Lead-free Green

JSR78L05

0.1A Linear Voltage Regulator

Description

The JSR78L05 is a voltage regulator with output current at 0.1A and output voltage at 5V.

The device is designed to suit wide range of applications where good voltage regulation, current limiting, and thermal overload protection are essential to reliable long-term operations. With adequate heat sink attached, the regulator delivers output current to the maximum value of 100mA.

Packages offered include SOT-89-3L, TO-92-3L.

Features and Benefits

- Fixed output voltage at 5V
- Output current up to 100mA with foldback style current limiting
- Good immunization from input noise with PSRR at > 62dB typical
- Wide operating temperature range at T_J = -40 ~ 125ºC
- Built-in thermal shut-down to ensure reliable operation
- No external components needed for proper operation
- Lead-free package assembled with 'green' molding compound

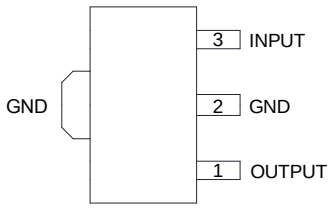
Applications

- Operating voltage supply to MCU and system ICs used in CE devices, industrial computing peripherals, network & communication systems
- Commonly adopted in e-Bike, 2/4-wheel scooters, toys, power adapters for computer peripherals / set-top boxes / routers, industrial machineries, test equipment

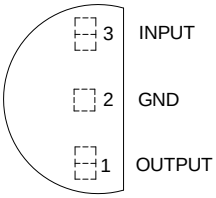
Pin Assignment

Top View

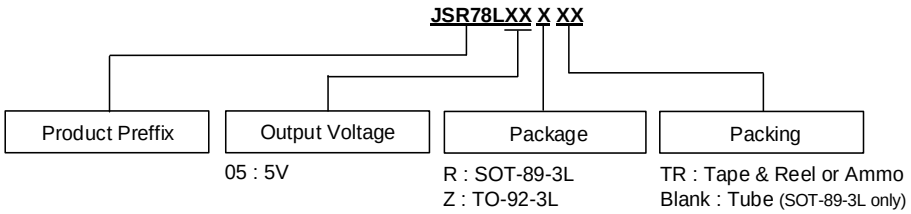
(SOT-89-3L)



(TO-92-3L Ammo Packing)



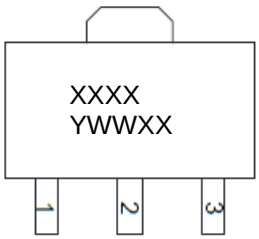
Ordering Information



Product Name	Package	Marking	MSL	T_J (ºC)	Media	Quantity (pcs)
JSR78L05RTR	SOT-89-3L	G78E	3	-40 ~ 125	7" T&R	1000
JSR78L05ZTR	TO-92-3L	G1	3	-40 ~ 125	Ammo	2000

Marking Information

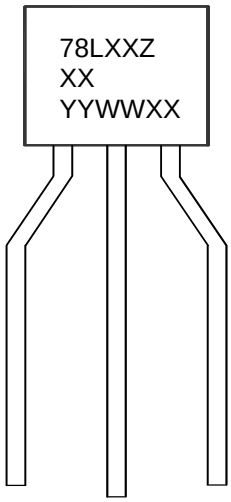
Top View



First Line: Marking (see Ordering Information)
Second Line: Date Code
Y: Year (e.g. 3 for CY2023)
WW: Work Week (≤ 51) of Molding
XX: Code for Assembly & Test Site

Marking Information (continued)

Top View



First Line: 78LXXZ (XX = Output Voltage; e.g. '05' for 5V)
Second Line: Marking (see Ordering Information)
Third Line: Date Code
YY: Year (e.g. 23 for CY2023)
WW: Work Week (≤ 51) of Molding
XX: Code for Assembly & Test Site

