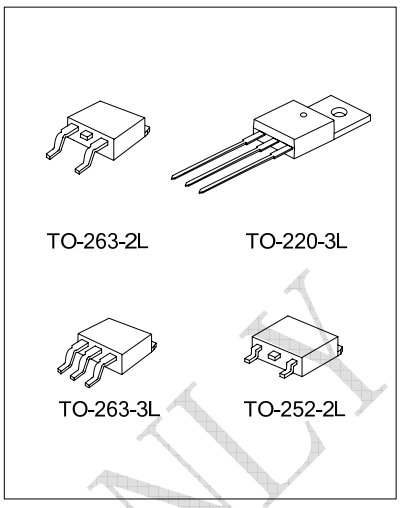
3A LDO VOLTAGE REGULATOR

DESCRIPTION

The SA1085 is a positive voltage regulator with low dropout voltage of 1.18V at 3A.

SA1085 provides two versions: fixed and adjustable versions. VOUT of fixed version has a tolerance of less than 1% for five kinds of output voltages 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V.

The SA1085 offers some key features include thermal shutdown and current limiting .The SA1085 is an excellent choice for use in battery powered applications and portable computers.



FEATURES

* Available fixed and adjustable version 1.5V, 1.8V, 2.5V, 3.3V, 5.0V
* Low Dropout Voltage: 1.18V at 3A output current
* Current Limiting: 4.5A
* Thermal Shutdown
* Line Regulation(Adj Version: Typical): 0.015%
* Load Regulation (Adj Version: Typical): 0.1%
* Temperature Range: 0 to 125°C

APPLICATIONS

* High Efficiency Linear Regulators
* Post Regulators for Switching Supplies
* Battery Charger
* Microprocessor Supply
* Desktop PCs, RISC and Embedded Processors Supply

ORDERING INFORMATION (Tamb=0~125°C)

SA1085 □ – □ □

Circuit type

Package

D:TO-252-2L S2:TO-263-2L
S:TO-263-3L T:TO-220-3L

TR: Tape and Reel
Blank: Stick

ADJ: Adjustable output
1.5: Fixed output 1.5V
1.8: Fixed output 1.8V
2.5: Fixed output 2.5V
3.3: Fixed output 3.3V
5.0: Fixed output 5.0V

Part Number	Package	Seal	Packing Type
SA1085D-ADJ	TO-252-2L	SA1085D-ADJ	Stick
SA1085D-ADJTR		SA1085D-ADJ	Tape & Reel
SA1085D-1.5		SA1085D-1.5	Stick
SA1085D-1.5TR		SA1085D-1.5	Tape & Reel
SA1085D-1.8		SA1085D-1.8	Stick
SA1085D-1.8TR		SA1085D-1.8	Tape & Reel

(To be continued)

