DESCRIPTION

The A1084 is a series of low dropout three terminal regulators with a dropout of 1.4V at 5A load current.

Other than a fixed version (V_{OUT} = 1.8V, 2.5V, 3.3V, 5V), The A1084 has an adjustable version, which can set the output voltage with two external resistors.

The A1084 offers thermal shutdown and current limit functions, to assure the stability of chip and power system.

The A1084 is available in TO-252, TO-263-2 and TO-263-3 package.

ORDERING INFORMATION

Package Type	Part Number	
TO-252	D	A1084DR-XX
		A1084DVR-XX
TO-263-2	S2	A1084S2R-XX
		A1084S2VR-XX
TO-263-3	S3	A1084S3R-XX
		A1084S3VR-XX
Note	XX: Output Voltage, 33 = 3.3V, 50 = 5V, ADJ: Adjustable R : Tape & Reel V: Green Package	
AiT provides all Pb free products Suffix " V " means Green Package		

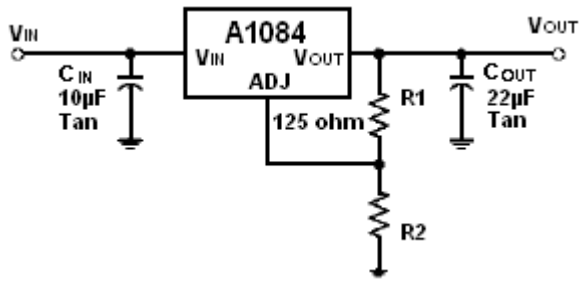
FEATURES

- Provide Fixed Version and an Adjustable Version, Output Value can be customized on command.
- Maximum Output Current: 5A
- Range of Operation Input Voltage: Max 15V
- Line Regulation: 0.2% (Typ.)
- Load Regulation: 0.2% (Typ.)
- Environment Temperature: 0°C to +80°C
- Available in TO-252, TO-263-2 and TO-263-3 Package

APPLICATION

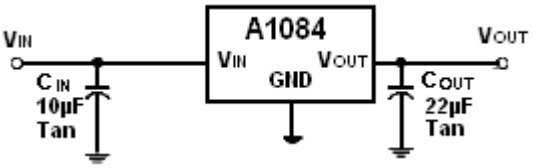
- Power Management for Computer Mother Board, Graphic Card
- Battery Charger
- Microprocessor Supply
- Post Regulators for Switching Supplies