Typical Application Circuit

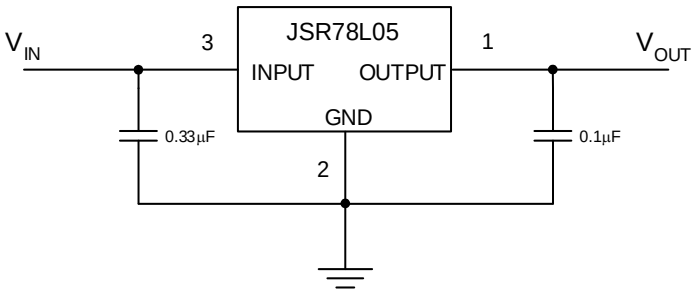


Fig. 1: Application Circuit

Diagram of Function Blocks

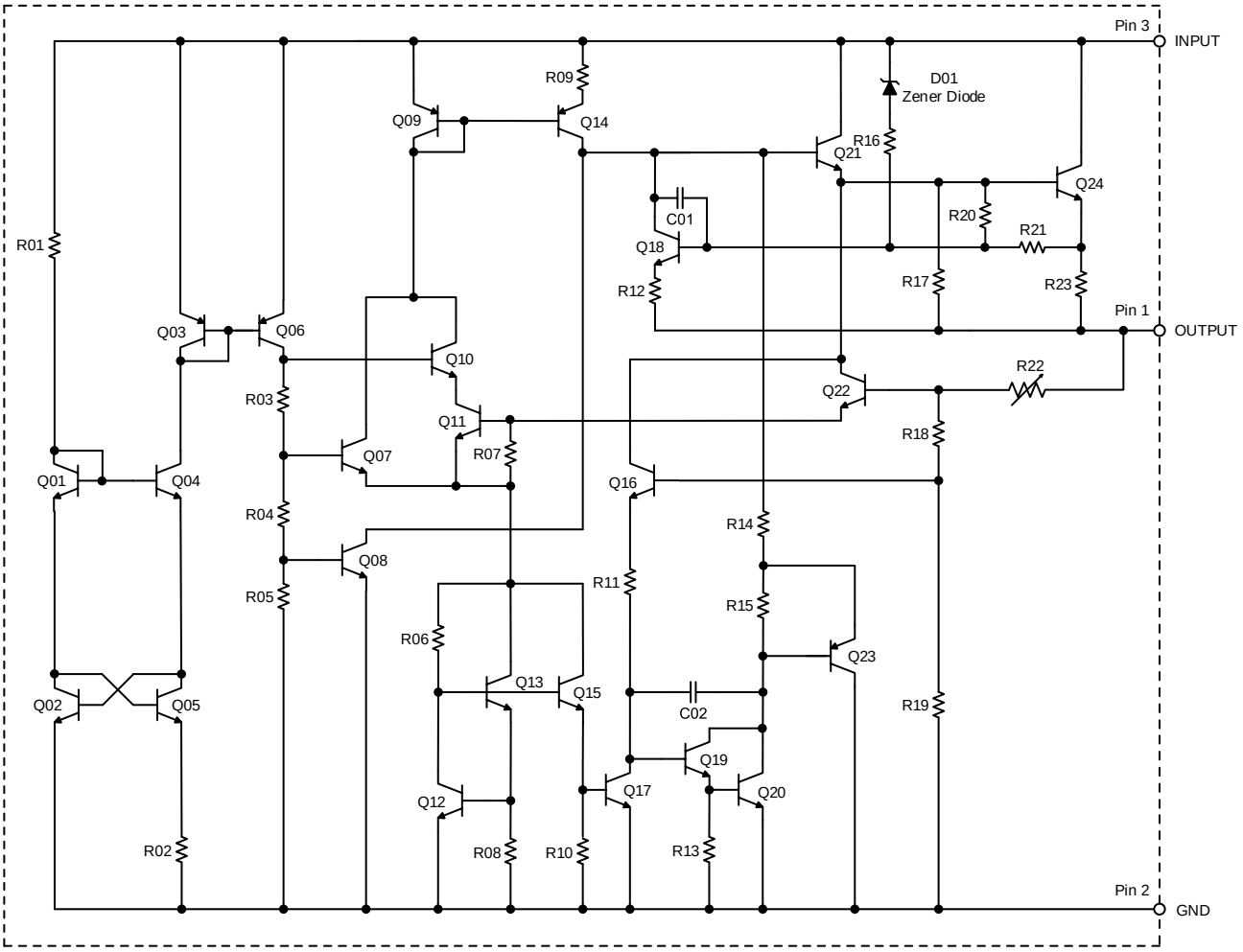


Fig. 2: Function Blocks

Absolute Maximum Ratings *1

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	36	V
T_J	Operating Junction Temperature	150	ºC
T_{LEAD}	Lead Temperature (soldering, 10s)	260	ºC
T_{STG}	Storage Temperature Range	-65 ~ 150	ºC
θ_{JA}	Thermal Resistance for SOT-89-3L	165	ºC / W
	Thermal Resistance for TO-92-3L	180	
HBM	ESD (Human Body Model)	2000	V
MM	ESD (Machine Model)	200	V

