



## 5A LDO VOLTAGE REGULATOR

### DESCRIPTION

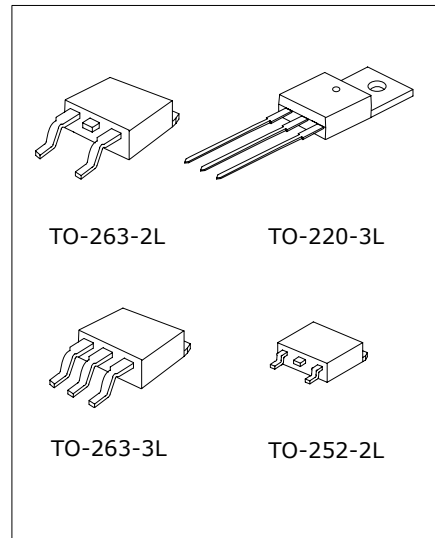
The AMS1084 is a positive low voltage dropout regulator, voltage dropout is only 1.5V at 5A.

AMS1084 has two versions: the fixed version and the adjustable version. VOUT has a tolerance of less than 1% for fixed versions 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version.

The AMS1084 integrates overheating protection and current limit circuits. It is an suitable for all electronic products.

### FEATURES

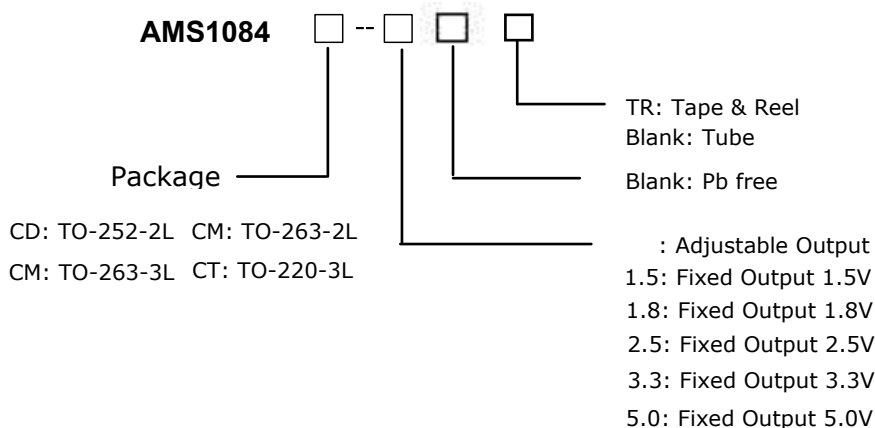
- \* 1% accuracy for fixed output VOUT while the voltage is 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and the adjustable output VOUT
- \* Low Dropout Voltage: 1.5V at 5A output current
- \* Current Limiting: 6.5A
- \* Load regulation : 0.1% typical (adjustable version)
- \* Line regulation : 0.015% typical (adjustable version)
- \* Temperature Range: 0°C to 125°C



### APPLICATIONS

- \* High Efficiency Linear Regulators
- \* SMPS Post-Regulator
- \* Battery Charger
- \* Microprocessor Supply
- \* Desktop PCs, RISC and embedded processors'supply