TYPICAL APPLICATION



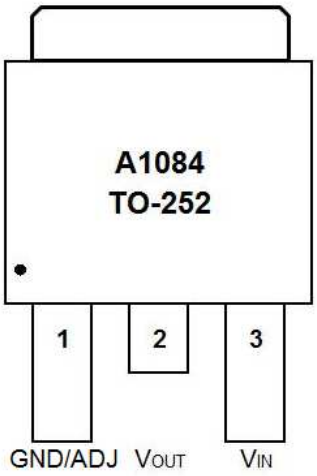
Adjustable Version

$V_{OUT} = V_{REF} \times (1 + R2 / R1) + I_{ADJ} \times R2$

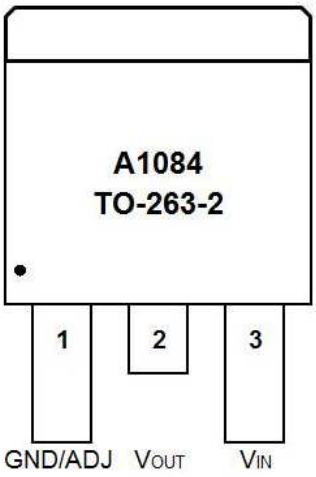


Fixed Output Version

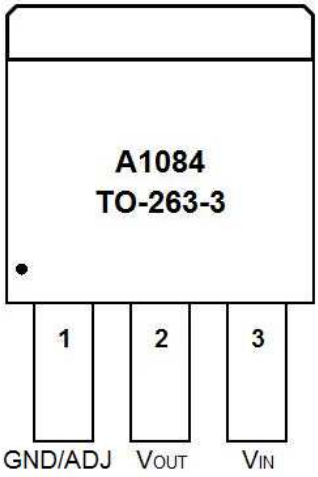
PIN DESCIPTION



Top View



Top View



Top View

Pin	TO-252		TO-263-2		TO-263-3	
#	A1084DR-XX	A1084DR-ADJ	A1084S2R-XX	A1084S2R-ADJ	A1084S3R-XX	A1084S3R-ADJ
1	GND	ADJ	GND	ADJ	GND	ADJ
2	V_{OUT}	V_{OUT}	V_{OUT}	V_{OUT}	V_{OUT}	V_{OUT}
3	V_{IN}	V_{IN}	V_{IN}	V_{IN}	V_{IN}	V_{IN}

ABSOLUTE MAXIMUM RATINGS

Maximum Input Voltage	15V
Junction Temperature (T_J)	150°C
Environment Temperature (T_A)	80°C
Storage Temperature (Ts)	-65°C to 150°C
Lead Temperature and Time	260°C, 10S

Stresses above may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

Test Condition: C_{IN}=10uF, C_{OUT}=22uF, T_A = 25°C, unless otherwise noted.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_{REF}	Reference Voltage	I_{OUT} = 10mA, V_{IN} − V_{OUT} = 3V 10mA ≤ I_{OUT} ≤ 5A, 1.5V ≤ V_{IN} − V_{OUT} ≤ 5V		1.238 1.225	1.25 1.25	1.262 1.275	V
V_{OUT}	Output Voltage	1.8V	I_{OUT} = 0mA, V_{IN} = 4.8V, T_J = 25°C 10mA ≤ I_{OUT} ≤ 5A, 3.4V ≤ V_{IN} ≤ 7V	1.782 1.764	1.80 1.80	1.818 1.836	V
		2.5V	I_{OUT} = 0mA, V_{IN} = 5.5V, T_J = 25°C 10mA ≤ I_{OUT} ≤ 5A, 4.1V ≤ V_{IN} ≤ 7V	2.475 2.450	2.50 2.50	2.525 2.550	V
		3.3V	I_{OUT} = 0mA, V_{IN} = 6.3V, T_J = 25°C 10mA ≤ I_{OUT} ≤ 5A, 4.9V ≤ V_{IN} ≤ 8V	3.267 3.234	3.3 3.3	3.333 3.366	V
		5.0V	I_{OUT} = 0mA, V_{IN} = 8.0V, T_J = 25°C 10mA ≤ I_{OUT} ≤ 5A, 6.6V ≤ V_{IN} ≤ 10V	4.95 4.90	5.0 5.0	5.05 5.10	V
ΔV_{OUT}	Line Regulation (Note1)	ADJ	I_{OUT} = 10mA, 2.85V ≤ V_{IN} ≤ 12V		0.035	0.2	%
		1.8V	I_{OUT} = 10mA, 3.4V ≤ V_{IN} ≤ 12V		7	15	mV
		2.5V	I_{OUT} = 10mA, 4.1V ≤ V_{IN} ≤ 12V		7	15	mV
		3.3V	I_{OUT} = 10mA, 4.9V ≤ V_{IN} ≤ 12V		7	15	mV
		5.0V	I_{OUT} = 10mA, 6.6V ≤ V_{IN} ≤ 12V		7	15	mV
ΔV_{OUT}	Load Regulation (Note1, 2)	ADJ	V_{IN} − V_{OUT} = 3V, 10mA ≤ I_{OUT} ≤ 5A		0.2	0.4	%
		1.8V	V_{IN} − V_{OUT} = 3V, 0mA ≤ I_{OUT} ≤ 5A		16	30	mV
		2.5V	V_{IN} − V_{OUT} = 3V, 0mA ≤ I_{OUT} ≤ 5A		16	30	mV
		3.3V	V_{IN} − V_{OUT} = 3V, 0mA ≤ I_{OUT} ≤ 5A		16	30	mV
		5.0V	V_{IN} − V_{OUT} = 3V, 0mA ≤ I_{OUT} ≤ 5A		16	30	mV
V_{IN} −V_{OUT}	Dropout Voltage (Note 3)	ΔV_{OUT}, ΔV_{REF} = 1%, I_{OUT} = 5A			1.4		V