Note *1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. While these are stress ratings only, functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” are not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V_{IN}	Input Voltage	–	30	V
T_J	Operating Junction Temperature Range	-40	125	ºC

Electrical Characteristics

V_{IN} = 10V, I_{OUT} = 40mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF, T_J = 25ºC; *Italic* & Bold typefaces applies over -40ºC ≤ T_J ≤ 125ºC unless otherwise specified

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	–	4.8	5.0	5.2	V
		7V ≤ V_{IN} ≤ 20V, 1mA ≤ I_{OUT} ≤ 100mA, P_D ≤ 0.75W	***4.75***	–	***5.25***	
ΔV_{R_LINE}	Line Regulation	7V ≤ V_{IN} ≤ 20V	–	8	150	mV
ΔV_{R_LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 100mA	–	10	60	mV
I_Q	Quiescent Current	–	–	3	5.5	mA
ΔI_Q	Quiescent Current Change	8V ≤ V_{IN} ≤ 20V	–	–	***1.5***	mA
		1mA ≤ I_{OUT} ≤ 40mA	–	–	***0.1***	
PSRR	Power Supply Rejection Ratio	Frequency = 120Hz, 8V ≤ V_{IN} ≤ 18V	47	62	–	dB
V_{DROP}	Drop-out Voltage	I_{OUT} = 40mA	–	1.7	2.0	V
		I_{OUT} = 100mA	–	1.8	2.3	
V_{NOISE}	Output Noise Voltage	10Hz ≤ Frequency ≤ 100kHz *2	–	40	–	µV
$\Delta V_{OUT} / \Delta T$	Output Voltage Temperature Coefficient	I_{OUT} = 5mA	–	0.42	–	mV / ºC
θ_{JC}	Thermal Resistance	SOT-89-3L	–	28.3	–	ºC / W

Note *2: For the purpose of minimizing high frequency noise in the application circuit, load capacitance at 0.01µF and above are recommended.