### ORDERING INFORMATION (Temperature range: 0°C ~125°C)



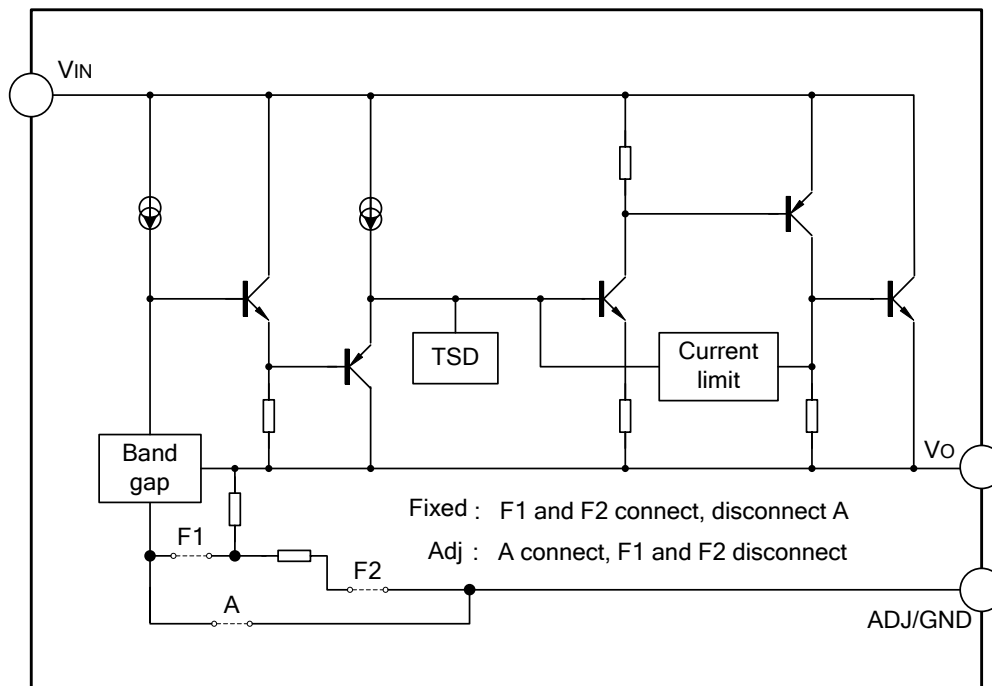


PART NO	Package	Marking	Material	Packing Type
AMS1084D-ADJ	TO-252-2L	AMS1084CD	Pb free	Tube
AMS1084D-ADJTR		AMS1084CD	Pb free	Tape & Reel
AMS1084D-1.5		AMS1084CD-1.5	Pb free	Tube
AMS1084D-1.5TR		AMS1084CD-1.5	Pb free	Tape & Reel
AMS1084D-1.8		AMS1084CD-1.8	Pb free	Tube
AMS1084D-1.8TR		AMS1084CD-1.8	Pb free	Tape & Reel
AMS1084D-2.5		AMS1084CD-2.5	Pb free	Tube
AMS1084D-2.5TR		AMS1084CD-2.5	Pb free	Tape & Reel
AMS1084D-3.3		AMS1084CD-3.3	Pb free	Tube
AMS1084D-3.3TR		AMS1084CD-3.3	Pb free	Tape & Reel
AMS1084D-5.0		AMS1084CD-5.0	Pb free	Tube
AMS1084D-5.0TR		AMS1084CD-5.0	Pb free	Tape & Reel
AMS1084S-ADJ		TO-263-3L	AMS1084CM	Pb free
AMS1084S-ADJTR	AMS1084CM-ADJ		Pb free	Tape & Reel
AMS1084S-1.5	AMS1084CM-1.5		Pb free	Tube
AMS1084S-1.5TR	AMS1084CM-1.5		Pb free	Tape & Reel
AMS1084S-1.8	AMS1084CM-1.8		Pb free	Tube
AMS1084S-1.8TR	AMS1084CM-1.8		Pb free	Tape & Reel
AMS1084S-2.5	AMS1084CM-2.5		Pb free	Tube
AMS1084S-2.5TR	AMS1084CM-2.5		Pb free	Tape & Reel
AMS1084S-3.3	AMS1084CM-3.3		Pb free	Tube
AMS1084S-3.3TR	AMS1084CM-3.3		Pb free	Tape & Reel
AMS1084S-5.0	AMS1084CM-5.0		Pb free	Tube
AMS1084S-5.0TR	AMS1084CM-5.0		Pb free	Tape & Reel
AMS1084T-ADJ	TO-220-3L		AMS1084CT	Pb free
AMS1084T-1.5		AMS1084CT-1.5	Pb free	Tube
AMS1084T-1.8		AMS1084CT-1.8	Pb free	Tube
AMS1084T-2.5		AMS1084CT-2.5	Pb free	Tube
AMS1084T-3.3		AMS1084CT-3.3	Pb free	Tube
AMS1084T-5.0		AMS1084CT-5.0	Pb free	Tube
AMS1084S2-ADJ	TO-263-2L	AMS1084CM	Pb free	Tube
AMS1084S2-ADJTR		AMS1084CM	Pb free	Tape & Reel
AMS1084S2-1.5		AMS1084CM-1.5	Pb free	Tube
AMS1084S2-1.5TR		AMS1084CM-1.5	Pb free	Tape & Reel
AMS1084S2-1.8		AMS1084CM-1.8	Pb free	Tube
AMS1084S2-1.8TR		AMS1084CM-1.8	Pb free	Tape & Reel
AMS1084S2-2.5		AMS1084CM-2.5	Pb free	Tube



