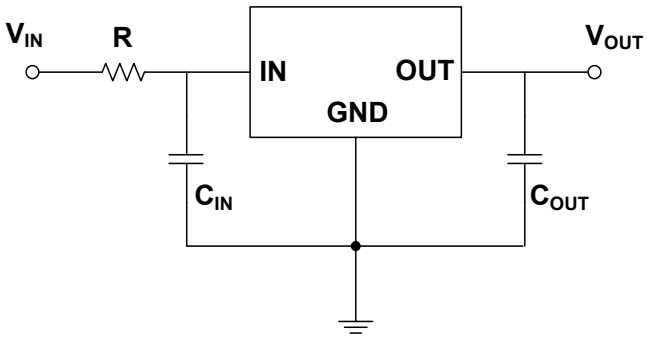


Figure 9-2. Resistance is used at IN

9 Application and Implementation

9.1 Risk Alert and Precautions (continued)

Regulator Input Short Circuit

In case of short circuit to ground at the input of the voltage regulator, the input of the voltage regulator will be pulled down to the ground potential. At this time, if the capacitance value of the output pin is large, a large amount of charge stored in it will enter the regulator from the output pin of the regulator and generate internal discharge, which may damage the output diodes and transistors inside the regulator, resulting in damage to the regulator. As shown in Figure 9-3.

This phenomenon may be avoided by connecting a protection diode at the input and output pins. The diode can shunt the discharge current of the capacitor to achieve protection in the case of short circuit to ground at the input pin. If the output capacitance is small (Capacitance value is less than 10μF), the protection diode is generally not required.

Increase the Output Voltage above the Input Voltage

If the output voltage is forcibly increased above the input voltage, because the potential at the output pin of the regulator is higher than the input pin, the internal working of the regulator under low current conditions may be damaged due to reverse internal discharge. Such damage mechanism is similar to the *Regulator Input Short Circuit*.

Float the Ground Pin of the Regulator

When the ground pin of the regulator floats, the voltage at the output is close to the voltage at the input, which may damage the internal circuit of the regulator. Even if the ground terminal is connected to the ground terminal from floating under the power on state, it may still cause damage to the voltage regulator. This kind of situation usually occurs when the voltage regulator module on the card is connected to the power supply. To reduce the possibility of such faults, the regulator ground terminal should be grounded before the regulator is connected to the power supply. Before the voltage regulator on the card is inserted into the power on socket, the power supply shall be turned off and the thermal shutdown shall stop working. If the power on state must be maintained, the voltage regulator must be grounded. As shown in Figure 9-4.

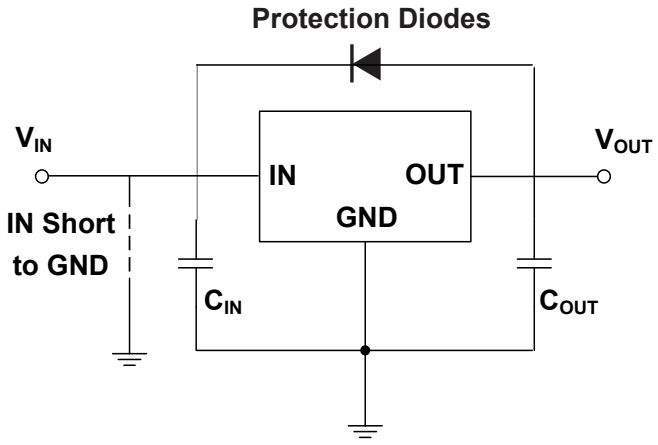


Figure 9-3. Regulator Input Short Circuit

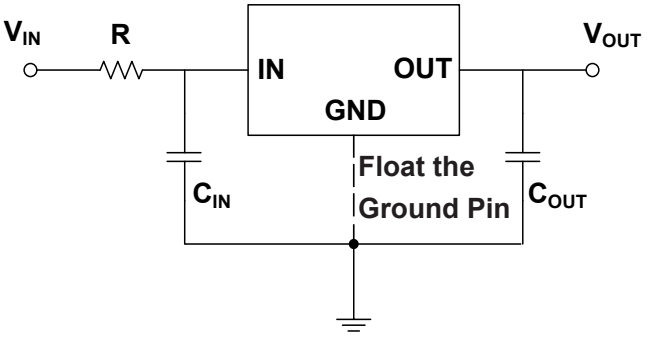


Figure 9-4. Float the Ground Pin

9 Application and Implementation

9.1 Risk Alert and Precautions (continued)

Large Output Capacitance

The CJ78 series can obtain better transient response with the help of output capacitance. However, if the output capacitor is relatively large, the surge current generated by the charging of the output capacitor will also be large at the moment of power on of the regulator, and the large surge current passing through the regulator may damage the internal circuit. When the output capacitance is large, adopting the circuit design shown in Figure 9-2 will reduce the possibility of damage to the device due to large surge current to a certain extent. It is recommended that the selection of output capacitor should not exceed 20μF. **If the selection of output capacitor exceeds 20μF, it is recommended to adopt the circuit design in Figure 9-2 to reduce the possibility of accidental failure of the device due to large surge current during power on.**

9.2 Application Information

Bypass Capacitance Selection

A capacitance between IN and GND (C_{IN}) is required if the regulator is located far from the power supply filter. It is recommended to use a 0.33μF capacitor for C_{IN}, and the capacitor (C_{IN}) should be placed as close to the device IN pin and GND pin as possible.

It is recommended to use a 0.1μF capacitor between OUT and GND (C_{OUT}), and the capacitor should be placed as close as possible between OUT and GND. The output capacitance can limit the high-frequency noise and help the device obtain the best stability and transient response.

The tolerance and temperature coefficient of the input and output capacitor (C_{IN} and C_{OUT}) must be considered to ensure that the capacitor can work normally within the rated working ambient temperature and rated working conditions of the equipment.

It is recommended that the output capacitor (C_{OUT}) should not exceed 20μF. When the output capacitor (C_{OUT}) exceeds 20μF, it is recommended to use the circuit layout shown in Figure 9-2. See *Large Output Capacitance* for more details.