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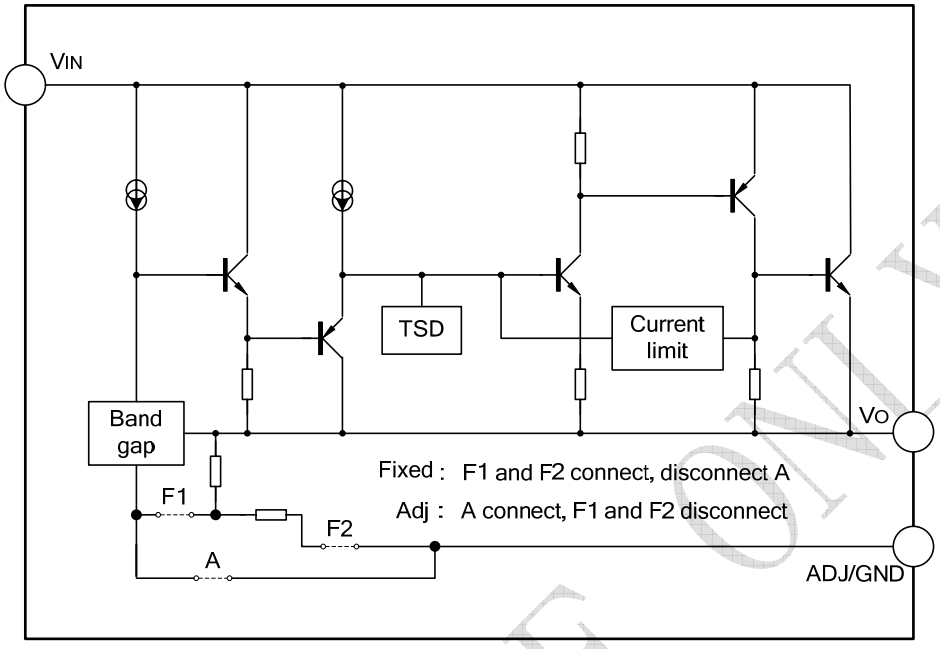
Part Number	Package	Seal	Packing Type
SA1085D-2.5	TO-252-2L	SA1085D-2.5	Stick
SA1085D-2.5TR		SA1085D-2.5	Tape & Reel
SA1085D-3.3		SA1085D-3.3	Stick
SA1085D-3.3TR		SA1085D-3.3	Tape & Reel
SA1085D-5.0		SA1085D-5.0	Stick
SA1085D-5.0TR		SA1085D-5.0	Tape & Reel
SA1085S-ADJ	TO-263-3L	SA1085S-ADJ	Stick
SA1085S-ADJTR		SA1085S-ADJ	Tape & Reel
SA1085S-1.5		SA1085S-1.5	Stick
SA1085S-1.5TR		SA1085S-1.5	Tape & Reel
SA1085S-1.8		SA1085S-1.8	Stick
SA1085S-1.8TR		SA1085S-1.8	Tape & Reel
SA1085S-2.5		SA1085S-2.5	Stick
SA1085S-2.5TR		SA1085S-2.5	Tape & Reel
SA1085S-3.3		SA1085S-3.3	Stick
SA1085S-3.3TR		SA1085S-3.3	Tape & Reel
SA1085S-5.0		SA1085S-5.0	Stick
SA1085S-5.0TR		SA1085S-5.0	Tape & Reel
SA1085T-ADJ	TO-220-3L	SA1085T-ADJ	Stick
SA1085T-1.5		SA1085T-1.5	Stick
SA1085T-1.8		SA1085T-1.8	Stick
SA1085T-2.5		SA1085T-2.5	Stick
SA1085T-3.3		SA1085T-3.3	Stick
SA1085T-5.0		SA1085T-5.0	Stick
SA1085S2-ADJ	TO-263-2L	SA1085S2-ADJ	Stick
SA1085S2-ADJTR		SA1085S2-ADJ	Tape & Reel
SA1085S2-1.5		SA1085S2-1.5	Stick
SA1085S2-1.5TR		SA1085S2-1.5	Tape & Reel
SA1085S2-1.8		SA1085S2-1.8	Stick
SA1085S2-1.8TR		SA1085S2-1.8	Tape & Reel
SA1085S2-2.5		SA1085S2-2.5	Stick
SA1085S2-2.5TR		SA1085S2-2.5	Tape & Reel
SA1085S2-3.3		SA1085S2-3.3	Stick
SA1085S2-3.3TR		SA1085S2-3.3	Tape & Reel
SA1085S2-5.0		SA1085S2-5.0	Stick
SA1085S2-5.0TR		SA1085S2-5.0	Tape & Reel

BLOCK DIAGRAM



ABOSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V_{IN}	20	V
Lead Temperature (Soldering, 5 seconds)	T_{LEAD}	260	°C
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_S	-65 ~ +150	V
Power Disspation	PD	Internally Limited (note1)	mW
ESD Tolerance (Minimum)	ESD	2000	V

Note1: The maximum allowable power dissipation is a function of maximum operating junction temperature, T_J (max), the junction to ambient thermal resistance, θ_{JA}, and the ambient temperature T_{amb}. The maximum allowable power dissipation at any ambient temperature is given: PD (max) = ($T_{J\,(max)}$ – T_{amb})/θ_{JA}, exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The junction to ambient thermal resistance, θ_{JA} of some packages may be different, The value of θ_{JA} depends on mounting technique.

RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Ratings	Unit
Input voltage	V_{IN}	12	V
Operating Junction Temperature Range	T_J	0 ~ +125	°C

ELECTRICAL CHARACTERISTICS (Tamb=25°C, unless otherwise specified. Limits appearing in Boldface type apply over the entire junction temperature range for operation, 0°C to 125°C.)