PART NO	Package	Marking	Material	Packing Type
AMS1084S2-2.5TR	TO-263-2L	AMS1084CM-2.5	Pb free	Tape & Reel
AMS1084S2-3.3		AMS1084CM-3.3	Pb free	Tube
AMS1084S2-3.3TR		AMS1084CM-3.3	Pb free	Tape & Reel
AMS1084S2-5.0		AMS1084CM-5.0	Pb free	Tube
AMS1084S2-5.0TR		AMS1084CM-5.0	Pb free	Tape & Reel

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V <sub>IN</sub>	20	V
Lead Temperature (Soldering, 5 Seconds)	T <sub>LEAD</sub>	260	°C
Operating Junction Temperature Range	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>S</sub>	-65 ~ +150	V
Power Dissipation	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<sub>J</sub> (max), the junction to ambient thermal resistance θ<sub>JA</sub>, and the ambient temperature T<sub>amb</sub>. The maximum allowable power dissipation at any ambient temperature is given: PD (max) = (T<sub>J</sub> (max) - T<sub>amb</sub>)/θ<sub>JA</sub>, 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<sub>JA</sub> of different packages may be different, and the value of θ<sub>JA</sub> depends on mounting technique.



## RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V <sub>IN</sub>	12	V
Operating Junction Temperature Range	T <sub>J</sub>	0 ~ +125	°C

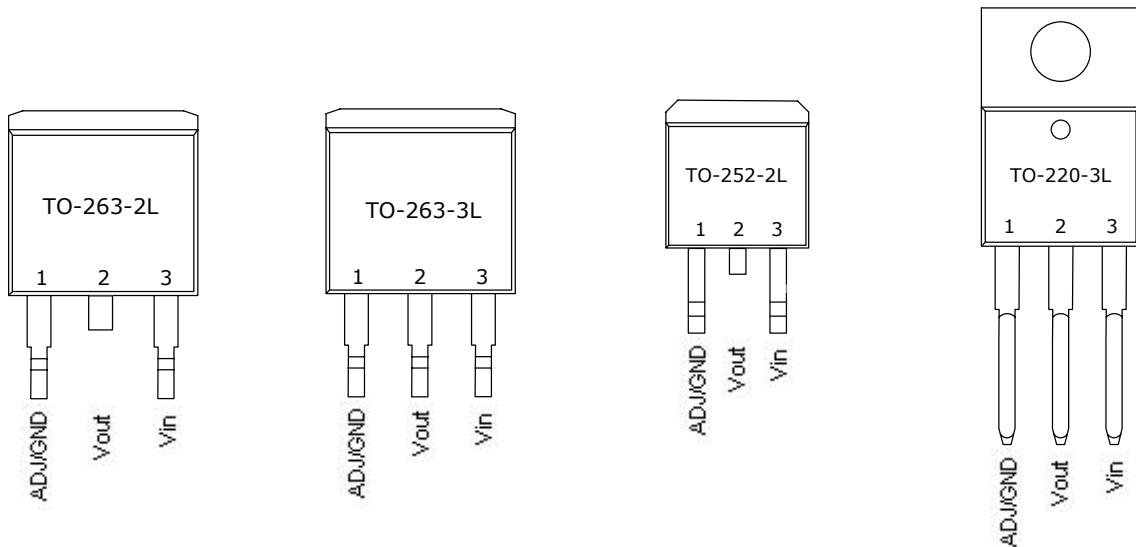
**ELECTRICAL CHARACTERISTICS** (T<sub>amb</sub>=25°C, unless otherwise specified. Limits appearing in Boldface type apply over the entire junction temperature range for operation, 0°C to 125°C. )