Design Requirements and Procedure

The CJ78 series is mainly used to provide fixed output voltage regulation, the output voltage is set based on the device variant, which is available in 5.0V, 6.0V, 8.0V, 9.0V and 12V regulator options, and it requires a very small number of equipment components. If the regulator is far from the power filter, the input capacitor C_{IN} is required. The bypass capacitor C_{OUT} is used at the output to obtain the best stability and transient response. These capacitors must be as close to the regulator as possible. The simplest implementation of the CJ78 series is shown in Figure 9-8.

9 Application and Implementation

9.3 Test Circuits

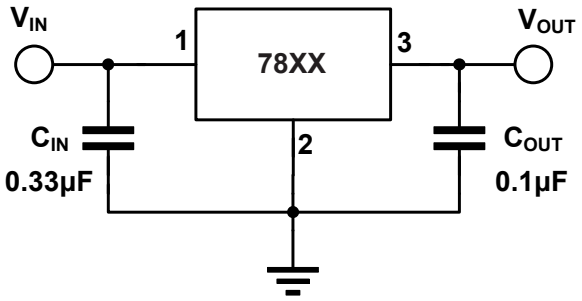


Figure 9-5. DC Parameters

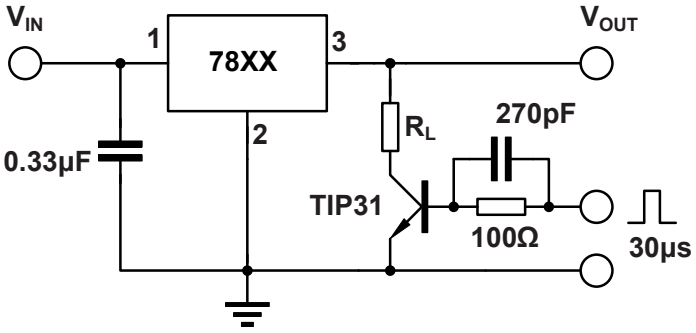


Figure 9-6. Load Regulation

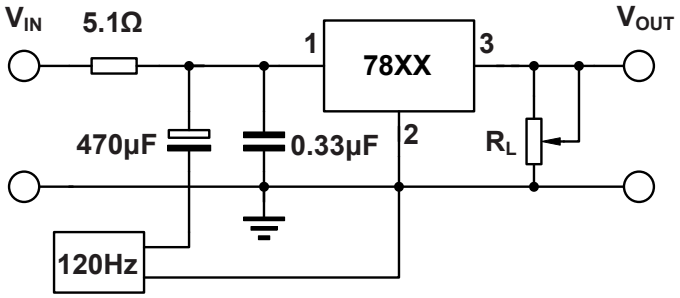
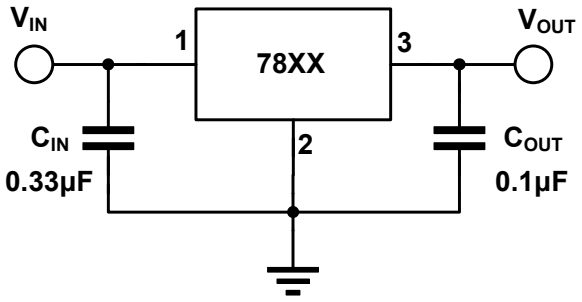


Figure 9-7. Ripple Rejection

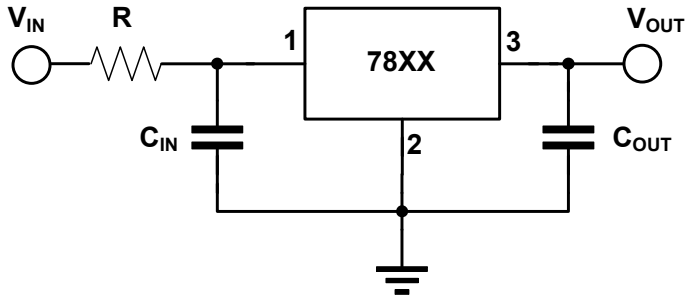
9.4 System Example

The "XX" in the "78XX" represents the output voltage, for example, if V_{OUT} = 5.0V, the "78XX" is "7805".



(1) Conventional Circuit

Used for the normal form of circuit



(2) Resistance are used at IN

Used for circuits that may have large electrical surges or use large capacitors

Figure 9-8. Fixed Output Regulator

Note: For more details, see the part *Risk Alert and Precautions*.

9 Application and Implementation

9.4 System Example(continued)

The "XX" in the "78XX" represents the output voltage, for example, if V_{OUT} = 5.0V, the "78XX" is "7805".

