TN78L Series

Plastic-Encapsulate Voltage Regulators

功能说明

78LXX 一款固定输出的线性三端稳压电路，具有宽的输入电压范围。内置基准电压电路、过压保护、过流保护、过温度保护，实现电路的可靠工作。输出级具有较低的输出阻抗，输出电流可达 100mA。芯片具有较低的静态电流。封装采用 SOT89-3L、SOT23-3L 或者 TO-92 形式封装。

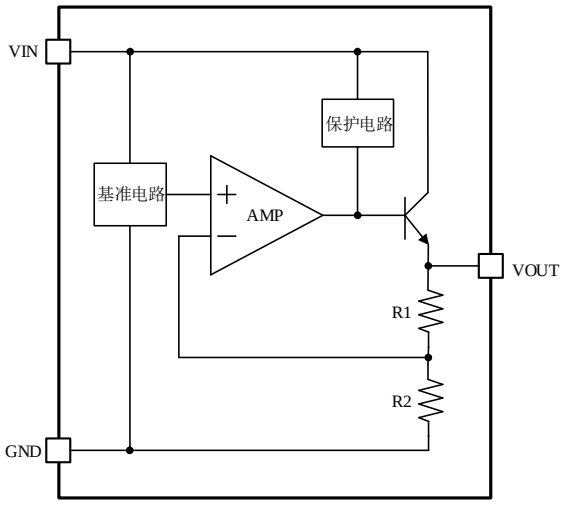
主要特性

- 采用 50V 工艺平台制造
- 输出电压可以是固定的 3.3V，5V，6V，9V，12V，15V
- 宽输入电压范围：7-35V（40V）输入
- 低静态工作电流：典型值 2.3mA@10V
- 全电压、全电流、全温下输出电压冗余范围±5%。
- 稳定输出电流达 100mA
- 内建过温保护、过压保护、过流保护

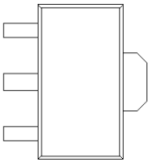
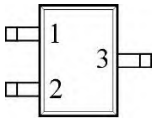
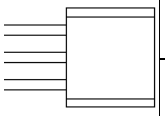
应用范围

- 仪器仪表
- 主板电源
- 多路电源系统
- 设备电源模块

内部模块图



外形及 PIN 脚

	SOT-89-3L		SOT-23-3L		TO-92
VOUT		VOUT		VOUT	
GND				GND	
VIN		IN		VIN	

极限参数

描述（Description）	符号（Symbol）		参数（Value range）	单位（Unit）
输入电压范围	V_{IN}		-0.3~35(Vout＜10V)	V
输入电压范围	V_{IN}		-0.3~40(Vout＞10V)	V
最大结温	T_J		150	℃
最大功耗	P_D	SOT89-3L	630	mW
		SOT23-3L	400	
		TO-92	630	
热阻(结到环境)	$R_{\theta JA}$	SOT89-3L	160	℃/W
		SOT23-3L	250	
		TO-92	160	
工作温度范围	T_A		-40 ~ 85	℃
存储温度范围	T_{stg}		-55~150	℃

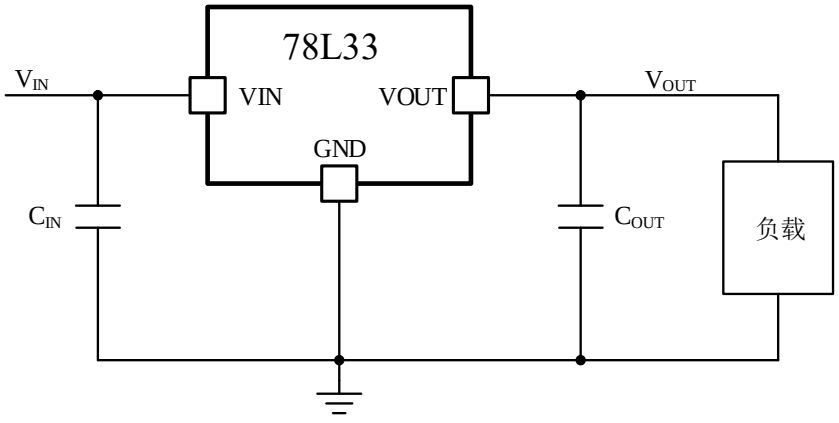
以上表格参数代表电路能够承受的极限范围。达到或者超过这个参数，电路不能正常工作，并且很大可能会损坏。并且长期工作在临界极限参数，也是会大大增加损坏的几率的。

电气参数（除特别说明外，T_J = ＋25°C）

78L33

特性 （Characteristic）	符号 （Symbol）	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 10V,I_O = 40mA	3.2	3.3	3.4	V
		5.5V < V_{IN} < 25V 1mA < I_O < 40mA	3.168		3.432	
		1mA < I_O < 100mA	3.135		3.465	
线性调整率	ΔV_O	5.5V < V_{IN} < 25V, I_O =10mA		18	75	mV
		7V < V_{IN} < 25V, I_O =10mA		10	55	
负载调整率	ΔV_O	V_{IN}=6.5V, 1mA < I_O < 100mA		20	50	mV
		V_{IN}=6.5V,1mA < I_O < 40mA		5	30	
静态电流	I_Q	V_{IN} =6.5V,I_O = 0mA		2.3	5	mA
静态电流变化	ΔI_Q	6V < V_{IN} < 25V		0.3	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		40		μV
电源抑制比	PSRR	f=100Hz, 6V < V_{IN} < 16V	47	62		dB
峰值输出电流	I_{PK}	V_{IN} =6.5V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		0.4		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	I_O = 10mA		5.5	6	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		36		V