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	SA1085-ADJ, I_{OUT}=10mA, V_{IN}-V_{OUT}=3V, 10mA≤I_{OUT}≤3A, 1.5V≤V_{IN}-V_{OUT}≤5V	1.238 1.225	1.250 1.250	1.262 1.275	V
Output Voltage	V_{OUT}	SA1085-1.5, I_{OUT}=10mA, V_{IN}=4.5V, 10mA≤I_{OUT}≤3A, 3.0V≤V_{IN}≤6V	1.485 1.47	1.5 1.5	1.515 1.53	V
		SA1085-1.8, I_{OUT}=10mA, V_{IN}=4.8V, 10mA≤I_{OUT}≤ 3A, 3.3V≤V_{IN}≤7V	1.782 1.764	1.8 1.8	1.818 1.836	V
		SA1085-2.5, I_{OUT}=10mA, V_{IN}=5.5V 10mA≤I_{OUT}≤3A, 4.0V≤V_{IN} ≤7V	2.475 2.45	2.5 2.5	2.525 2.55	V
		SA1085-3.3, I_{OUT}=10mA, V_{IN}=6.3V, 10mA≤I_{OUT}≤3A, 4.8V≤V_{IN}≤8V	3.267 3.234	3.3 3.3	3.333 3.366	V
		SA1085-5.0, I_{OUT}=10mA, V_{IN}=8V, 10mA≤ I_{OUT}≤3A, 6.5V≤V_{IN}≤10V	4.95 4.9	5 5	5.05 5.1	V
Line Regulation	ΔV_{OUT}	SA1085-ADJ, I_{OUT}=10mA, 2.85V≤V_{IN}≤10V		0.015 0.035	0.2 0.2	%
		SA1085-1.5, I_{OUT}=10mA, 3.0V≤V_{IN}≤10V		0.5 1	6 6	mV
		SA1085-1.8, I_{OUT}=10mA, 3.3V≤V_{IN}≤10V		0.5 1	6 6	mV
		SA1085-2.5, I_{OUT}=10mA, 4.0V≤V_{IN}≤10V		0.5 1	6 6	mV
		SA1085-3.3, I_{OUT}=10mA, 4.8V≤V_{IN}≤10V		0.5 1	6 6	mV
		SA1085-5.0, I_{OUT}=10mA, 6.5V≤V_{IN}≤10V		0.5 1	10 10	mV
Load Regulation	ΔV_{OUT}	SA1085-ADJ, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		0.1 0.2	0.3 0.4	%
		SA1085-1.5, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 7	15 20	mV
		SA1085-1.8, 0mA≤ I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 7	15 20	mV
		SA1085-2.5, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 7	15 20	mV

(To be continued)