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V <sub>REF</sub>	AMS1084-ADJ, I <sub>OUT</sub> =10mA, V <sub>IN</sub> -V <sub>OUT</sub> =3V, 10mA ≤ I <sub>OUT</sub> ≤ 5A, 1.5V ≤ V <sub>IN</sub> -V <sub>OUT</sub> ≤ 5V	1.238	1.250	1.262	V
			1.225	1.250	1.270	
Output Voltage	V <sub>OUT</sub>	AMS1084-1.5, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =4.5V, 10mA ≤ I <sub>OUT</sub> ≤ 5A, 3.0V ≤ V <sub>IN</sub> ≤ 6V	1.485	1.5	1.515	V
			1.47	1.5	1.53	
		AMS1084-1.8, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =4.8V, 10mA ≤ I <sub>OUT</sub> ≤ 5A, 3.3V ≤ V <sub>IN</sub> ≤ 6V	1.782	1.8	1.818	V
			1.764	1.8	1.836	
		AMS1084-2.5, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =5.5V 10mA ≤ I <sub>OUT</sub> ≤ 5A, 4.0V ≤ V <sub>IN</sub> ≤ 7V	2.475	2.5	2.525	V
			2.45	2.5	2.55	
AMS1084-3.3, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =6.3V, 10mA ≤ I <sub>OUT</sub> ≤ 5A, 4.8V ≤ V <sub>IN</sub> ≤ 8V	3.267	3.3	3.333	V		
	3.234	3.3	3.366			
Line Regulation	ΔV <sub>OUT</sub>	AMS1084-ADJ, I <sub>OUT</sub> =10mA, 2.85V ≤ V <sub>IN</sub> ≤ 10V		0.015	0.2	%
				0.035	0.2	
		AMS1084-1.5, I <sub>OUT</sub> =10mA, 3.0V ≤ V <sub>IN</sub> ≤ 10V		0.5	6	mV
				1	6	
		AMS1084-1.8, I <sub>OUT</sub> =10mA, 3.3V ≤ V <sub>IN</sub> ≤ 10V		0.5	6	mV
				1	6	
AMS1084-2.5, I <sub>OUT</sub> =10mA, 4.0V ≤ V <sub>IN</sub> ≤ 10V		0.5	6	mV		
		1	6			
AMS1084-3.3, I <sub>OUT</sub> =10mA, 4.8V ≤ V <sub>IN</sub> ≤ 10V		0.5	6	mV		
		1	6			
AMS1084-5.0, I <sub>OUT</sub> =10mA, 6.5V ≤ V <sub>IN</sub> ≤ 10V		0.5	10	mV		
		1	10			



Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Load Regulation	$\Delta V_{OUT}$	AMS1084-ADJ, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		0.1 0.2	0.3 0.4	%
		AMS1084-1.5, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		3 7	15 20	mV
		AMS1084-1.8, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		3 7	15 20	mV
		AMS1084-2.5, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		3 7	15 20	mV
		AMS1084-3.3, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		3 7	15 20	mV
		AMS1084-5.0, $0mA \leq I_{OUT} \leq 5A$ , $V_{IN} - V_{OUT} = 3V$		5 10	20 35	mV
Dropout Voltage	$V_{DROP}$	$I_{OUT} = 5A$ , $\Delta V_{REF}$ , $\Delta V_{OUT} = 1\%$		1.45	1.5	V
Current Limiting	$I_{LIMIT}$	$V_{IN} - V_{OUT} = 3V$	5.5	6.5		A
Minimum Load Current	$I_{LOAD}$ (MIN)	$V_{IN} = 10V$ (AMS1084-ADJ)		3	10	mA
Quiescent Current	$I_Q$	$V_{IN} = 10V$ (AMS1084)		5	10	mA
Ripple Rejection	PSRR	$f_{RIPPLE} = 120Hz$ , $C_{OUT} = 25\mu F$ $I_{OUT} = 5A$ , $V_{IN} - V_{OUT} = 3V$	60	72		dB
Adjust Pin Current	$I_{ADJ}$	$V_{IN} = 4.25V$ , $I_{OUT} = 10mA$		55	120	$\mu A$
Adjust Pin Current Change	$\Delta I_{ADJ}$	$10mA \leq I_{OUT} \leq 5A$ , $1.5V \leq (V_{IN} - V_{OUT}) \leq 4.5V$		0.2	5	$\mu A$
Temperature Stability		$I_{OUT} = 10mA$ , $V_{IN} - V_{OUT} = 1.5V$		0.5		%
Long Term Stability		$T_{amb} = 125^\circ C$ , 1000Hrs		0.5		%
RMS Output Noise(% of Vout)		$10Hz \leq f \leq 10kHz$		0.003		%
Thermal Resistance	$\theta_{JA}$	TO-263-3L		60		$^\circ C/W$
		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	--/O	Ground/ADJ
2	VOUT	O	Output voltage
3	VIN	I	Input supply voltage

## FUNCTION DESCRIPTION

The AMS1084 is a LDO regulator, its 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 AMS084 has two versions: the fixed output version and the adjustable output version. Output voltages can be 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. On-chip thermal shut-down circuit provides protection against overload and overheating that would create excessive junction temperature.

The adjustable output version requires a 22  $\mu$ F or bigger tantalum capacitor at output for AMS1084 stability. The capacitor for fixed output version can be smaller and should be determined base on actual application. Generally, the stability of linear regulator stability decreases with output currents increase.