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{LIMIT}	Current Limit	$V_{IN} - V_{OUT} = 3V$, $T_J = 25^oC$		7.0		A
	Minimum Load Current (Note 4)	A1084-ADJ		3	10	mA
Iq	Quiescent Current	$V_{IN} = 10V$		5	10	mA
I_{ADJ}	Adjust Pin Current	Adjustable Version $V_{IN} = 4.25V$, $I_{OUT} = 10mA$		45	110	uA
Ripple Rejection		F = 120Hz, C_{OUT} = 25uF (Tan) $I_{OUT} = 5A$, $V_{IN} - V_{OUT} = 3V$	60			dB
I_{CHANGE}	Adjust Pin Current Change	$10mA \le I_{OUT} \le 5A$, $1.5V \le V_{IN} - V_{OUT} \le 6V$		0.2	5	uA
Temperature Stability		$I_{OUT} = 10mA$, $V_{IN} - V_{OUT} = 1.5V$			0.5	%
Θ_{JC}	Thermal Resistance Junction to Case	TO-252 TO-263-2 and TO-263-3		12.5 3		$^oC/W$

Note 1: The Parameters of Line Regulation and Load Regulation are tested under constant junction temperature.

Note 2: When I_{OUT} varies between 0 to 5A, $V_{IN} - V_{OUT}$ varies between 1.5V to 6.0V under constant junction temperature, the parameter is satisfied the criterion as above mentioned. If temperature varies between $0^oC \le T_A \le 80^oC$, it needs output current to be larger than 10mA to satisfy the criterion.

Note 3: Dropout Voltage is tested under I_{OUT} = 5A and the following testing conditions:

First step is to find out the V_{OUT} value (V_{OUT1}) when $V_{IN1} = V_{OUT} + 1.5V$,

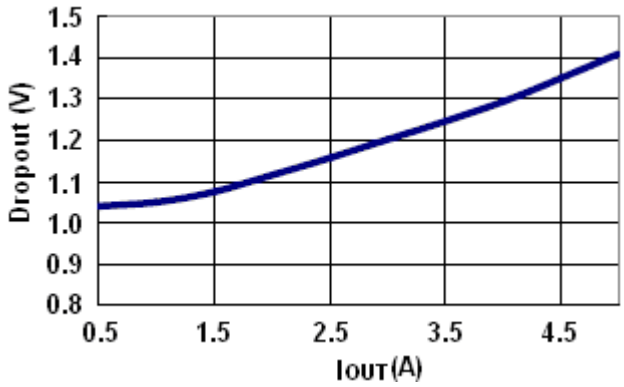
Second step is to decrease V_{IN} (V_{IN2}) until V_{OUT} value is equal to 99% x V_{OUT1} (V_{OUT2}). $V_{DROPOUT} = V_{IN2} - V_{OUT2}$.

Note 4: Minimum Load Current is defined as the minimum output current required to maintain regulation.