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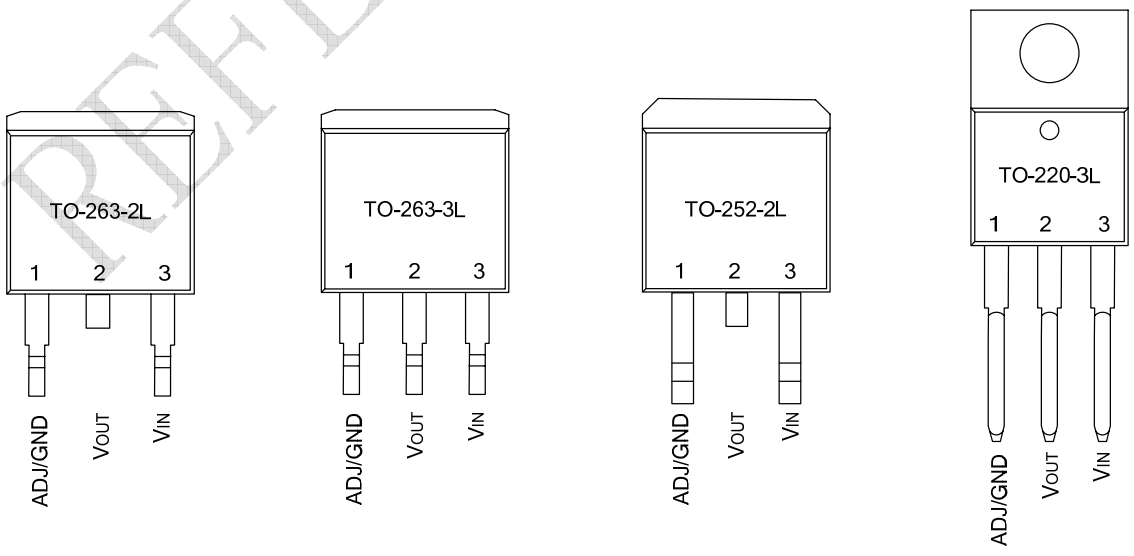
Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Load Regulation	ΔV_{OUT}	SA1085-3.3, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		3 7	15 20	mV
		SA1085-5.0, 0mA≤I_{OUT}≤3A, V_{IN}-V_{OUT}=3V		5 10	20 35	mV
Dropout Voltage	V_{DROP}	I_{OUT}=3A, ΔV_{REF}, ΔV_{OUT}=1%		1.18	1.3	V
Current Limit	I_{LIMIT}	V_{IN}-V_{OUT}=3V	3.2	4.5		A
Minimum Load Current	I_{LOAD} (MIN)	V_{IN}=10V (SA1085-ADJ)		3	10	mA
Quiescent Current	I_Q	V_{IN}=10V (SA1085)		5	10	mA
Ripple Rejection	PSRR	f_{RIPPLE}=120Hz, C_{OUT}=25μF, I_{OUT}=3A, V_{IN}-V_{OUT}=3V	60	72		dB
Adjust Pin Current	I_{ADJ}	V_{IN}=4.25V, I_{OUT}=10mA		55	120	μA
Adjust Pin Current Change	ΔI_{ADJ}	10mA≤I_{OUT}≤3A, 1.5V≤(V_{IN}-V_{OUT})≤6V		0.2	5	μA
Temperature Stability		I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V		0.5		%
Long Term Stability		T_{amb}=125°C, 1000Hrs		0.5		%
RMS Noise (% of V_{OUT})		T_{amb}=125°C,10Hz≤f≤10kHz		0.003		%
Thermal Resistance	θJA	TO-263-3L		60		°C/W
		TO-263-2L		60		
		TO-220-3L		60		
		TO-252-2L		100		

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Pin name	I/O	Functions
1	GND/ADJ	G/O	Ground/ADJ
2	VOUT	O	Output voltage
3	VIN	I	Input supply voltage

FUNCTION DESCRIPTION

The SA1085 is a LDO regulator, it's pass transistor is made up of a single NPN transistor being driven by a PNP. The dropout voltage is defined as: $V_{DROP} = V_{BE} + V_{SAT}$.

The SA1085 series of fixed and adjustable regulators are easy to use. Output voltages are 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V.On-chip thermal shut down provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The SA1085 requires an output capacitor for device stability. Its value of 22 μF tantalum covers all cases of bypassing the adjustment terminal. Without bypassing the adjustment terminal smaller capacitors can be used with equally good results .depends upon the application circuit. In general, linear regulator stability decreases with higher output currents.