Performance Characteristics

Fig. 3: Output Voltage vs. Input Voltage

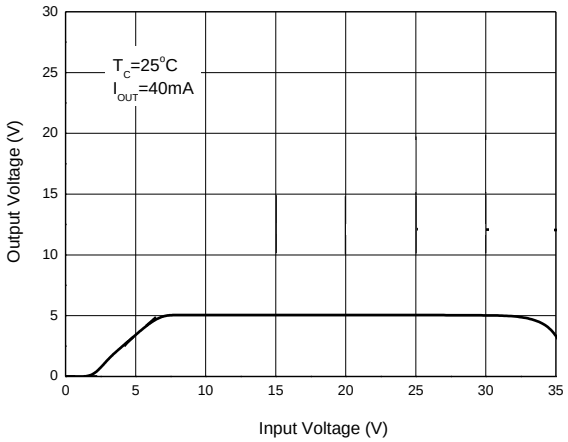


Fig. 4: Output Voltage vs. Case Temperature

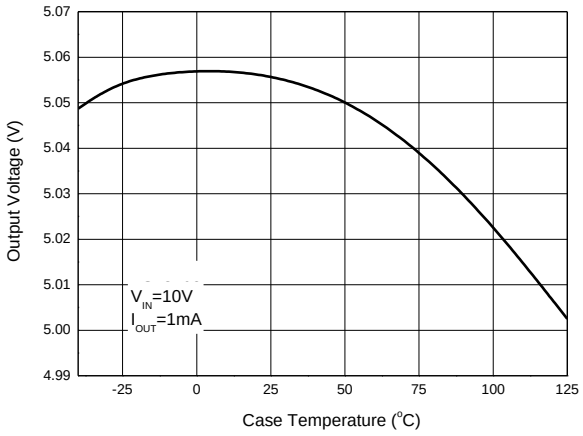


Fig. 5: Over Temperature Protection

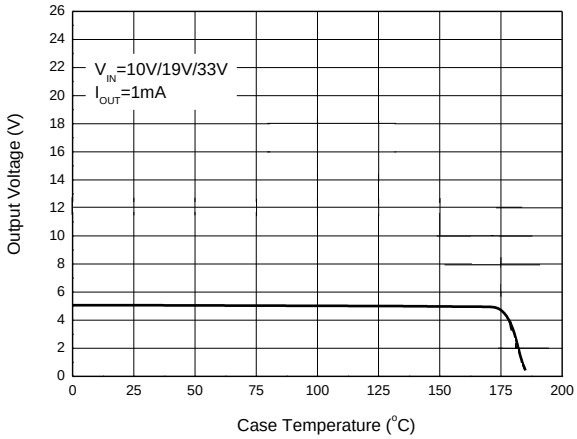


Fig. 6: Drop-out Voltage vs. Case Temperature

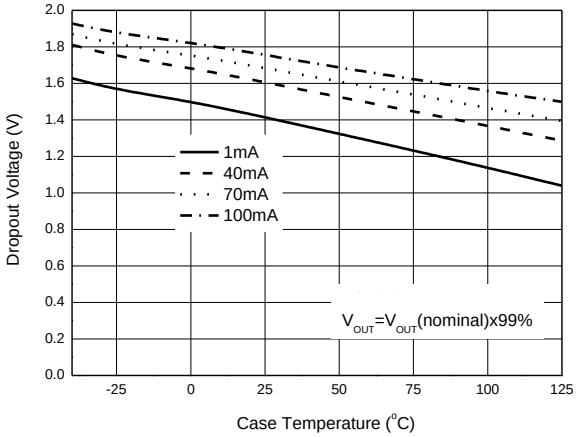


Fig. 7: Output Voltage vs. Output Current

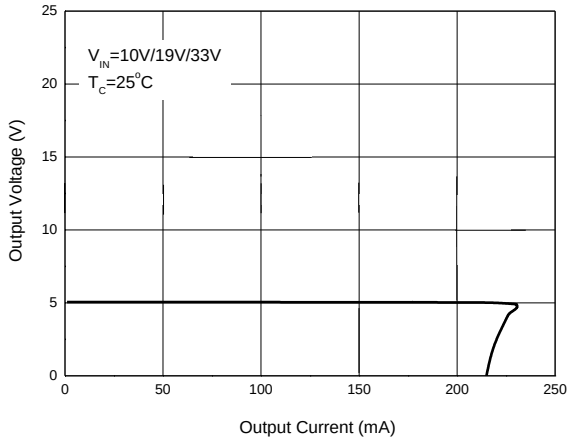
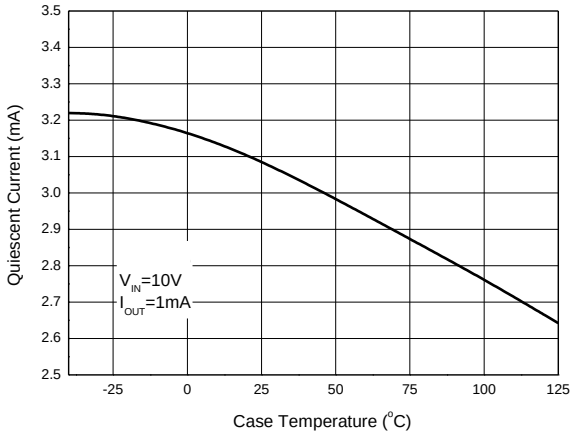


Fig. 8: Quiescent Current vs. Case Temperature



Performance Characteristics (continued)