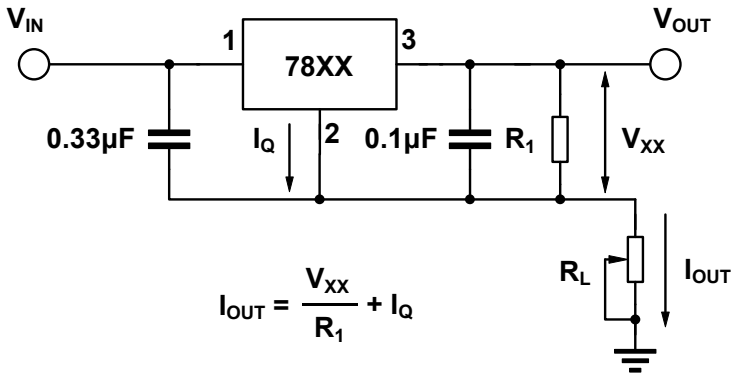


Figure 9-9. Constant Current Regulator

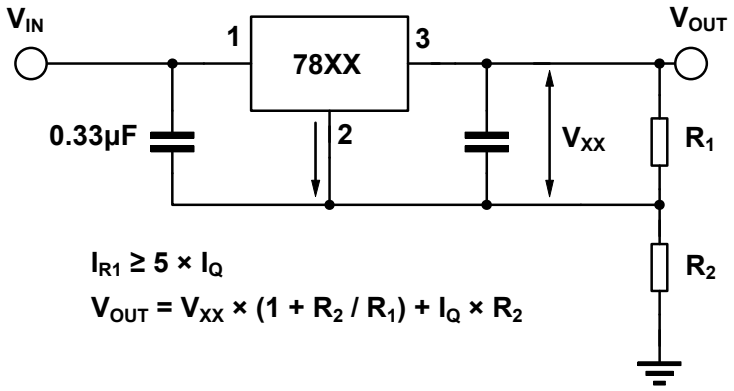


Figure 9-10. Circuit for Increasing Regulator Output Voltage

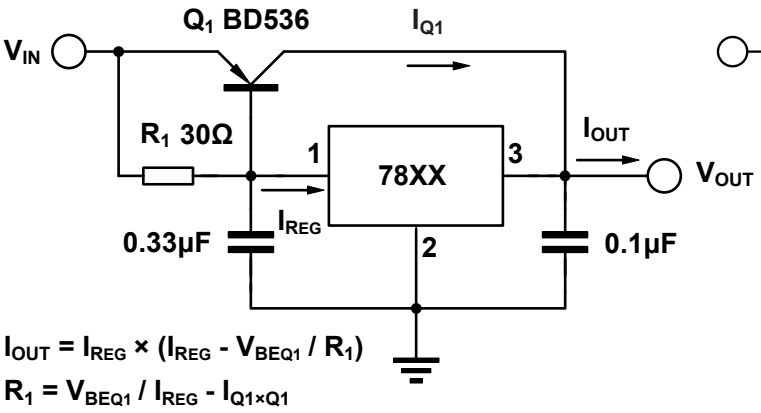


Figure 9-11. High Current with Voltage Regulator

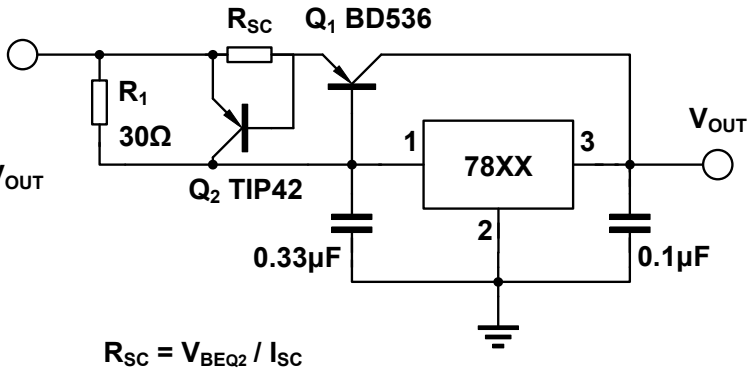


Figure 9-12. High Output Current Short Circuit Protection

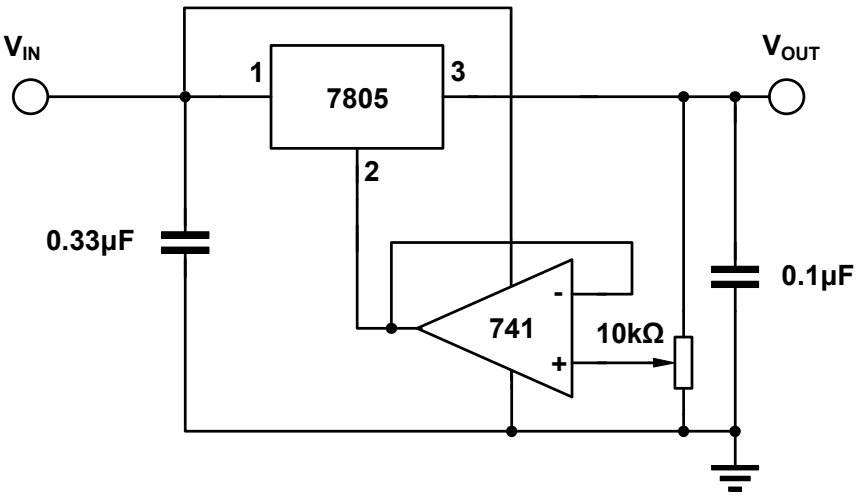


Figure 9-13. Adjustable Output

9 Application and Implementation

9.4 System Example(continued)

The "XX" in the "78XX" represents the output voltage, for example, if V_{OUT} = 5.0V, the "78XX" is "7805".