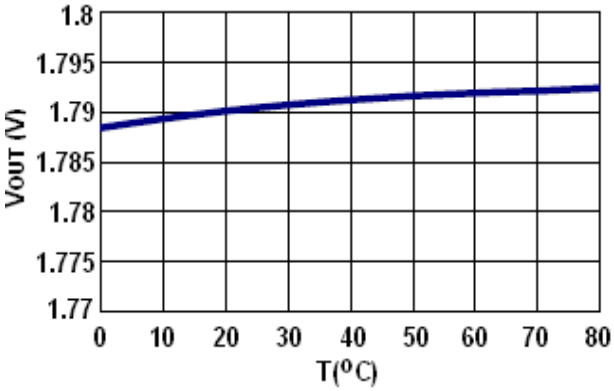
When $1.5V \leqq V_{IN} - V_{OUT} \leqq 6V$, the device is guaranteed to regulate if the output current is greater than 10mA.

TYPICAL PERFORMANCE CHARACTERISTICS

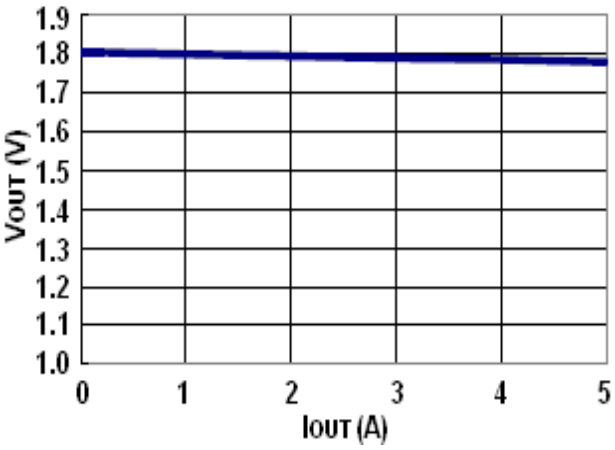
1.Dropout Voltage vs. Output Current



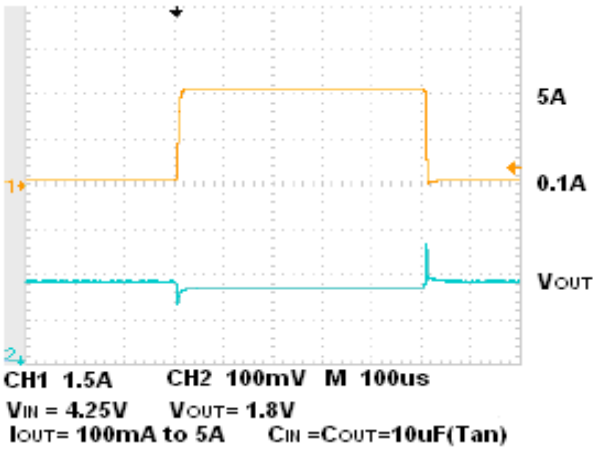
2.Output Voltage vs. Temperature



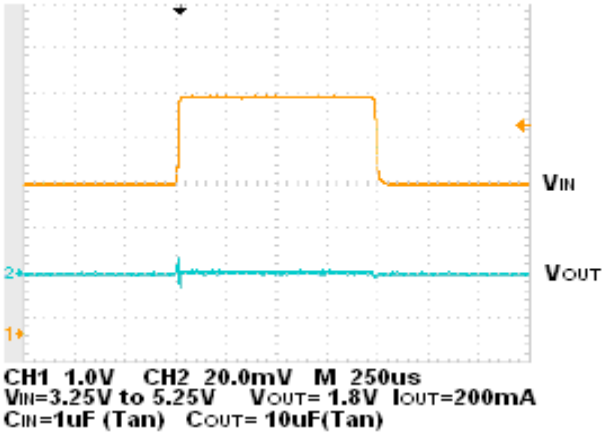
3.Output Voltage vs. Output Current



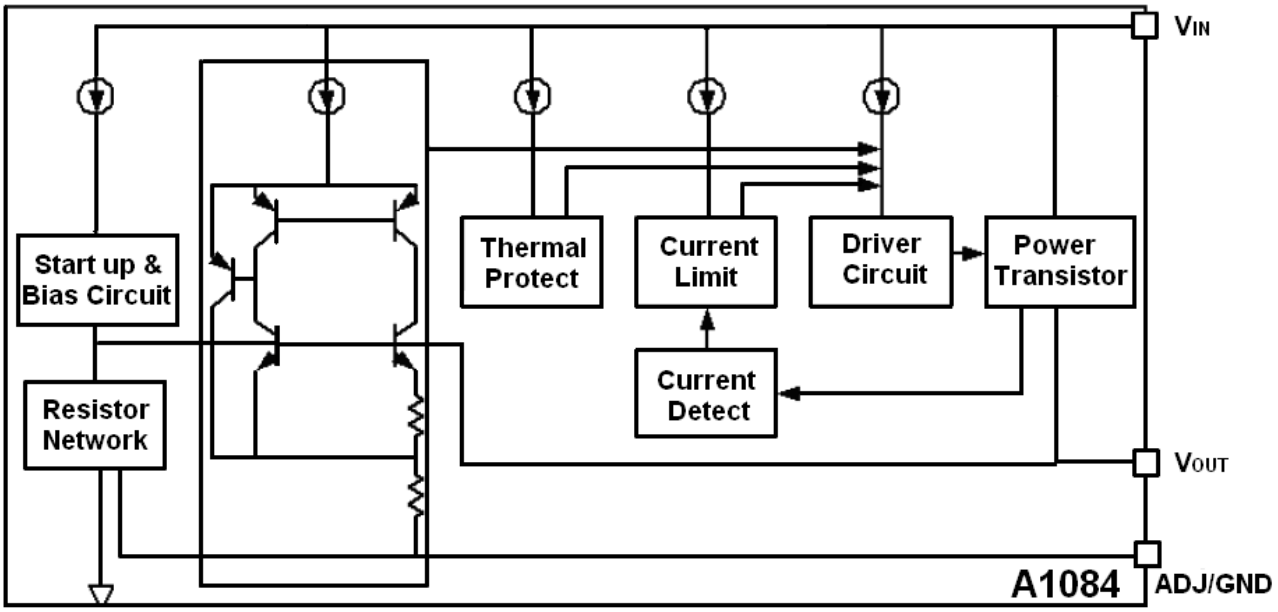
4.Load Transient Response



5.Line Transient Response



BLOCK DIAGRAM



DETAILED INFORMATION

A1084 is a series of low dropout voltage, three terminal regulators which application circuit of fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, band-gap, thermal shutdown, current limit, power transistors and its driver circuit and so on.

Thermal Shutdown and Current Limit

The A1084 thermal shutdown and current limit modules can assure chip and its application system working safety when the environment temperature is larger than 80°C or output current is larger than 5.2A.

Stable Reference Output Voltage

The band-gap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100ppm/°C. And the accuracy of output voltage is guaranteed by trimming technique.

Application Hints (See Schematic 1)

1. Recommend using 10uF Tan capacitor (C_{IN}) as bypass capacitor for all application circuit.
2. Recommend using 22uF Tan capacitor (C_{OUT}) to assure circuit stability.
3. Using a bypass capacitor (C_{ADJ}) between the adjust terminal and ground can improve ripple rejection, this bypass capacitor prevents ripple from being amplified as the output voltage is increase. The impedance of C_{ADJ} should be less than the resistor's (R1) which is between output and adjust pins to prevent ripple from being amplified at any ripple frequency. As R1 is normally in the range of 120Ω ~ 200Ω, the value of C_{ADJ} should satisfy this equation: $1 / (2\pi x F_{RIPPLE} x C_{ADJ}) < R1$. Recommend using 10uF Tan capacitor.

Output Voltage of Adjustable Version

The A1084 adjustable version provides 1.25V reference voltage. Any output voltage between 1.25V ~ 10V can be available by choosing two external resistors (connection method is shown in Schematic 1), R1 and R2 are the two external resistors.