## TYPICAL APPLICATION CIRCUIT

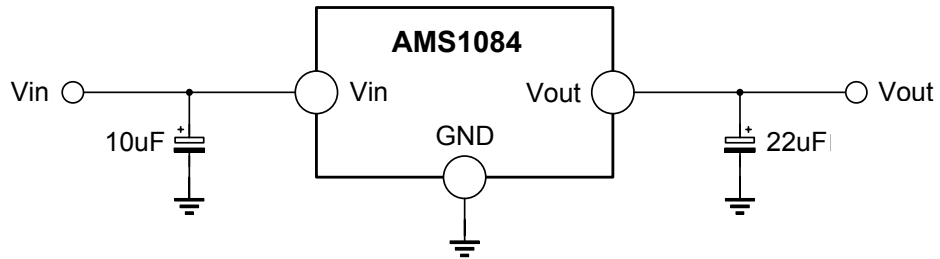


Figure 1. Typical Fixed Output Voltage

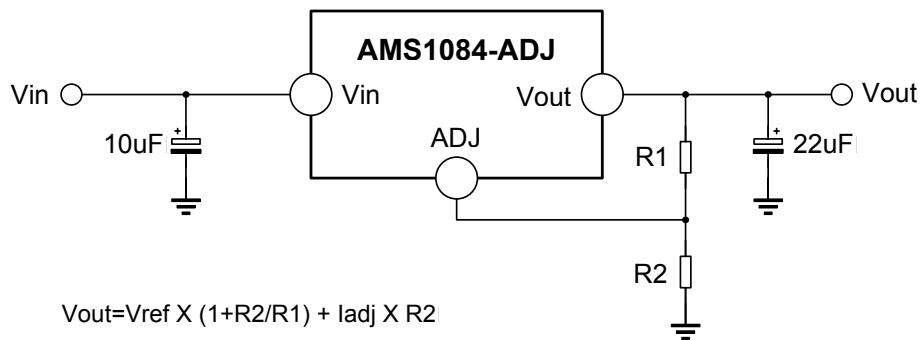


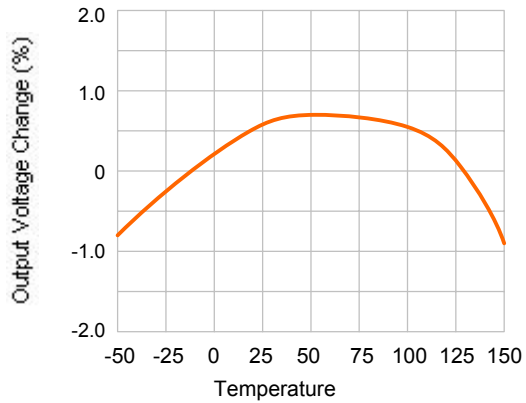
Figure 2. Typical Adjustable Output Voltage

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

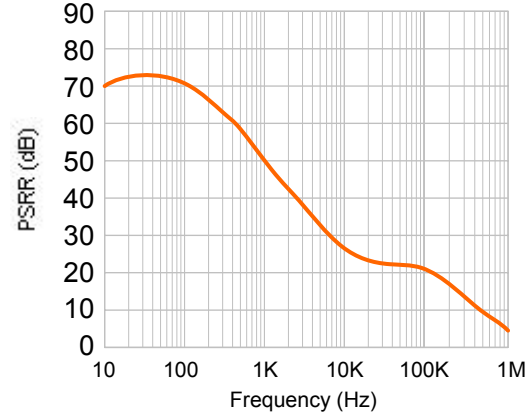


## TYPICAL CHARACTERISTICS CURVES

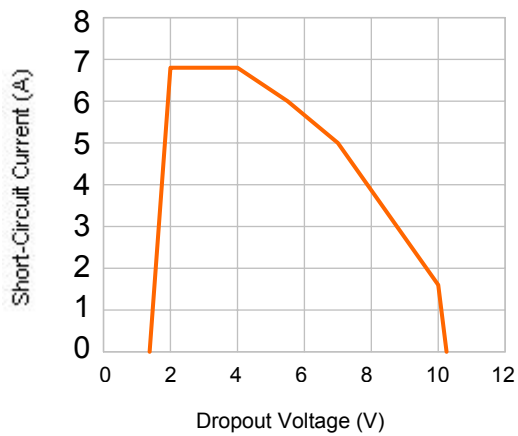
Output Voltage Change vs. Temperature Stability