典型应用



Cin=0.33uF，Cout=0.1uF

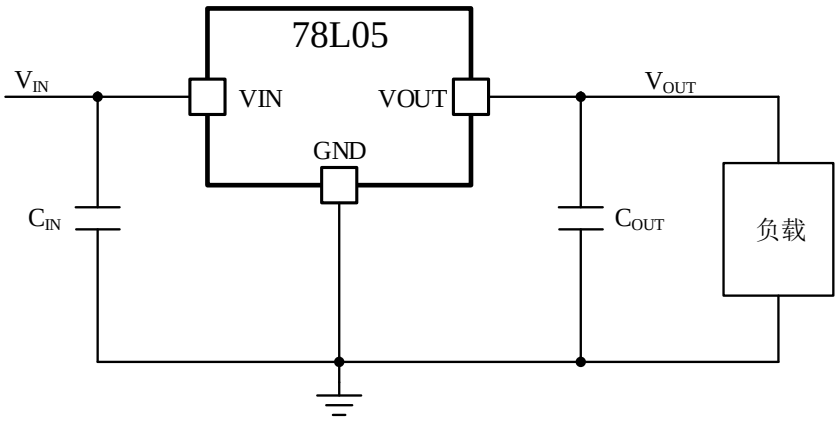
输出 3.3V 典型应用电路

电气参数（除特别说明外，T_J = ＋25°C）

78L05

特性（Characteristic）	符号（Symbol）	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 10V,I_O = 40mA	4.85	5.0	5.15	V
		7V < V_{IN} < 25V 1mA < I_O < 40mA	4.8		5.2	
		1mA < I_O < 100mA	4.75		5.25	
线性调整率	ΔV_O	7V < V_{IN} < 25V, I_O =10mA		18	100	mV
		8V < V_{IN} < 25V, I_O =10mA		10	70	
负载调整率	ΔV_O	V_{IN}=8V, 1mA < I_O < 100mA		20	60	mV
		V_{IN}=8V,1mA < I_O < 40mA		5	30	
静态电流	I_Q	V_{IN}=7V, I_O =0mA		2.3	5	mA
静态电流变化	ΔI_Q	8V < V_{IN} < 25V		0.3	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		40		μV
电源抑制比	PSRR	f=100Hz, 8V < V_{IN} < 16V	47	62		dB
峰值输出电流	I_{PK}	V_{IN}=8V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		0.5		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	I_O = 10mA		6.8	7	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		38		V

典型应用



Cin=0.33uF，Cout=0.1uF

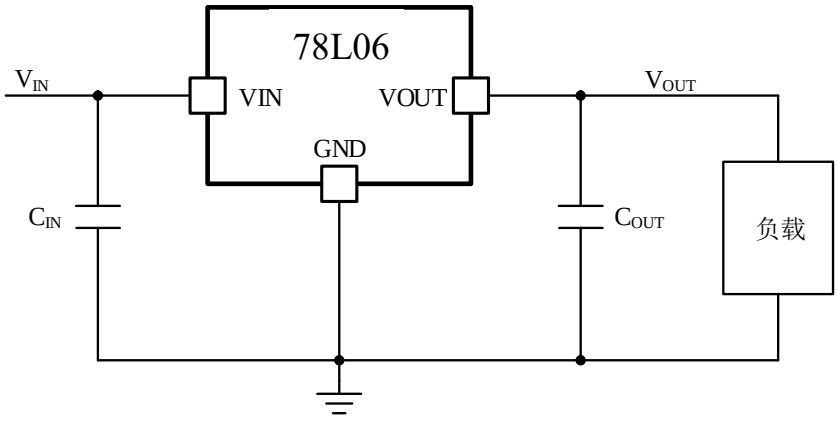
输出 5V 典型应用电路

电气参数（除特别说明外，T_J = ＋25°C）

78L06

特性 (Characteristic)	符号 (Symbol)	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 10V,I_O = 40mA	5.82	6.0	6.18	V
		8V < V_{IN} < 25V 1mA < I_O < 40mA	5.76		6.24	
		1mA < I_O < 100mA	5.7		6.3	
线性调整率	ΔV_O	8V < V_{IN} < 25V, I_O =10mA		18	100	mV
		9V < V_{IN} < 25V, I_O =10mA		10	70	
负载调整率	ΔV_O	V_{IN}=9V, 1mA < I_O < 100mA		20	60	mV
		V_{IN}=9V,1mA < I_O < 40mA		5	30	
静态电流	I_Q	V_{IN} = 8V,I_O = 0mA		2.3	5	mA
静态电流变化	ΔI_Q	9V < V_{IN} < 25V		0.3	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		40		μV
电源抑制比	PSRR	f=100Hz, 9V < V_{IN} < 16V	47	62		dB
峰值输出电流	I_{PK}	V_{IN} =9V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		0.5		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	I_O = 10mA		7.8	8	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		39		V

典型应用



Cin=0.33uF，Cout=0.1uF

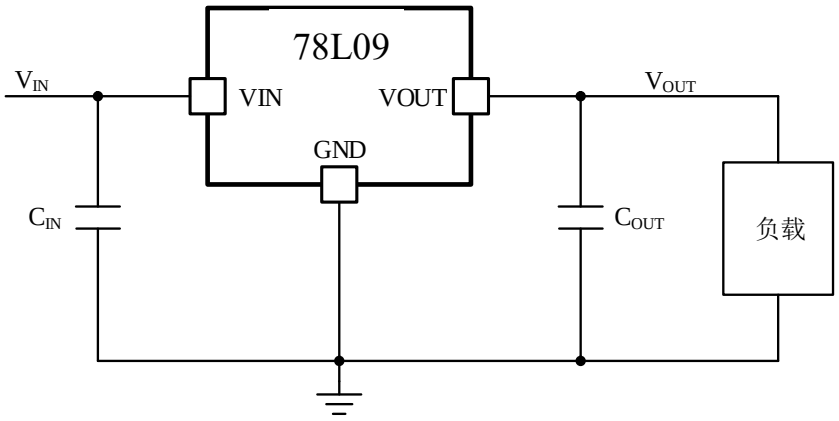
输出 6V 典型应用电路

电气参数（除特别说明外，T_J = ＋25°C）

78L09

特性 (Characteristic)	符号 (Symbol)	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 12V,I_O = 40mA	8.73	9.0	9.27	V
		11V < V_{IN} < 25V 1mA < I_O < 40mA	8.55		9.45	
		1mA < I_O < 100mA	8.55		9.45	
线性调整率	ΔV_O	11V < V_{IN} < 25V, I_O =10mA		25	150	mV
		12V < V_{IN} < 25V, I_O =10mA		15	100	
负载调整率	ΔV_O	V_{IN}=12V, 1mA < I_O < 100mA		30	100	mV
		V_{IN}=12V,1mA < I_O < 40mA		8	50	
静态电流	I_Q	V_{IN} = 11V,I_O = 0mA		2.3	5	mA
静态电流变化	ΔI_Q	12V < V_{IN} < 25V		0.3	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		70		μV
电源抑制比	PSRR	f=100Hz, 15V < V_{IN} < 25V	40	56		dB
峰值输出电流	I_{PK}	V_{IN} = 12V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		0.8		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	I_O = 10mA		10.8	11	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		42		V