Fig. 9: Power Dissipation vs. Case Temperature

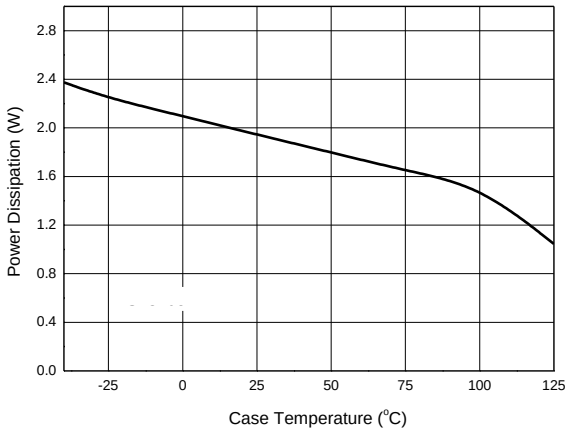


Fig. 10: PSRR vs. Frequency

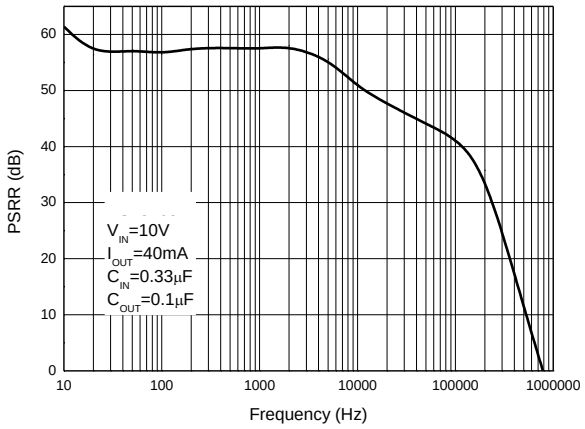


Fig. 11: Line Transient

(Conditions: I_{OUT} = 40mA, C_{IN} = 0.33µF, C_{OUT} = 0.1µF)

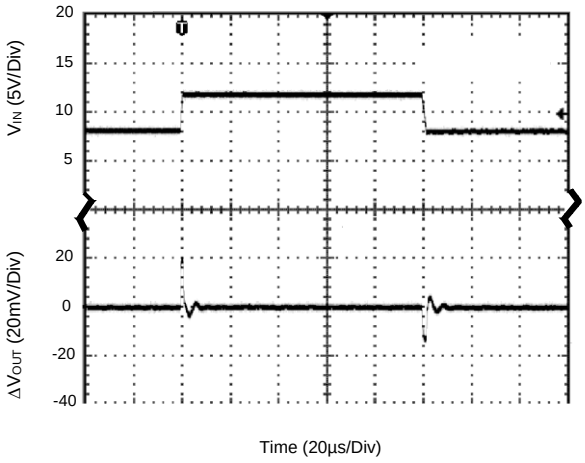
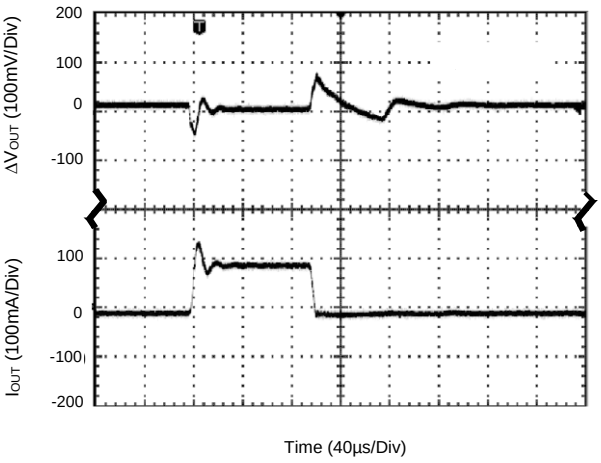