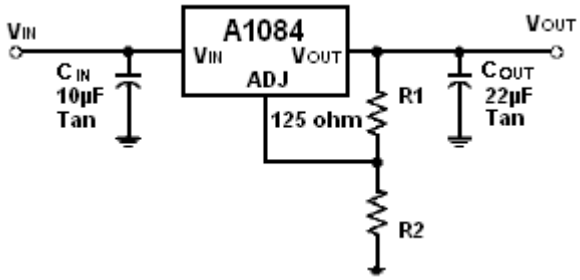
Example

The output voltage of A1084 adjustable version satisfies this followed equation:

$$V_{OUT} = V_{REF} \times (1+R2 / R1) + I_{ADJ} \times R2$$

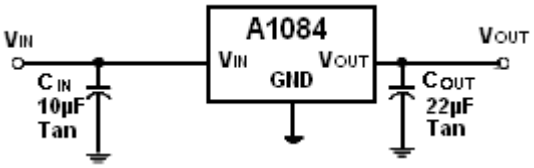
We can ignore I_{ADJ} because I_{ADJ} (about 50uA) is much less than the current of R1 (about 4mA).
The value of R1 should be in the range 120Ω ~ 200Ω to assure chip working normally without any load. To assure the electrical performance showed in Table 1, the output current should be larger than 5mA. If R1 is too large, the minimum output current should be large than 4mA, the best working condition is to assure that the output current exceeds 10mA.

(Schematic 1)



Adjustable Version (A1084)

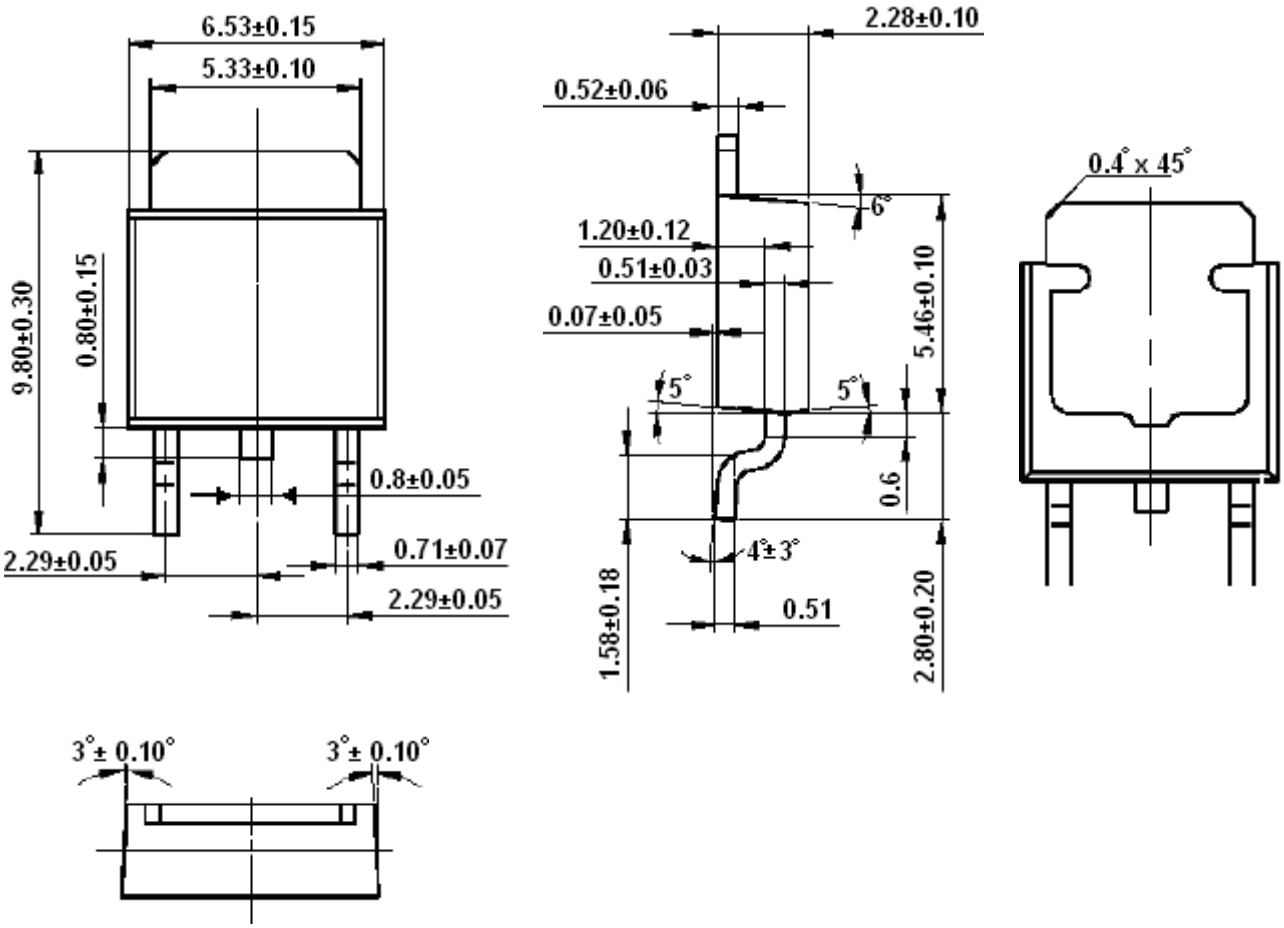
$$V_{OUT} = V_{REF} \times (1+R2 / R1) + I_{ADJ} \times R2$$