典型应用



Cin=0.33uF，Cout=0.1uF

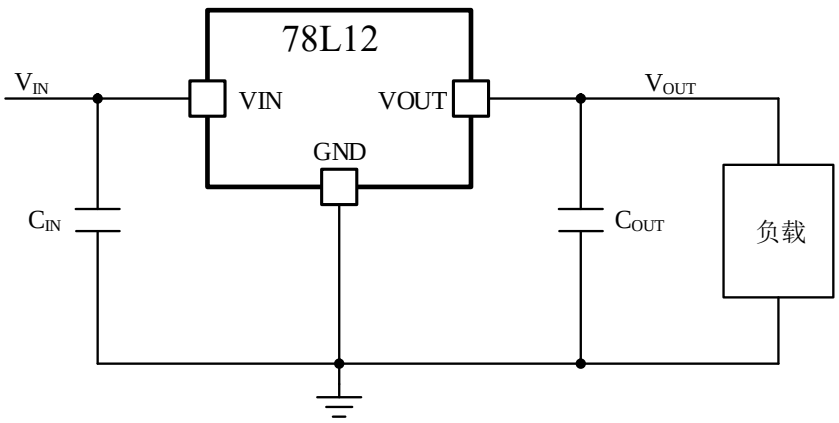
输出 9V 典型应用电路

电气参数（除特别说明外，T_J = ＋25°C）

78L12

特性（Characteristic）	符号（Symbol）	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 15V,I_O = 40mA	11.64	12.0	12.36	V
		14V < V_{IN} < 27V 1mA < I_O < 40mA	11.4		12.6	
		1mA < I_O < 100mA	11.4		12.6	
线性调整率	ΔV_O	14V < V_{IN} <27V, I_O =10mA		30	180	mV
		15V < V_{IN} < 27V, I_O =10mA		20	110	
负载调整率	ΔV_O	V_{IN}=15V, 1mA < I_O < 100mA		30	100	mV
		V_{IN}=15V,1mA < I_O < 40mA		10	50	
静态电流	I_Q	V_{IN} = 14V,I_O = 0mA		2.1	5	mA
静态电流变化	ΔI_Q	15V < V_{IN} < 27V		0.1	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		80		μV
电源抑制比	PSRR	f=100Hz, 15V < V_{IN} < 25V	40	54		dB
峰值输出电流	I_{PK}	V_{IN} = 15V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		1.0		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	$V_I I_O$ = 10mA		13.8	14	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		43		V

典型应用



Cin=0.33uF，Cout=0.1uF

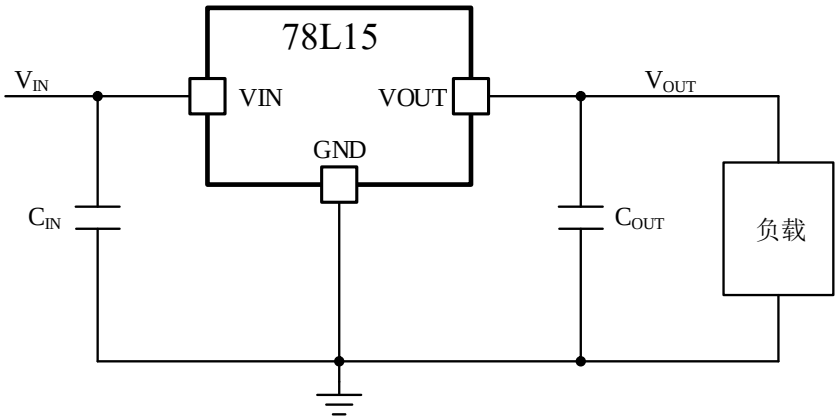
输出 12V 典型应用电路

电气参数（除特别说明外，T_J = ＋25°C）

78L15

特性（Characteristic）	符号（Symbol）	测试条件 (Test Conditions)	最小值 (Min.)	典型值 (Typ.)	最大值 (Max.)	单位 (Units)
输出电压	V_O	V_{IN} = 18V,I_O = 40mA	14.55	15.0	15.45	V
		17V < V_{IN} < 30V 1mA < I_O < 40mA	14.4		15.6	
		1mA < I_O < 100mA	14.25		15.75	
线性调整率	ΔV_O	17V < V_{IN} <30V, I_O =10mA		50	250	mV
		18V < V_{IN} < 30V, I_O =10mA		35	180	
负载调整率	ΔV_O	V_{IN}=18V, 1mA < I_O < 100mA		30	150	mV
		V_{IN}=18V,1mA < I_O < 40mA		15	75	
静态电流	I_Q	V_{IN} = 17V,I_O = 0mA		2.1	5	mA
静态电流变化	ΔI_Q	18V < V_{IN} < 30V		0.1	1.0	mA
		1mA < I_O < 40mA			1.0	
输出噪声电压	V_n	f=10Hz to 100KHz		85		μV
电源抑制比	PSRR	f=100Hz, 18V < V_{IN} < 28V	35	40		dB
峰值输出电流	I_{PK}	V_{IN} = 18V		300		mA
电压温度系数	V_{TC}	I_O = 10mA		1.2		mV/°C
低压差	V_{Drop}	I_O = 100mA		1.75	2	V
		I_O = 200mA		1.95	2.1	
最小输入电压	$V_{IN,MIN}$	I_O = 10mA		16.8	17	V
过压保护阈值	$V_{IN,MAX}$	I_O = 10mA		43		V

典型应用



Cin=0.33uF，Cout=0.1uF

输出 12V 典型应用电路

78L05 典型特性(C_{IN}=220nF, C_{OUT}=100nF)

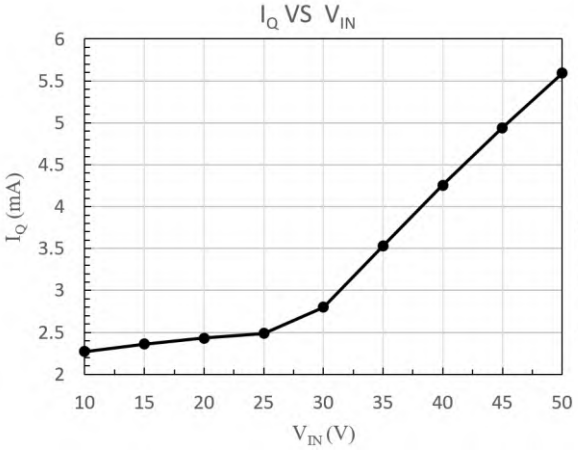


图 1 静态电流随输入电压变化

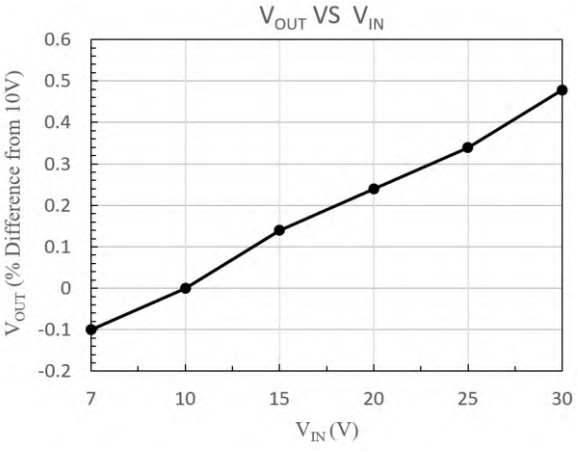


图 2 输出电压随输入电压变化(I_O=10mA)