TYPICAL APPLICATION CIRCUIT

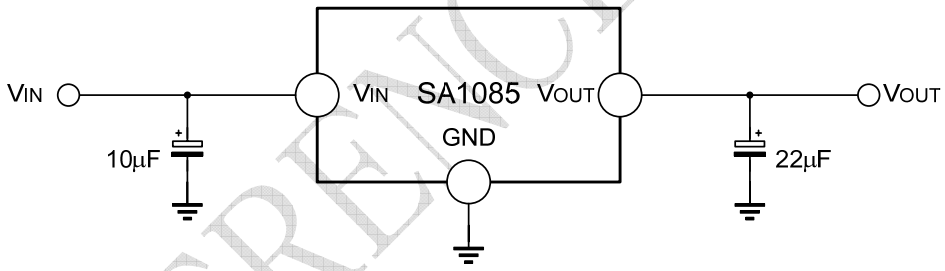


Figure 1. Typical Fixed Output Voltage

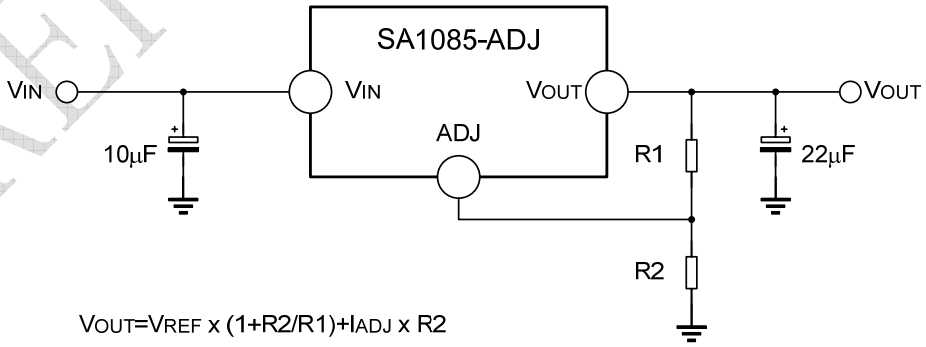
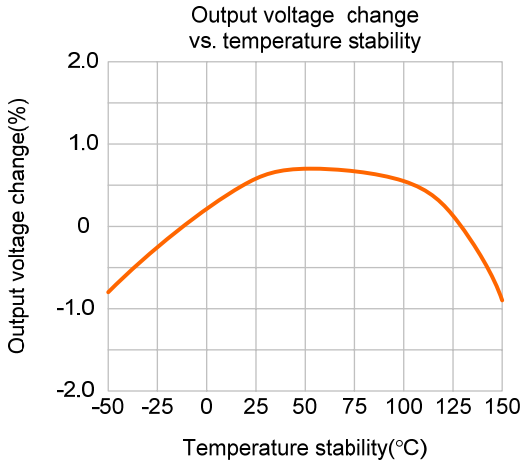
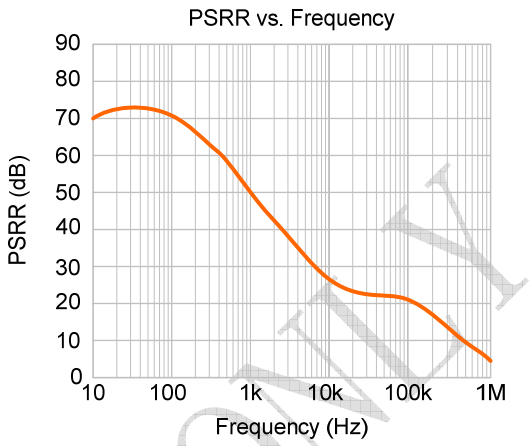


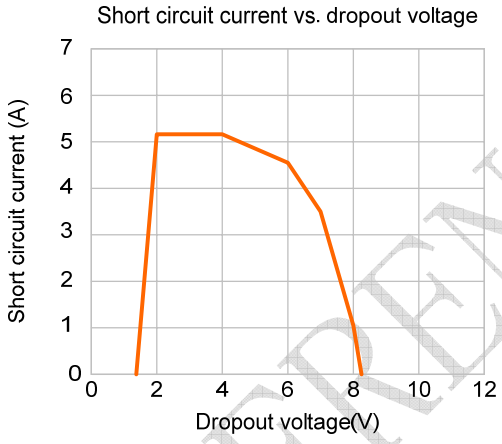
Figure 2. Typical Adjustable Output Voltage

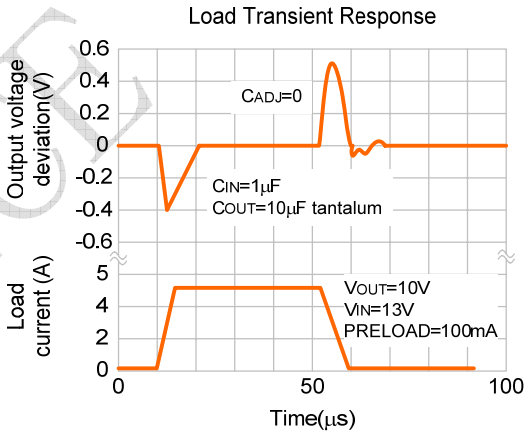
Note: The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