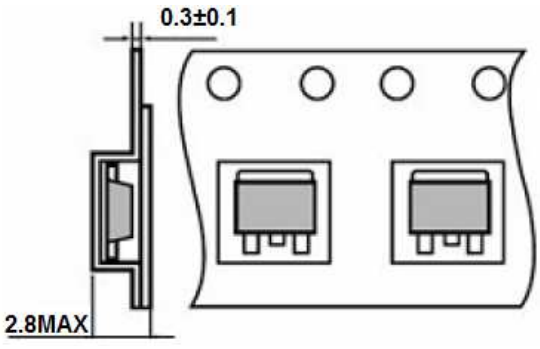
Fixed Output Version (A1084-XX)

PACKAGE INFORMATION

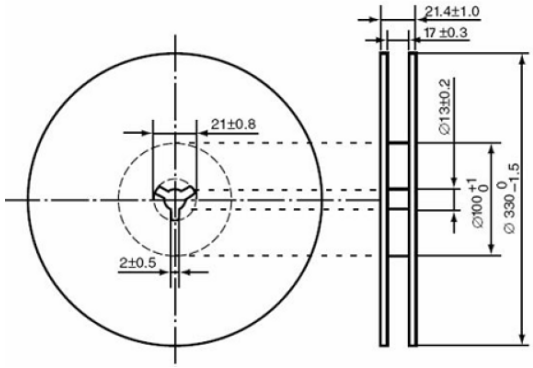
Dimension in TO-252 (Unit: mm)