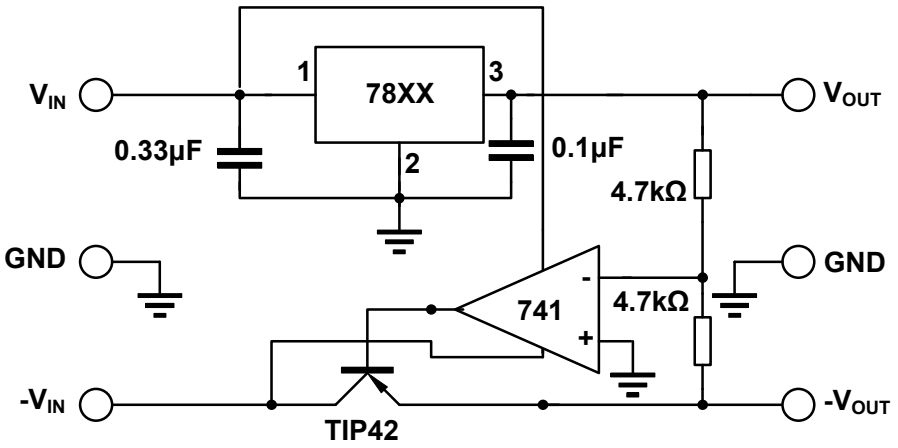


Figure 9-14. Tracking Voltage Regulator

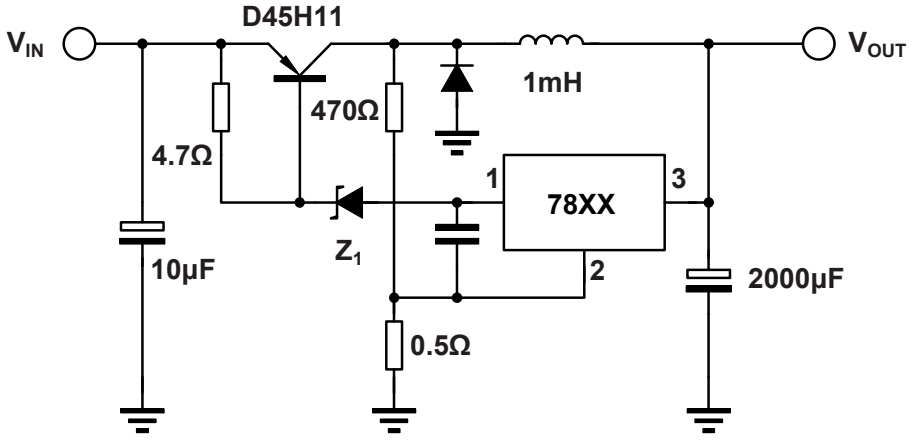


Figure 9-15. Switching Regulator

9 Application and Implementation

9.5 Layout Guidelines

In order to make the regulator have appropriate output voltage and less noise, the circuit design including the CJ78 series must follow certain rules to improve the output characteristics of the regulator and reduce the possibility of equipment failure. The following are some suggestions for the circuit layout of the CJ78 series:

1. In the practical application of the designed circuit, the conductor through which the load current flows usually has a certain parasitic tracking inductance. Widening these wires can improve the noise characteristics of the regulator output;
2. Selecting a suitable capacitor can improve the output transient and PSRR, and the position of the bypass capacitor must be set at the position of the corresponding pin, which should be as close to the IC as possible. The input capacitance (C_{IN}) of a typical application circuit is 0.33μF. The output capacitance (C_{OUT}) is 0.1μF. If the output capacitance is large (output capacitor C_{OUT} exceeds 20μF), it is recommended to use the circuit layout in Figure 9-8-(2);
3. When the input voltage is greater than 17V or the peak voltage greater than 35V may appear in the actual circuit, it is recommended to use the circuit layout in Figure 9-8-(2);
4. In the practical application of circuit design, the input of voltage regulator may be short circuited to ground for some reasons. At this time, the surge current at the output may damage the voltage regulator. Placing an external diode between the output and input can prevent damage to the regulator to some extent.

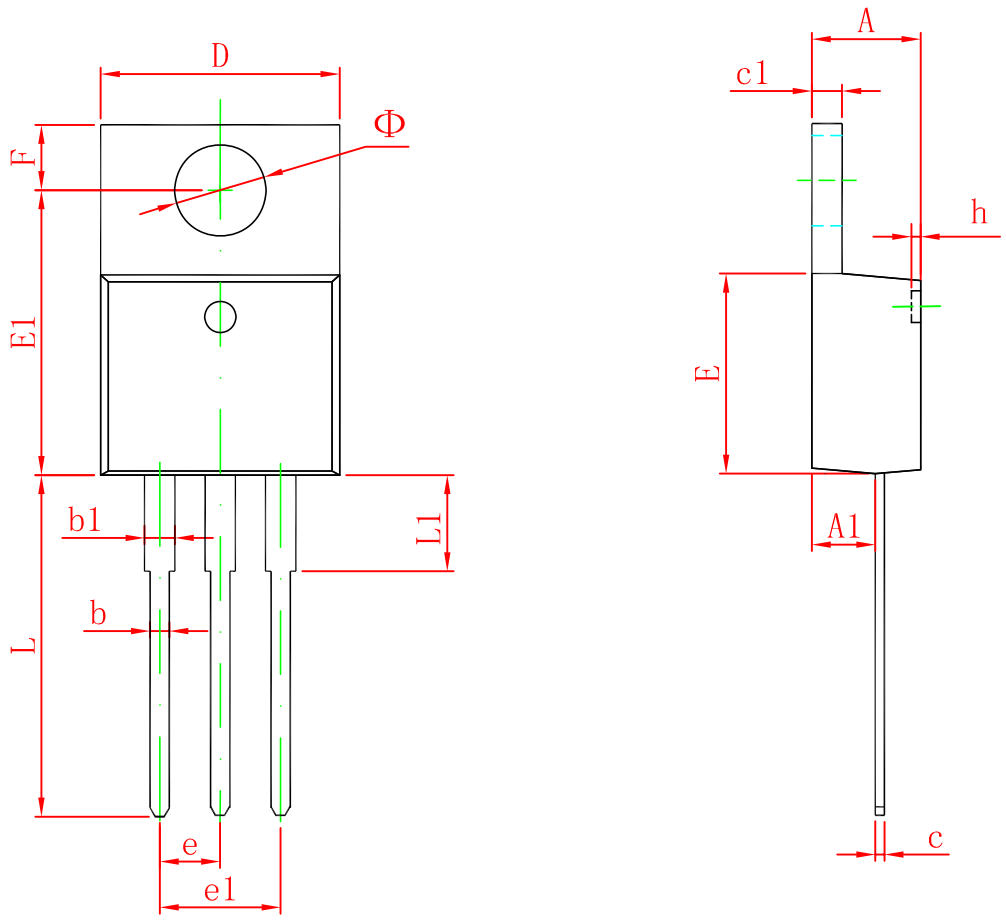
NOTE

The application information in this section is not part of the data sheet component specification, and JSCJ 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 TO-220-3L Mechanical Information