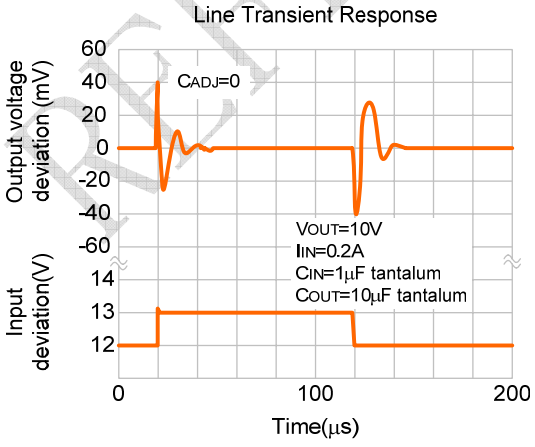
TYPICAL CHARACTERISTICS CURVES

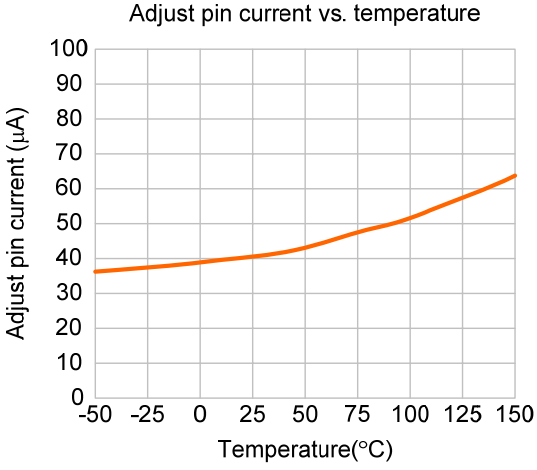






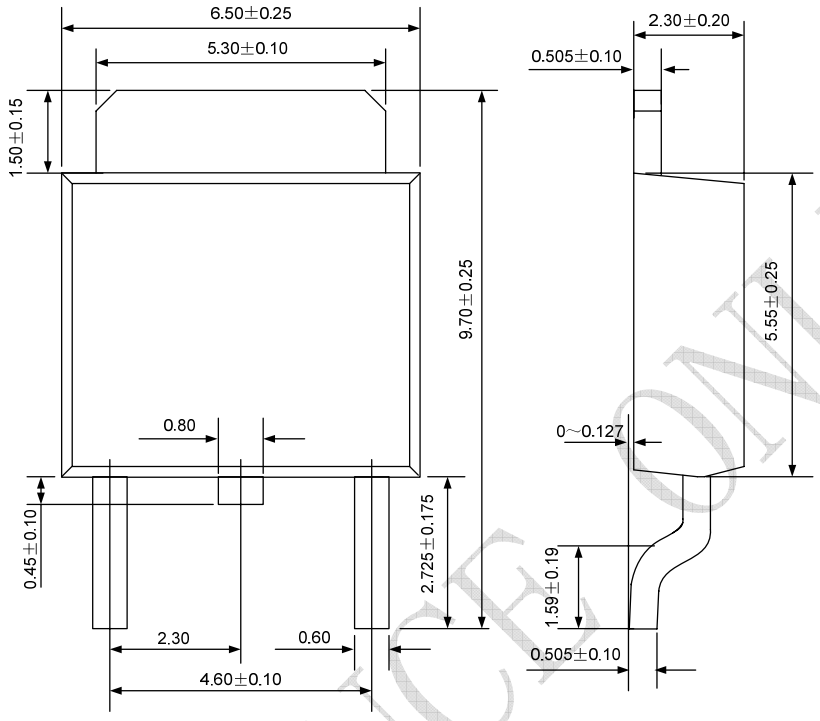




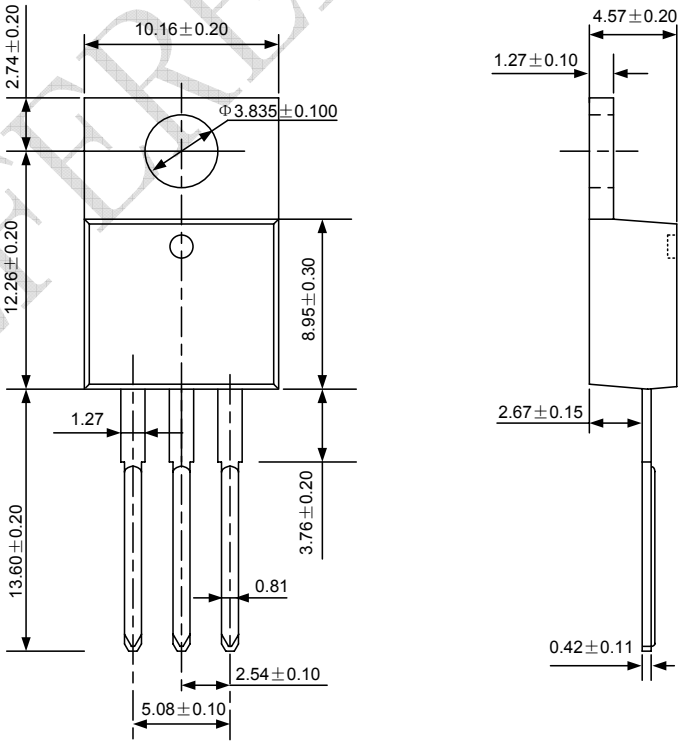


PACKAGE OUTLINE

TO-252-2L UNIT: mm

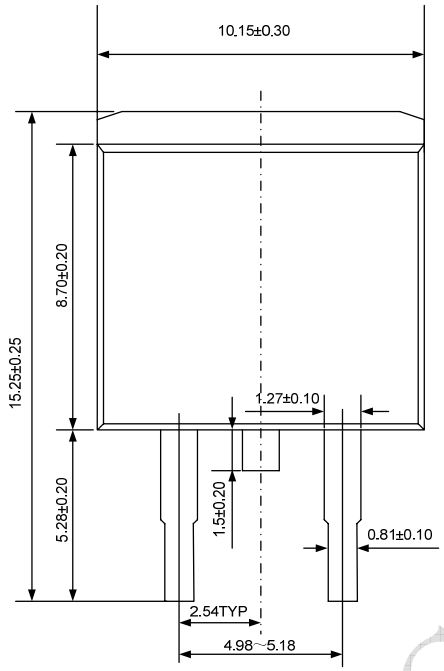


TO-220-3L UNIT: mm