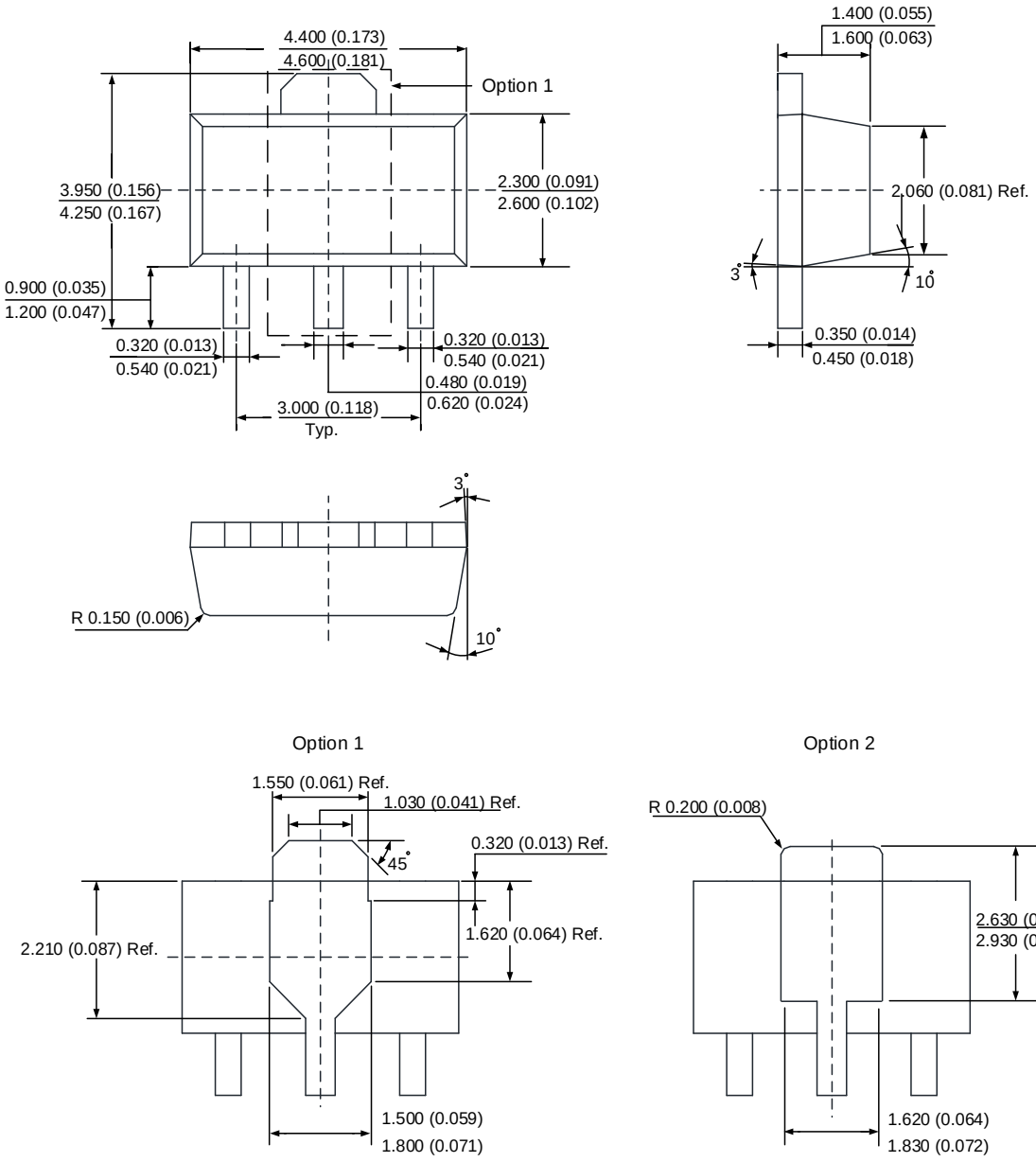
Fig. 12: Load Transient

(Conditions: V_{IN} = 10V, C_{IN} = 0.33µF, C_{OUT} = 0.1µF)



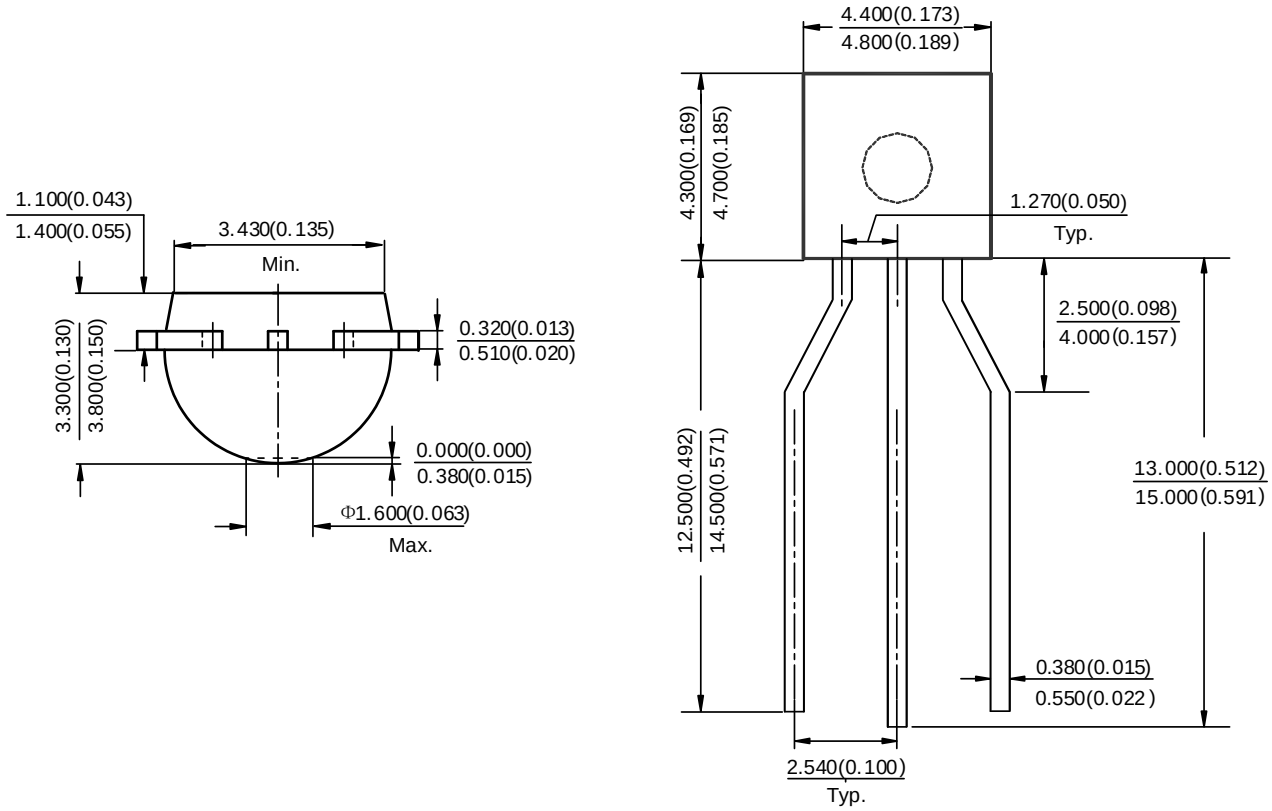
Package Outline (all measurement in mm & inch)