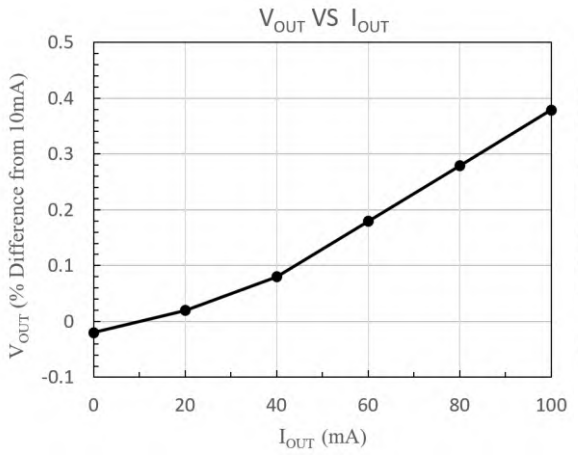


图 3 输出电压随负载电流变化(V_{IN}=8V)

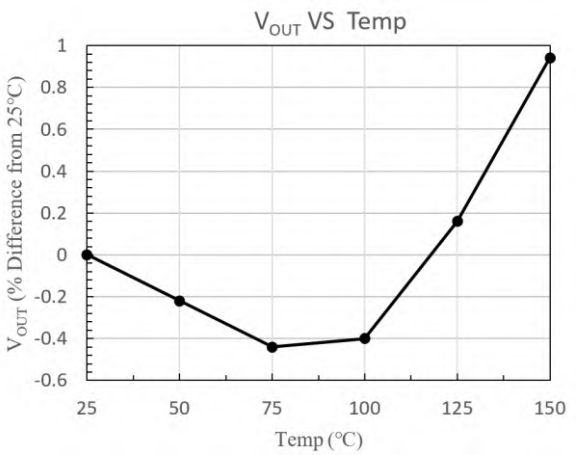
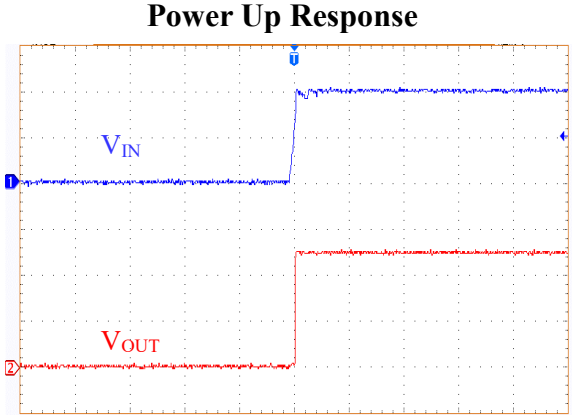


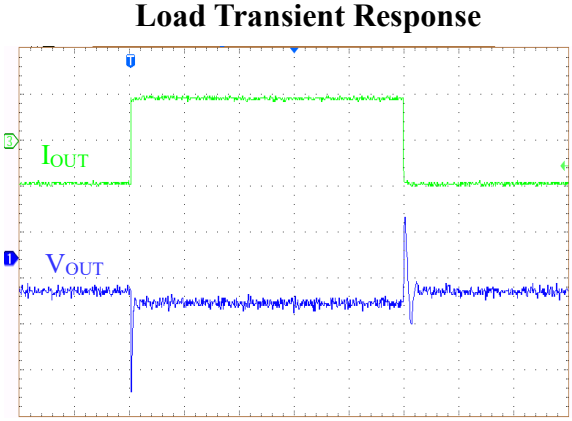
图 4 输出电压随温度变化(V_{IN}=10V, I_{OUT}=10mA)



CH1: V_{IN} (5V/DIV) CH2: V_{OUT} (2V/DIV)

I_{OUT}=10mA，V_{IN}=0V-10V 上电

图 5 电源上电瞬态响应



CH1: V_{OUT} (50mV/DIV) CH3: I_{OUT} (50mA/DIV)

V_{IN}=10V，I_{OUT}=10mA-100mA 改变

图 6 负载变化瞬态响应

78L06典型特性(C_{IN}=220nF, C_{OUT}=100nF)

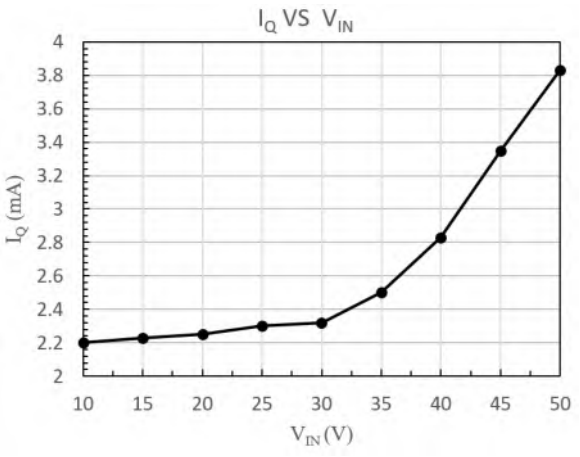


图 1 静态电流随输入电压变化

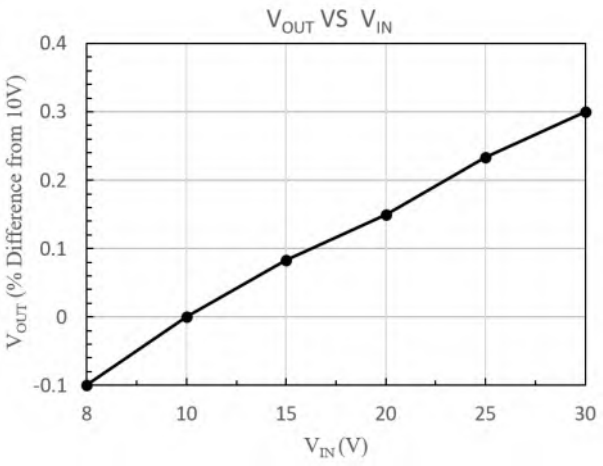


图 2 输出电压随输入电压变化(I_O=10mA)

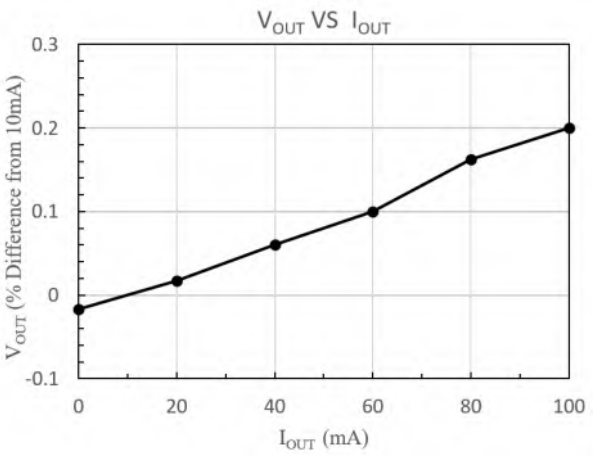


图 3 输出电压随负载电流变化(V_{IN}=9V)