TO-220-3L Outlines Dimensions

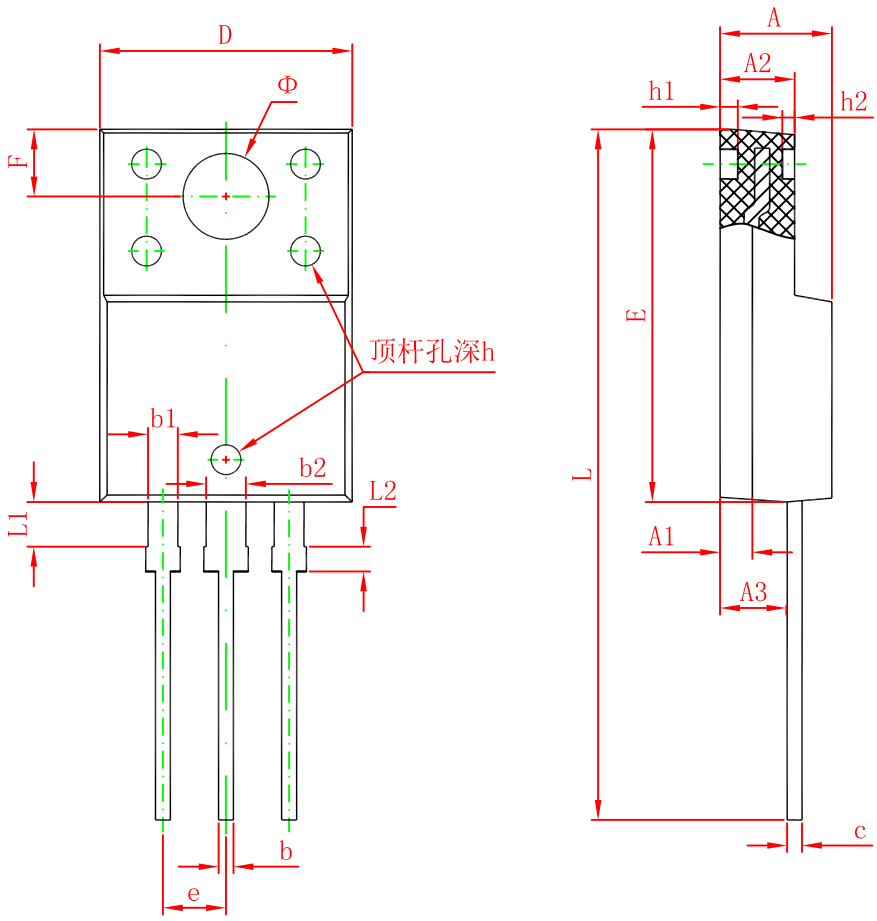


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

10 Mechanical Information

10.2 TO-220F Mechanical Information

TO-220F Outlines Dimensions

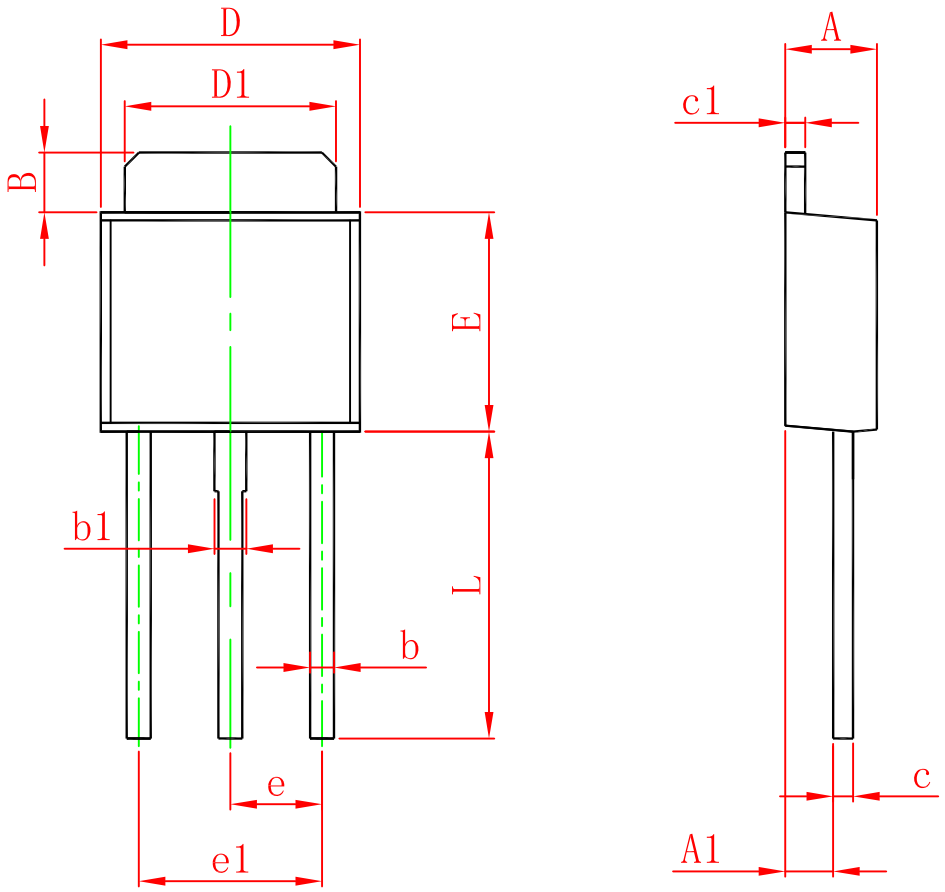


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	0.900	1.100	0.035	0.043

10 Mechanical Information

10.3 TO-251-3L Mechanical Information

TO-251-3L Outlines Dimensions

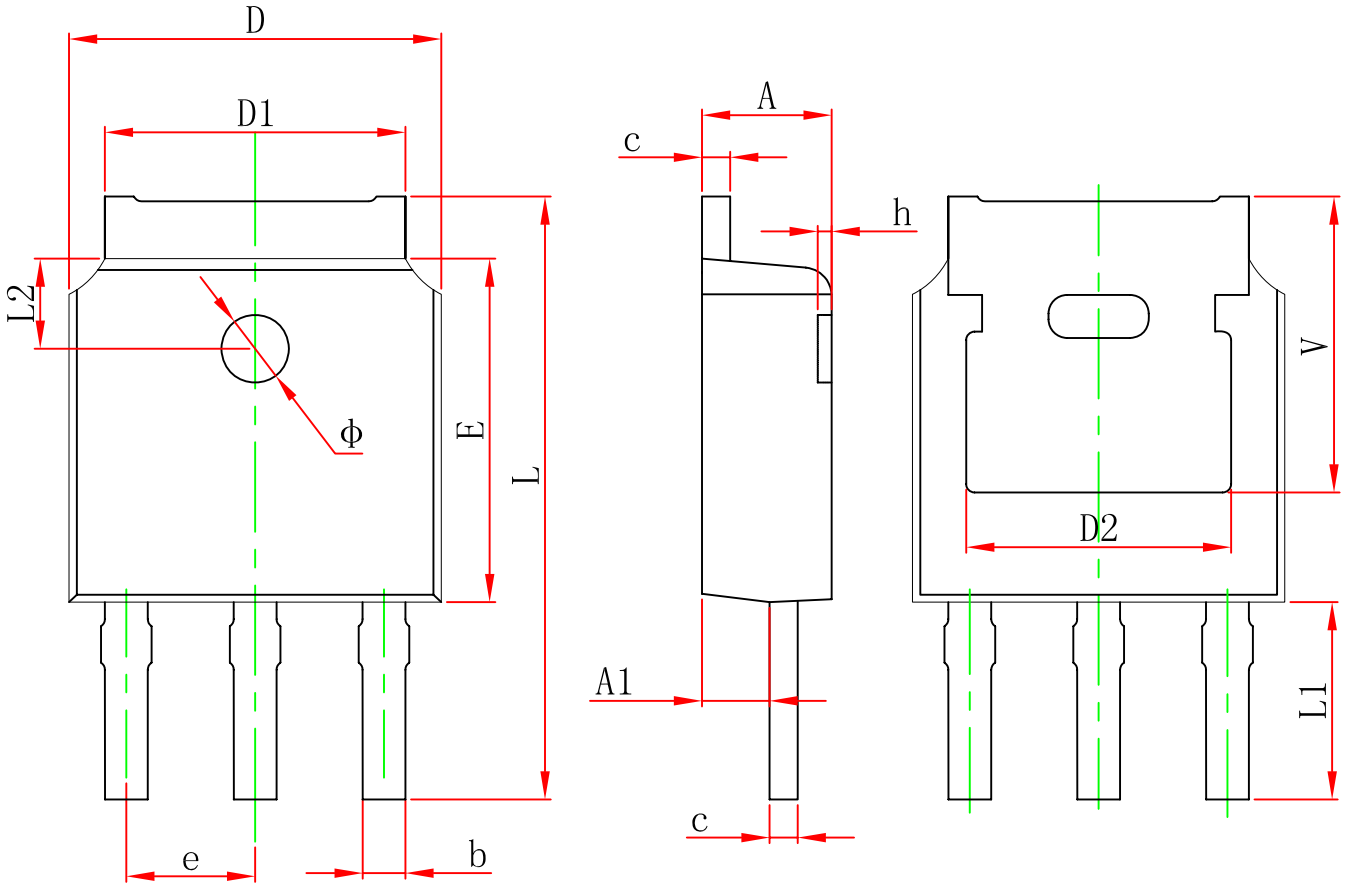


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	1.050	1.350	0.042	0.054
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311

10 Mechanical Information