1. Package Type: SOT-89-3L



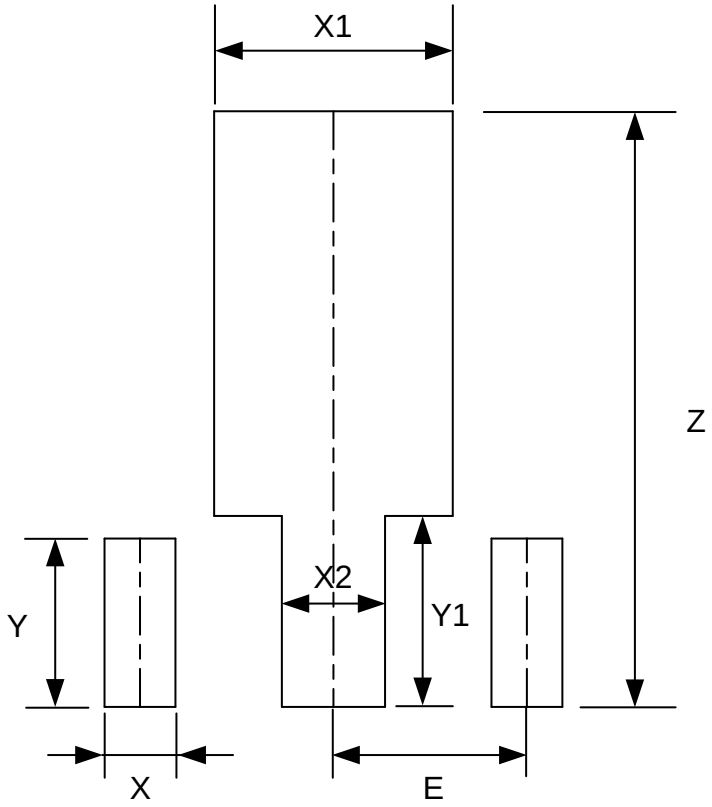
Package Outline (all measurement in mm & inch)

2. Package Type: TO-92-3L (Ammo Packing)



Suggested Pad Layout (all measurement in mm & inch)

1. Package Type: SOT-89-3L



Measurement	Z (mm) / (inch)	X (mm) / (inch)	X1 (mm) / (inch)	X2 (mm) / (inch)	Y (mm) / (inch)	Y1 (mm) / (inch)	E (mm) / (inch)
Value	4.600 / 0.181	0.550 / 0.022	1.850 / 0.073	0.800 / 0.031	1.300 / 0.051	1.475 / 0.058	1.500 / 0.059

Revision History

Revision	Release Date	Description
1.0	February 24, 2023	First release of JSR78L05 Data Sheet.
1.0a	April 8, 2023	Cosmetic changes made to improve consistency.
1.0b	April 13, 2023	TO-92-3L package in Ammo Packing added.
1.0c	April 18, 2023	Marking Information on TO-92-3L package revised to facilitate ease of tracking.
1.0d	April 22, 2023	Marking on packages updated after alignment with vendors
1.0e	April 27, 2023	θ_{JA} for TO-92-3L package added