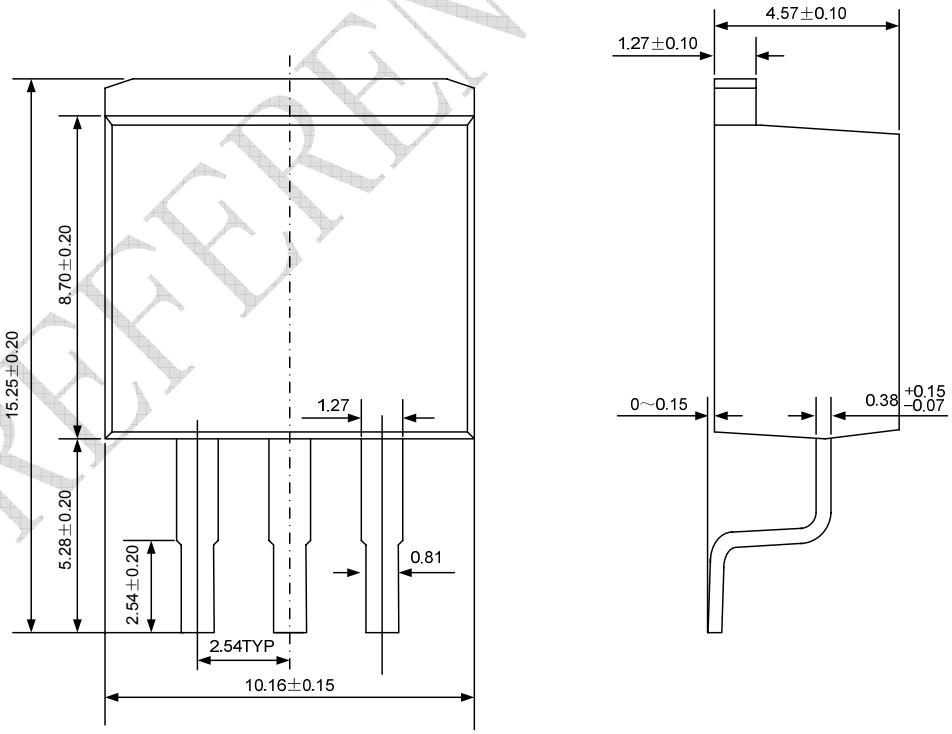


PACKAGE OUTLINE

TO-263-2L UNIT: mm



TO-263-3L UNIT: mm



Note: Silan reserves the right to make changes without notice in this specification for the improvement of the design and performance. Silan will supply the best possible product for customers.