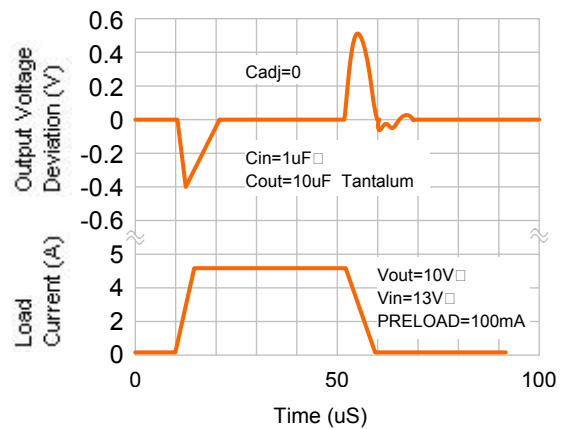
PSRR vs. Frequency



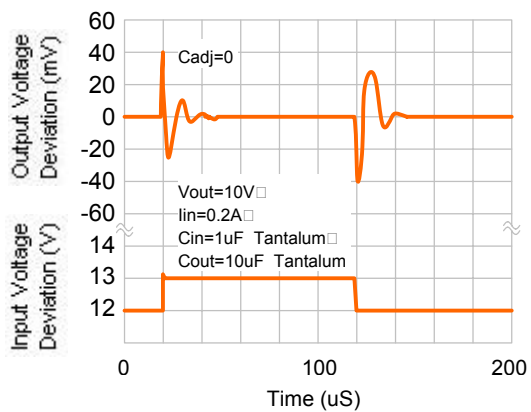
Short-Circuit Current vs. Dropout Voltage