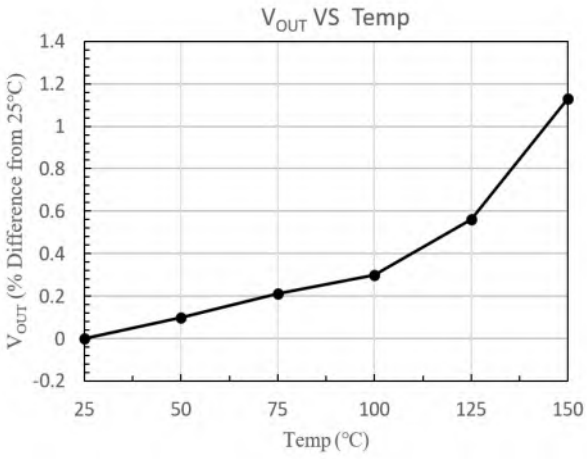


图 4 输出电压随温度变化(V_{IN}=10V, I_{OUT}=10mA)

78L09 典型特性(C_{IN}=220nF, C_{OUT}=100nF)

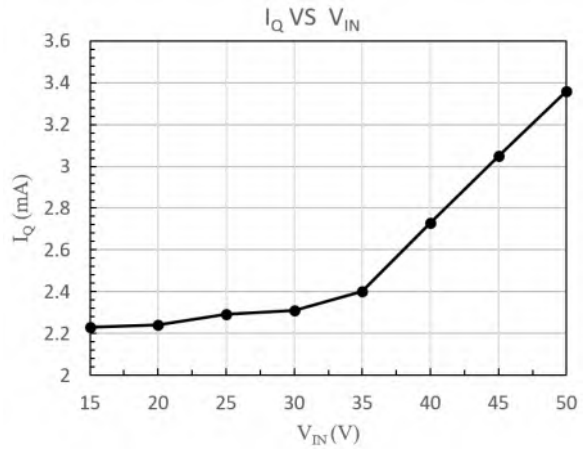


图 1 静态电流随输入电压变化

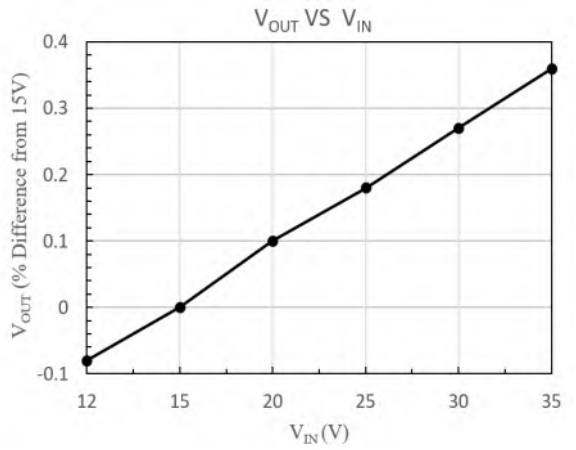


图 2 输出电压随输入电压变化(I_O=10mA)

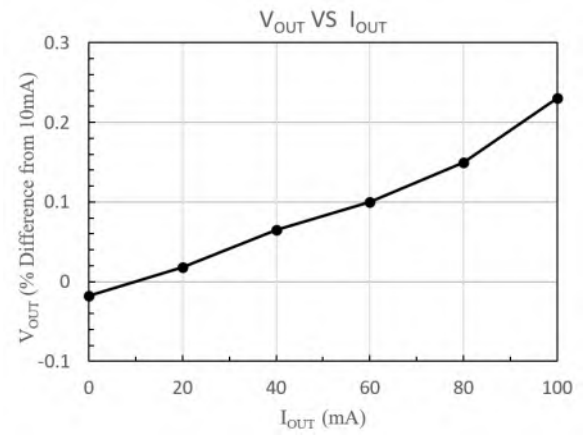


图 3 输出电压随负载电流变化(V_{IN}=12V)

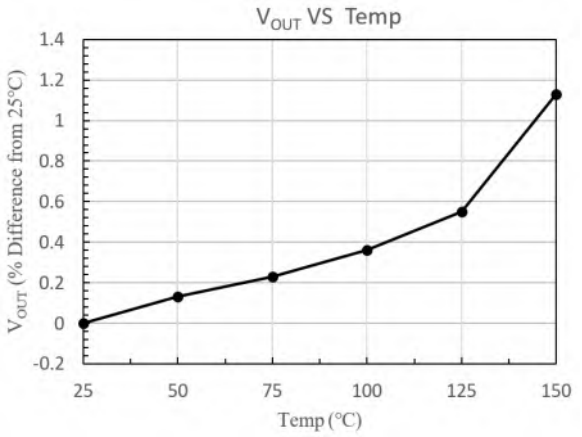


图 4 输出电压随温度变化(V_{IN}=12V, I_{OUT}=10mA)

78L12 典型特性(C_{IN}=220nF, C_{OUT}=100nF)

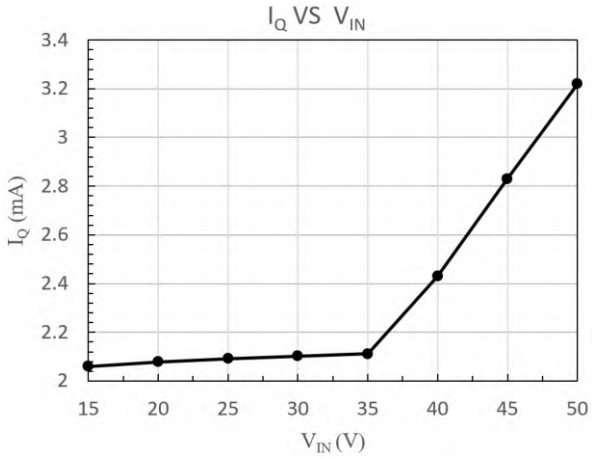


图 1 静态电流随输入电压变化

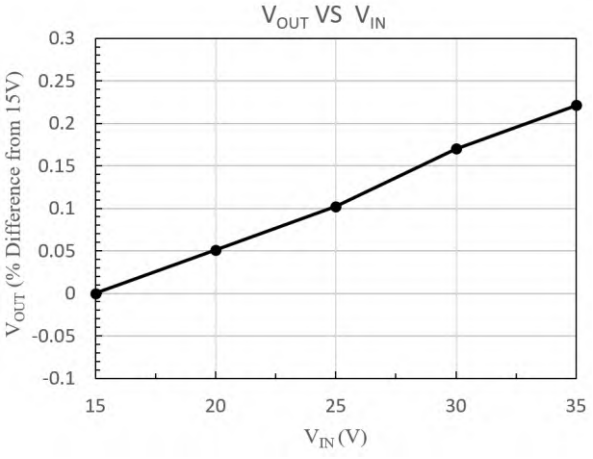


图 2 输出电压随输入电压变化(I_O=10mA)