10.4 TO-251S Mechanical Information

TO-251S Outlines Dimensions

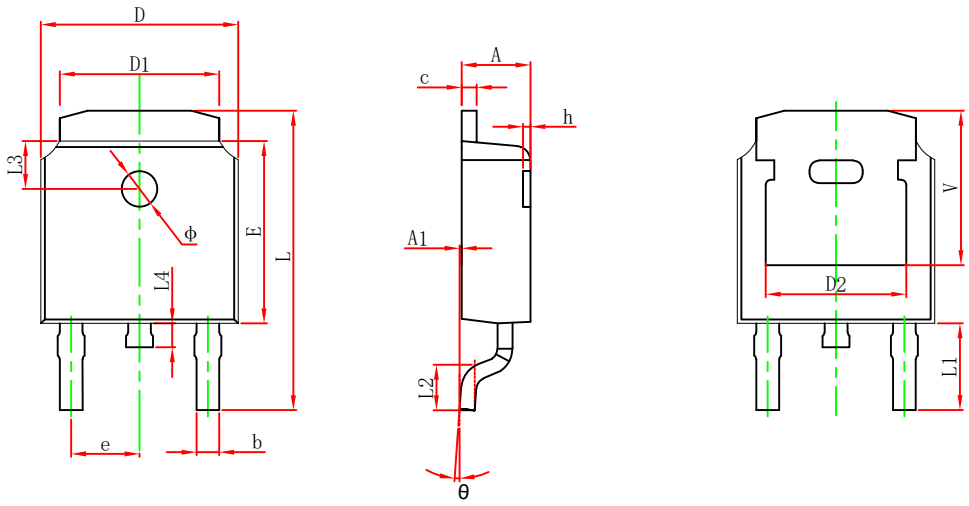


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.860	1.160	0.034	0.046
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	10.400	11.000	0.409	0.433
L1	3.300	3.700	0.130	0.146
L2	1.600 REF.		0.063 REF.	
Φ	1.100	1.300	0.043	0.051
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	

10 Mechanical Information

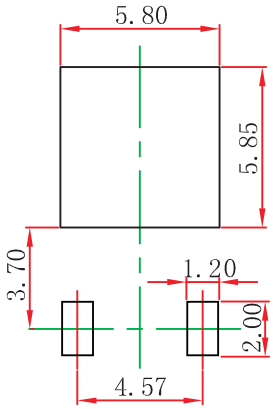
10.5 TO-252-2L Mechanical Information

TO-252-2L Outlines Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

TO-252-2L Suggest Pad Layout



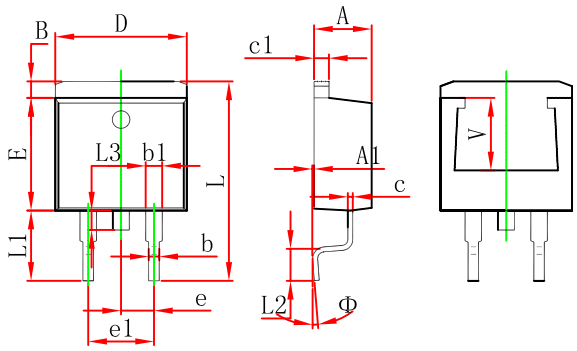
NOTE:

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

10 Mechanical Information

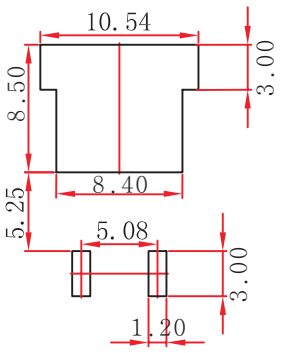
10.6 TO-263-2L Mechanical Information

TO-263-2L Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	

TO-263-2L Suggest Pad Layout



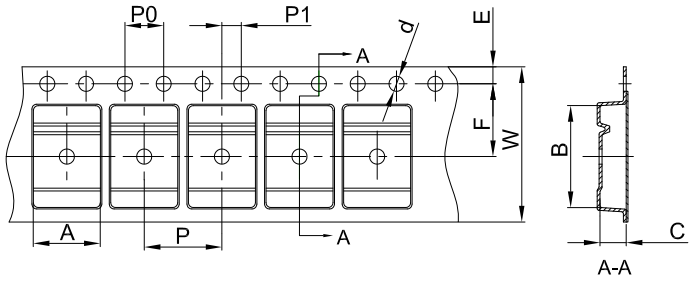
NOTE:

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

11 Packaging Information

11.1 TO-252-2L Tape and Reel Information

TO-252-2L Embossed Carrier Tape

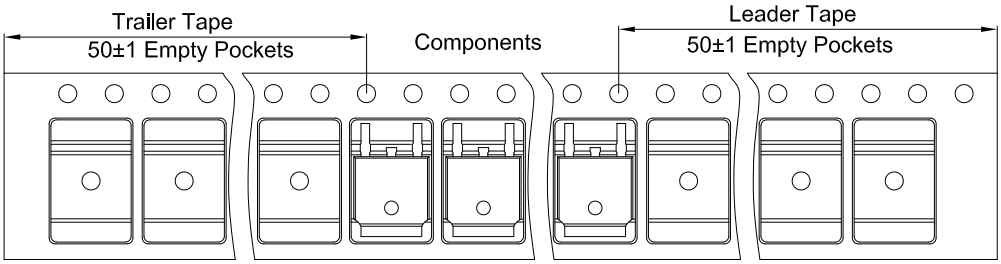


Packaging Description:

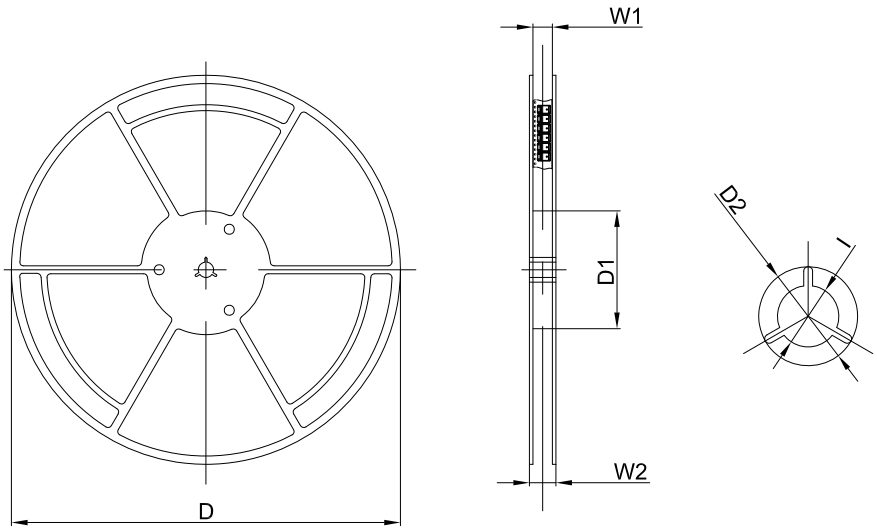
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 25,00 units per 13" or 33.0 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
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00

TO-252 Tape Leader and Trailer



TO-252 Reel



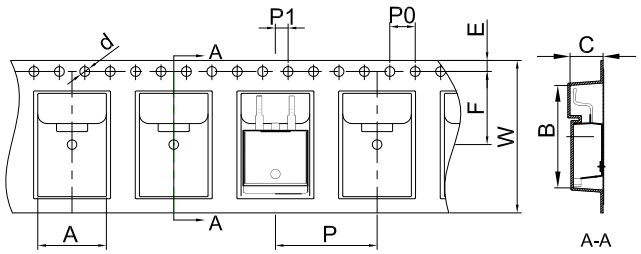
Dimensions are in millimeter						
Reel Option	D	D1	D2	W1	W2	I
13"Dia	330.00	100.00	Ø21.00	16.40	21.00	Ø13.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13inch	2,500 pcs	340×336×29	25,000 pcs	353×346×365	

11 Packaging Information

11.2 TO-263-2L Tape and Reel Information

TO-263-2L Embossed Carrier Tape

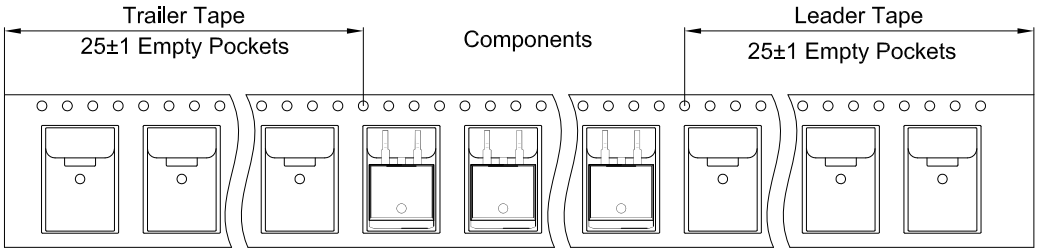


Packaging Description:

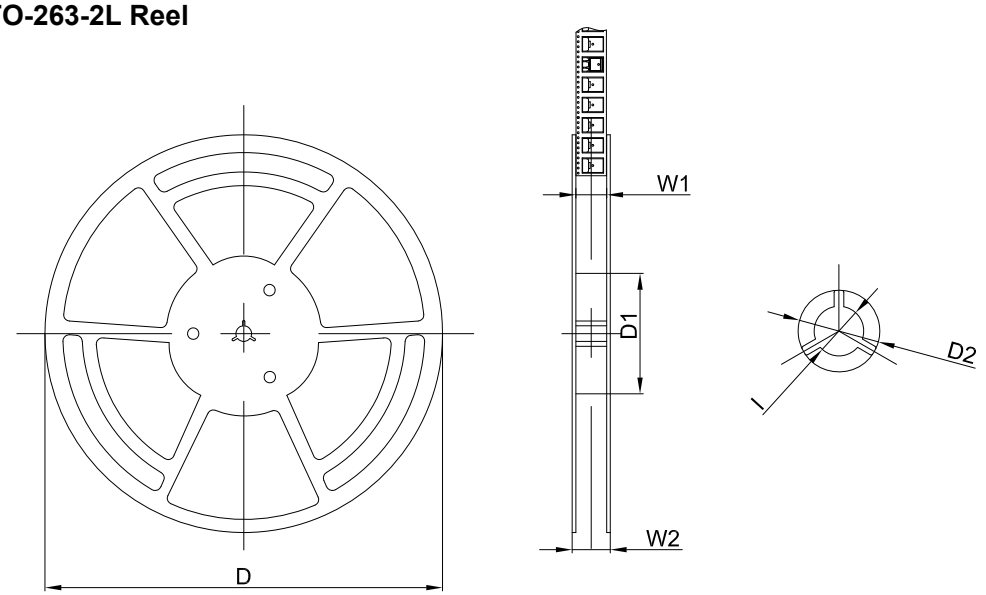
TO-263-2L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 800 units per 13" or 33.0 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
TO-263-2L	10.80	16.13	5.21	Ø1.55	1.75	11.50	4.00	16.00	2.00	24.00

TO-263-2L Tape Leader and Trailer



TO-263-2L Reel



Dimensions are in millimeter						
Reel Option	D	D1	D2	W1	W2	I
13"Dia	Ø330.00	100.00	Ø21.00	24.4	30.4	Ø13.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
800 pcs	13 inch	800 pcs	340×336×36	8,000 pcs	400×353×365	

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, please click the official website of JSCJ -- ***https: www.jscj-elec.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.

Junction-to-ambient Thermal Resistance $R_{\Theta JA}$

Definition: The junction to ambient thermal resistance $R_{\Theta JA}$ is a metric of the thermal performance of the device's packages. By comparing the metric of different companies on the same product package, the thermal performance of the product can be roughly estimated in a relative sense. $R_{\Theta JA}$ is measured under the conditions specified in the corresponding specifications. If the measurement of $R_{\Theta JA}$ of two products follows different specifications and standards, or although the same specifications and standards are adopted, it is not tested in strict accordance with the specifications, then the $R_{\Theta JA}$ of two products will lose the meaning of comparison. This product follows the test specified by JEDEC in the EIA/JESD51-x series documents. $R_{\Theta JA}$ 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.

Usage: Junction to ambient thermal resistance $R_{\Theta JA}$ is a parameter defined at the system level rather than on a single device or chip. In the test of $R_{\Theta JA}$ provided in the data sheet, most of the heat generated by the operation of the device is dissipated through the test board rather than the packaging surface of the device. In fact, the design and layout of PCB (such as chip or pad size, internal package geometry, etc.) will significantly affect $R_{\Theta JA}$. At this time, any calculation of the junction temperature or thermal power consumption of the device by applying $R_{\Theta JA}$ in the data sheet will have a very large error, so that it does not match the real performance of the device.

Therefore, $R_{\Theta JA}$ should be used as the relative comparison of product packaging thermal performance between different companies, rather than directly using $R_{\Theta JA}$ in the data sheet in the actual calculation.

Reference Maximum Power Dissipation for Continuous Operation $P_{D\ Ref}$

The reference maximum power dissipation for continuous operation $P_{D\ Ref}$ is not an accurate value obtained from the actual test. It is a theoretical value obtained according to the heat dissipation capacity of packaging combined with practical application. It is used to compare the differences of heat dissipation capacity more intuitively between products of different companies. This value is only for estimation reference and cannot be used as an index of the actual performance of the device for circuit design.

12 Notes and Revision History

12.3 Revision History

October, 2022: changed from rev - 3.2 to rev - 3.3:

- Page 6, Marking Information, modified CJ78XXF marking.

September, 2022: changed from rev - 3.1 to rev - 3.2:

- Changed the data sheet layout to JSCJ format;
- Page 1, Features, LNR and LDR changed from specific value into typical range;
- Page 4, Note, changed the font format of the text;
- Page 7, Recommended Operating Conditions, changed the content of the description;
- Page 9 ~ 13, Note, added the description of test conditions, and change the description of VD from 3% to 5%.

July, 2022: changed from rev - 3.0 to rev - 3.1:

- Modified data sheet format:
- All data sheet, added headers, changed font size;
- Page 1, modified footer;
- Page 2, page 3 and page 4, Orderable Information, deleted the description;
- Page 6, changed description format;
- Page 38, DISCLAIMER, deleted the description of "automotive electronics".

June, 2022: released CJ78 series rev - 3.0:

- Assembled CJ7805, CJ7806, CJ7808, CJ7809, CJ7812 devices into the CJ78 series;
- Added Introduction, Available Package, Applications, Pin Configuration and Marking Information, Recommended Operating Conditions, ESD Ratings, Thermal Information, Detailed Description, Application and Implementation and Notes and Revision History section;
- Deleted obsolete CJ7815 device from the data sheet.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ 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 JSCJ 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. JSCJ 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.

Without the written consent of JSCJ, this product shall not be used in occasions requiring high quality or high reliability, including but not limited to the following occasions: medical equipment, military facilities and aerospace. JSCJ shall not be responsible for casualties or property losses caused by abnormal use or application of this product.

Official Website: www.jscj-elec.com