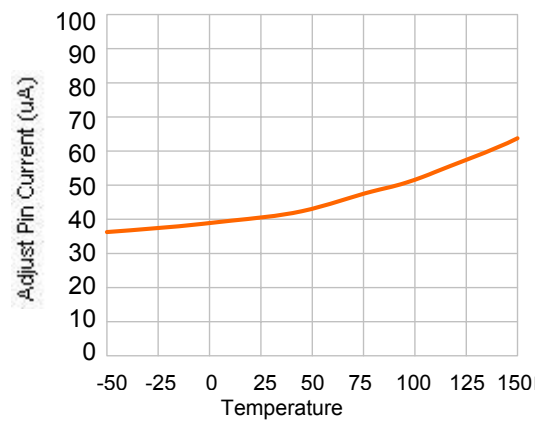
Load Transient Response



Line Transient Response



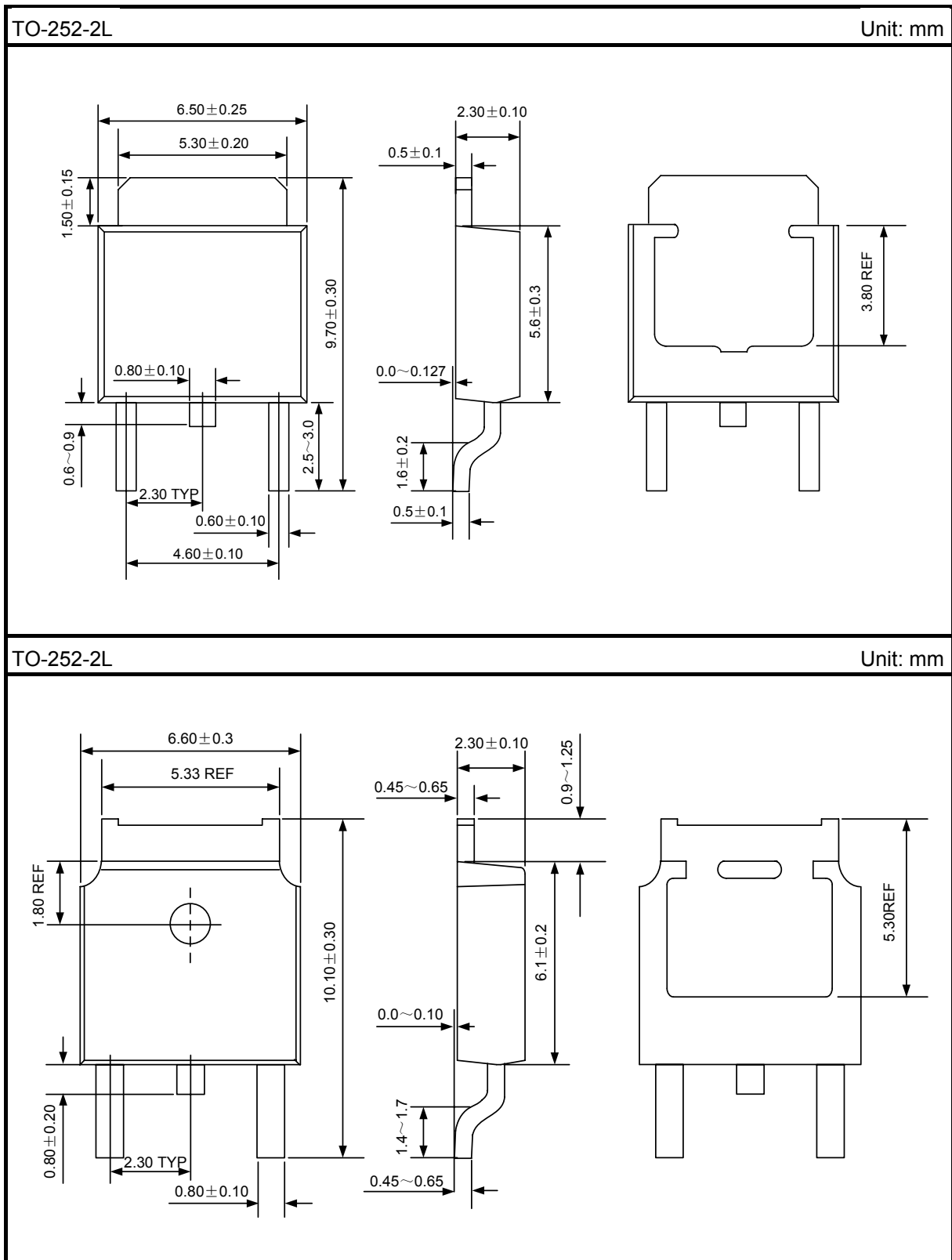
Adjust Pin Current vs. Temperature