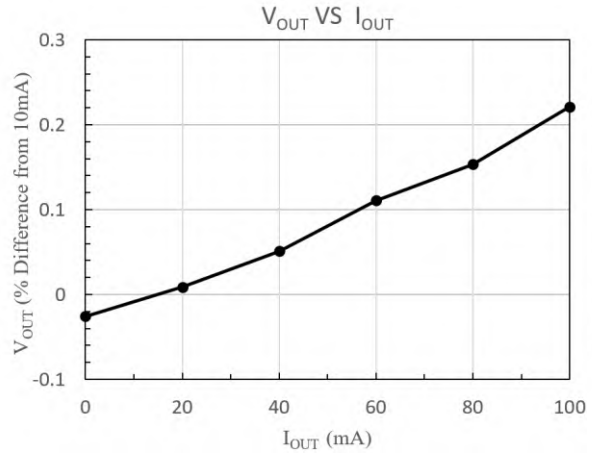


图 3 输出电压随负载电流变化(V_{IN}=15V)

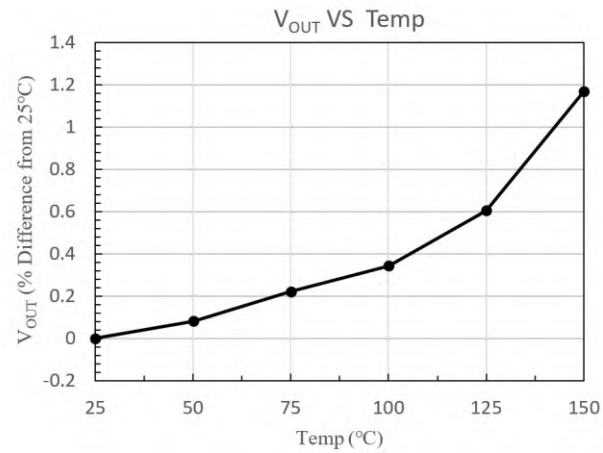
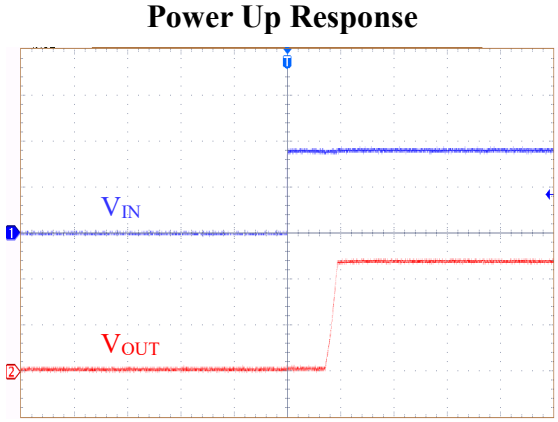


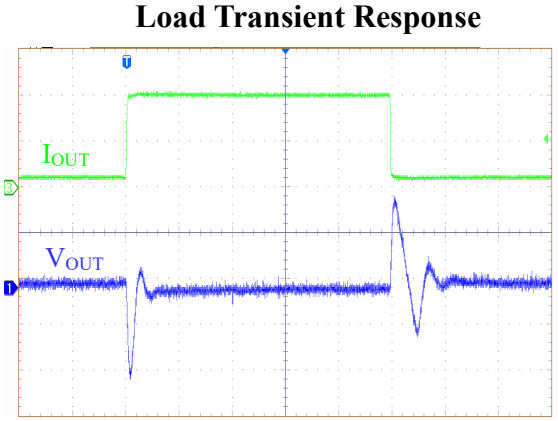
图 4 输出电压随温度变化(V_{IN}=15V, I_{OUT}=10mA)



CH1: V_{IN} (10V/DIV) CH2: V_{OUT} (5V/DIV)

I_{OUT}=10mA，V_{IN}=0V-18V 上电 t:(2ms/DIV)

图 5 电源上电瞬态响应



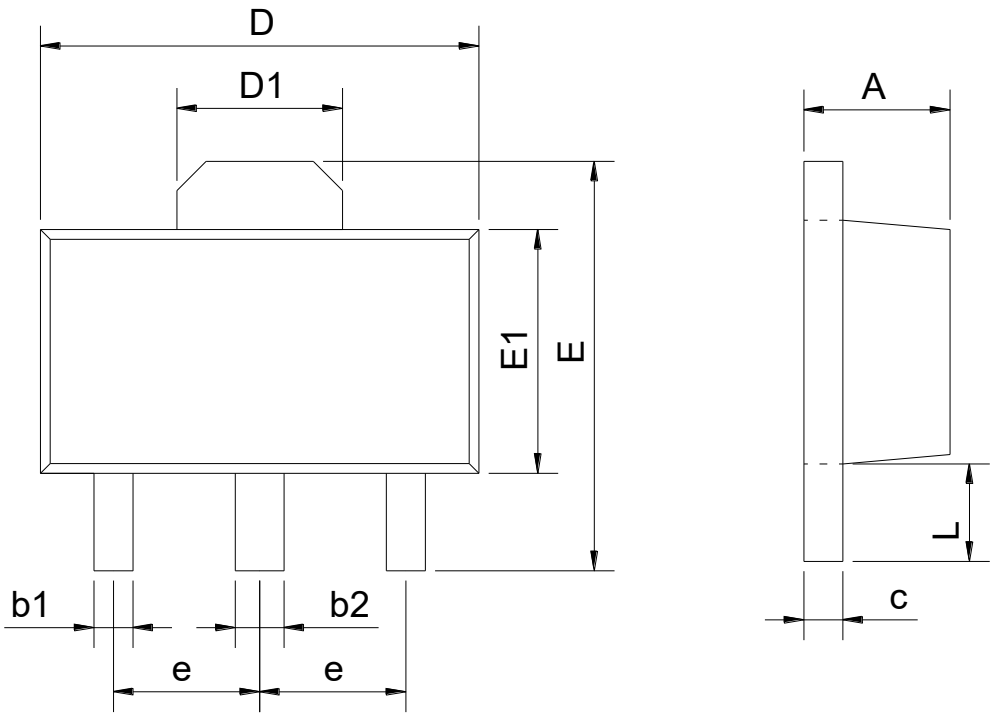
CH1: V_{OUT} (50mV/DIV) CH3: I_{OUT} (50mA/DIV)

V_{IN}=15V，I_{OUT}=10mA-100mA 改变 t:(20us/DIV)

图 6 负载变化瞬态响应

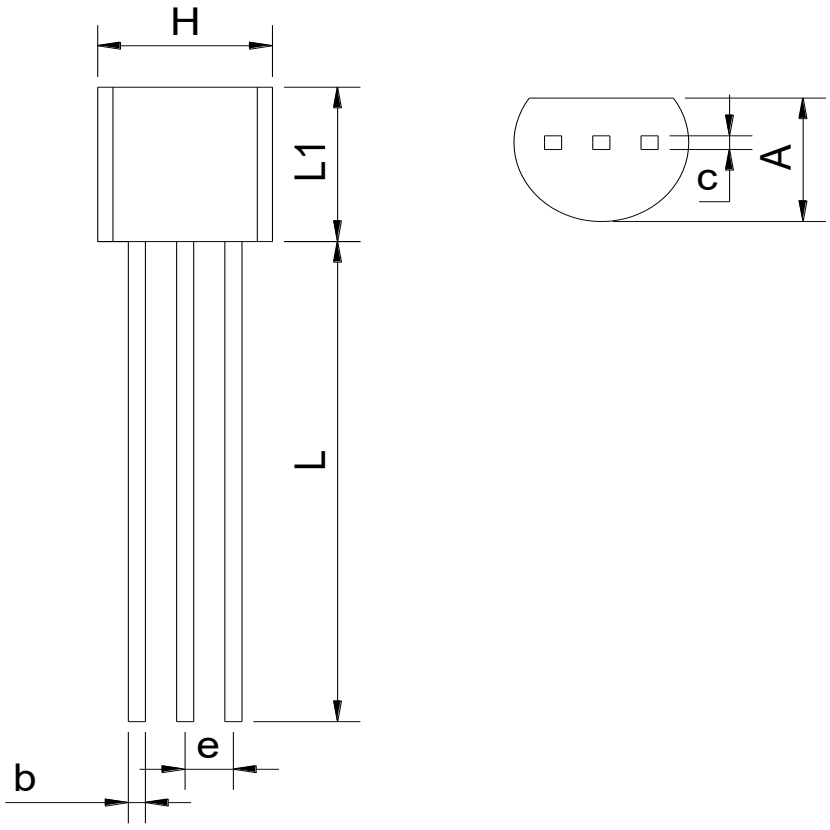
封装外形尺寸图

SOT-89-3L



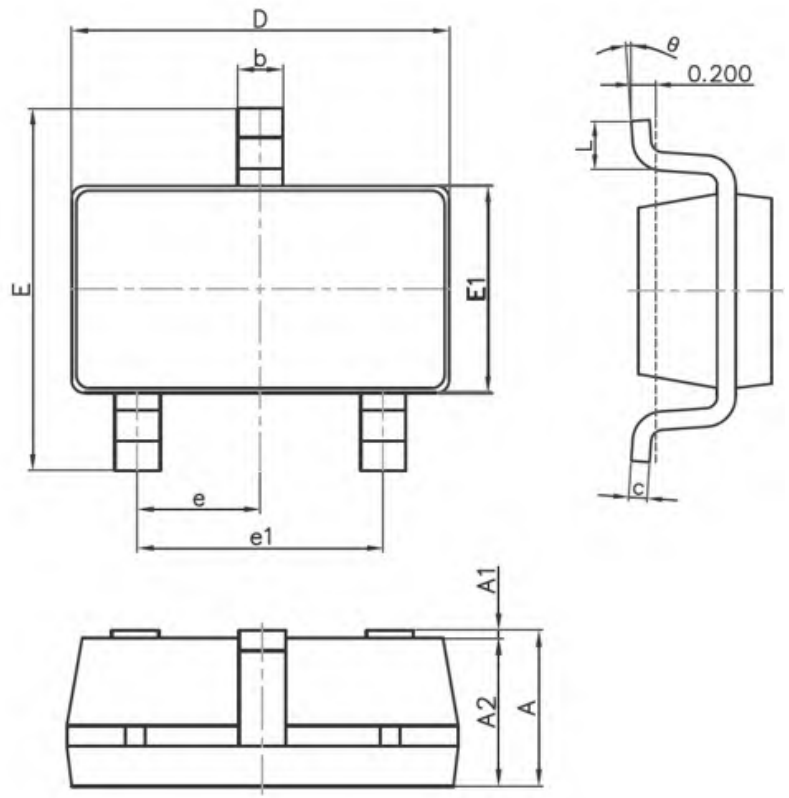
SYMBOL	mm	
	min	max
A	1.40	1.60
b1	0.32	0.52
b2	0.40	0.60
c	0.35	0.46
D	4.30	4.70
D1	1.40	1.80
E	4.00	4.40
E1	2.30	2.70
e	1.50BSC	
L	0.80	1.20

TO-92



SYMBOL	mm	
	min	max
A	3.30	3.80
b	0.38	0.55
c	0.36	0.51
e	1.27BSC	
H	4.40	4.80
L	13.00	15.00
L1	4.30	4.70

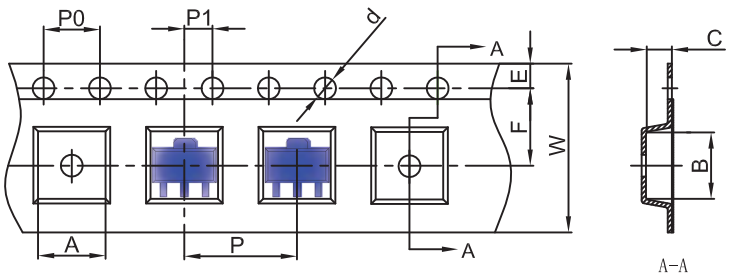
SOT-23-3L



SYMBOL	mm	
	min	max
A	1.05	1.25
A1	0.00	0.10
A2	1.05	1.15
b	0.3	0.5
c	0.1	0.2
D	2.82	3.02
E	2.65	2.95
E1	1.5	1.7
e	0.95BSC	
e1	1.8	2.0
L	0.30	0.60
θ	0	8°

SOT-89-3L Tape and reel

SOT-89-3L Embossed Carrier Tape

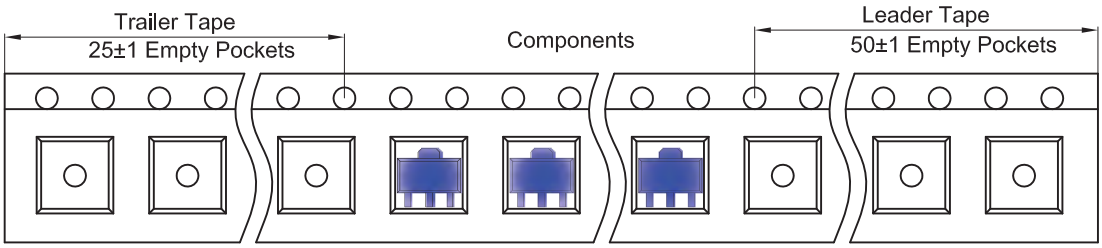


Packaging Description:

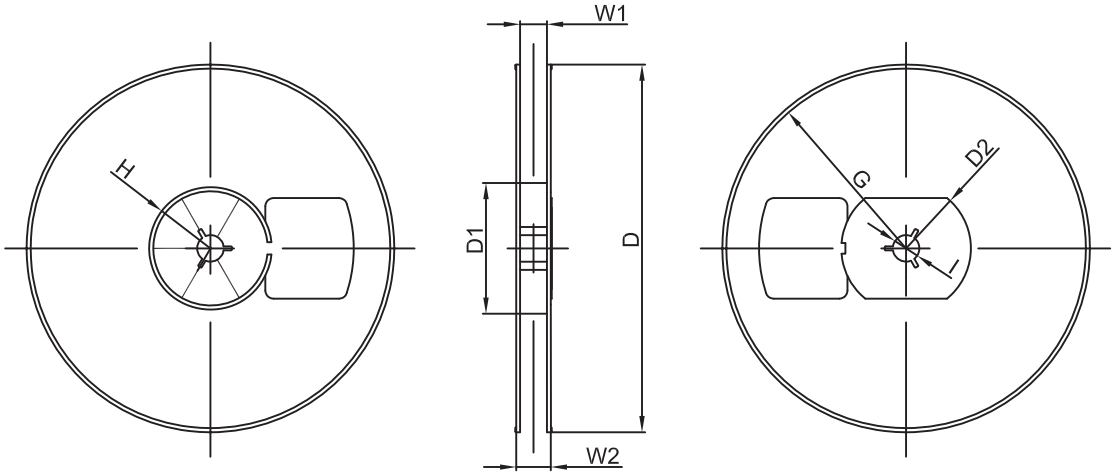
SOT-89-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts 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

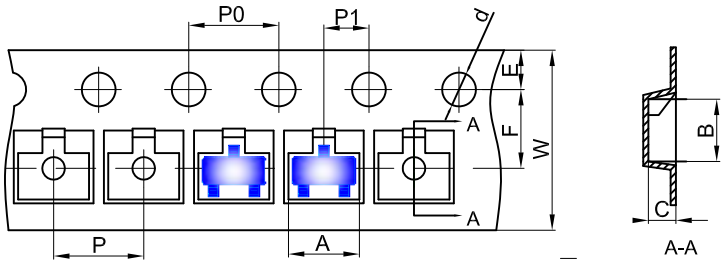


Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø180.00	60.00	R32.00	R86.50	R30.00	Ø13.00	13.20	16.50

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	

SOT-23-3L Tape and Reel

SOT-23-3L Embossed Carrier Tape

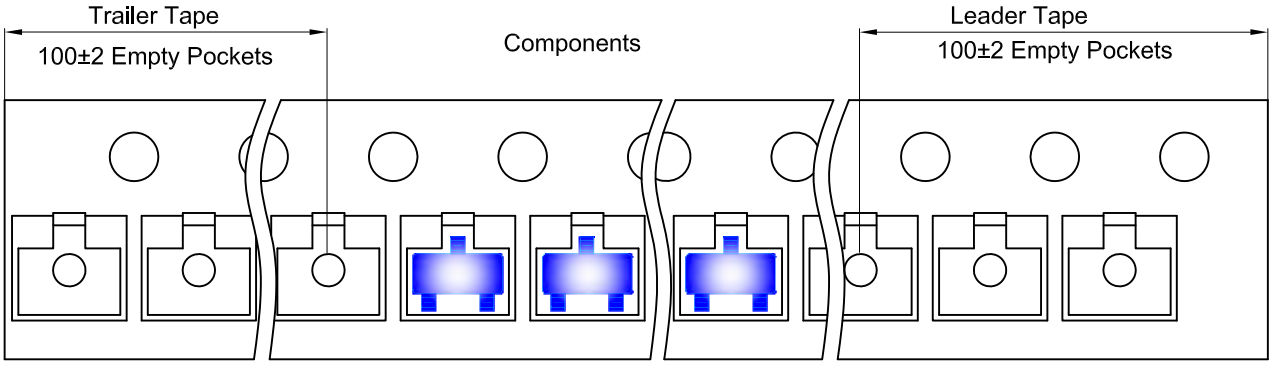


Packaging Description:

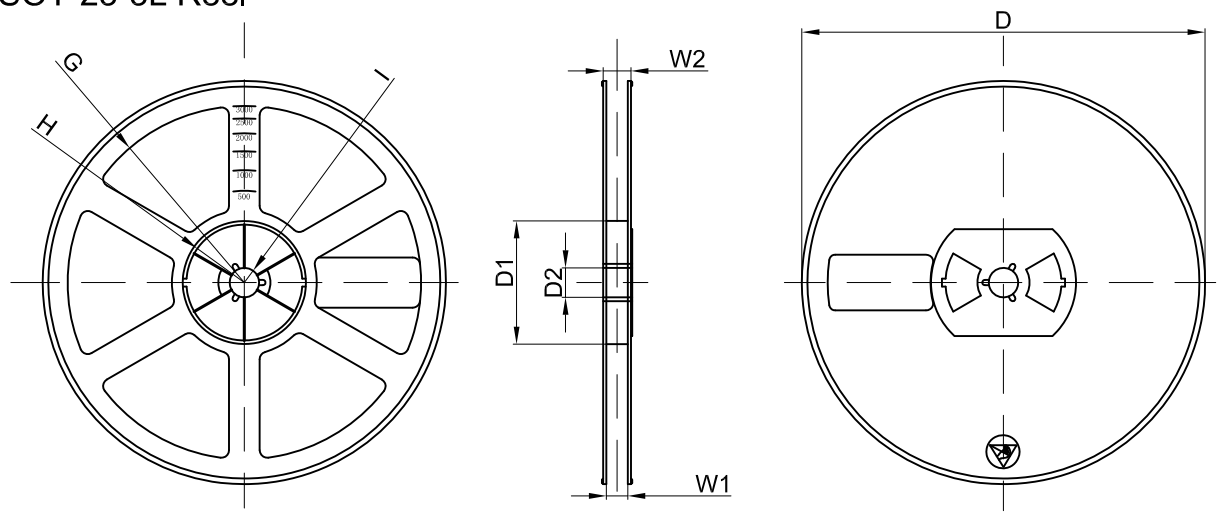
SOT-23-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts 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	

Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up -to- date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

TANI reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with TANI to ensure that the prod uct specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult TANI in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

Users should also comply with relevant laws, regulations, policies, and standards when using the product specification. Users are responsible for the risks and liabilities arising from the use of the product specification and must ensure that it is not used for illegal purposes. Additionally, users should respect the intellectual property rights related to the product specification and refrain from infringing upon any third- party legal rights. TANI shall assume no responsibility for any disputes or controv ersies arising from the above-mentioned issues in any form.