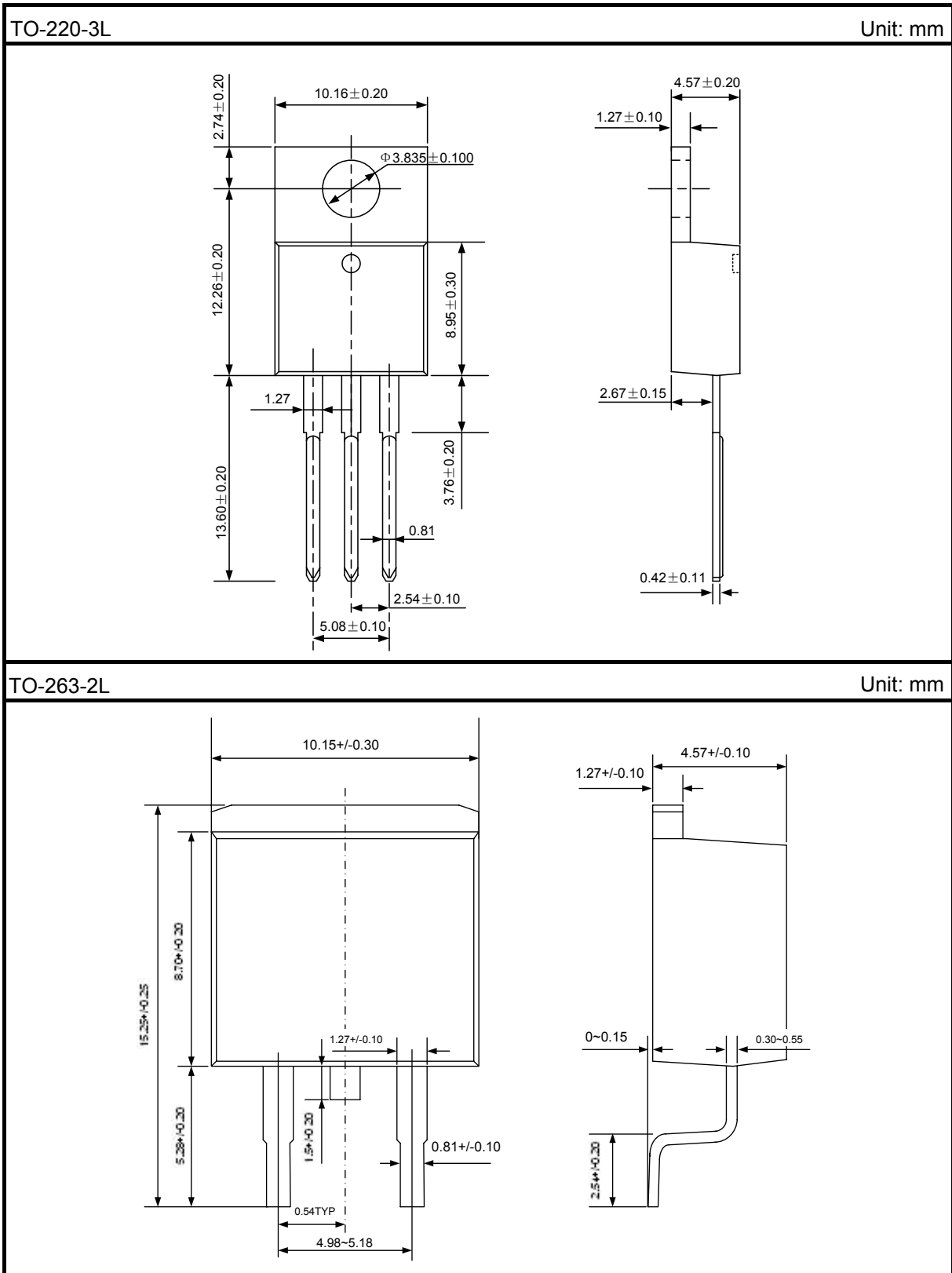


PACKAGE OUTLINE



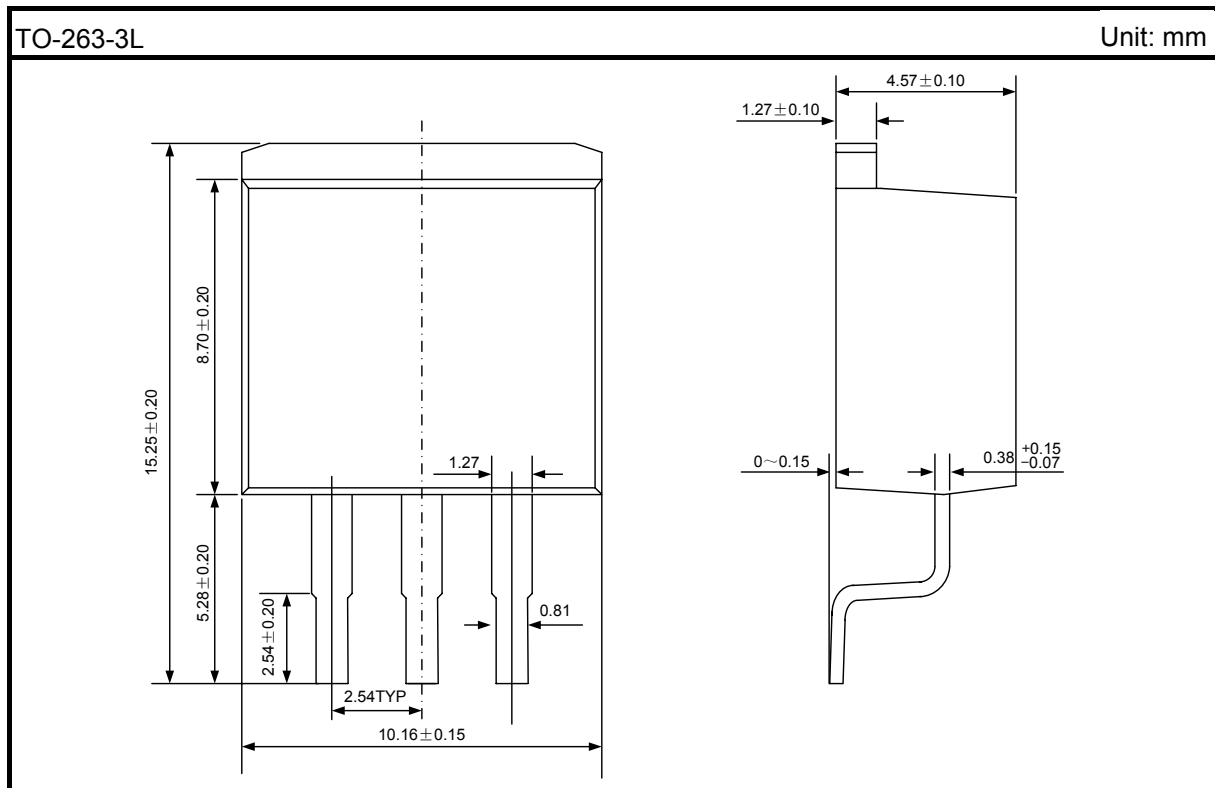


PACKAGE OUTLINE





## PACKAGE OUTLINE



### Disclaimer:

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