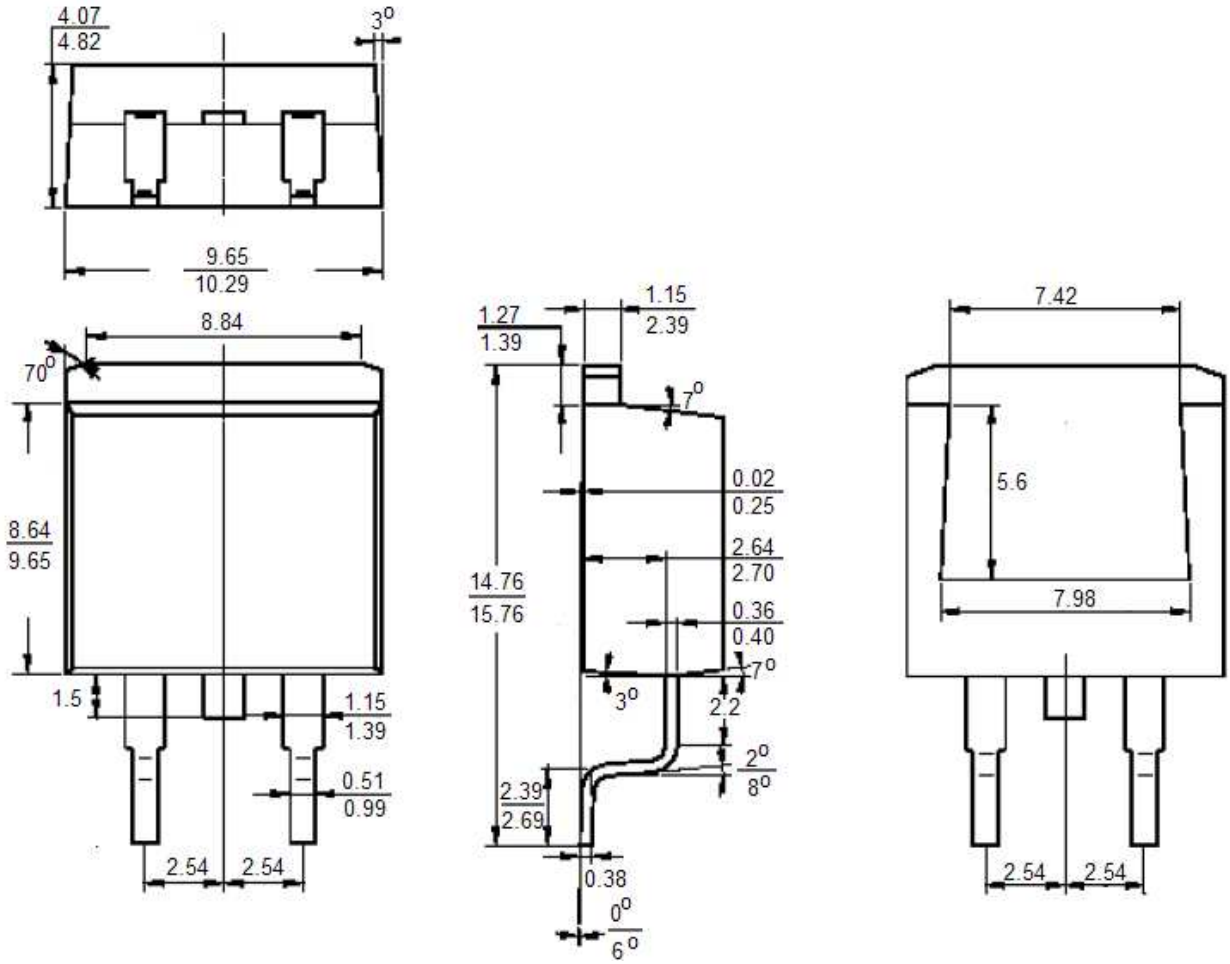
Tape Dimension



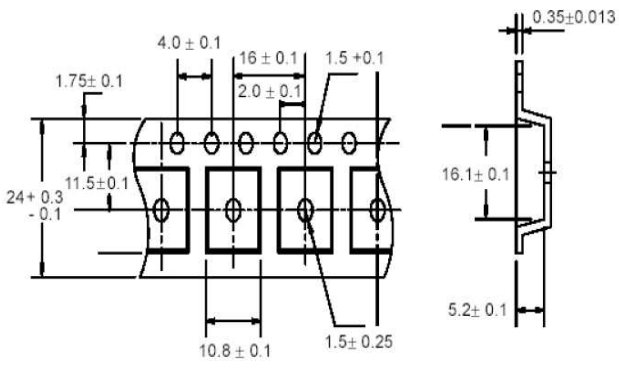
Reel Dimension



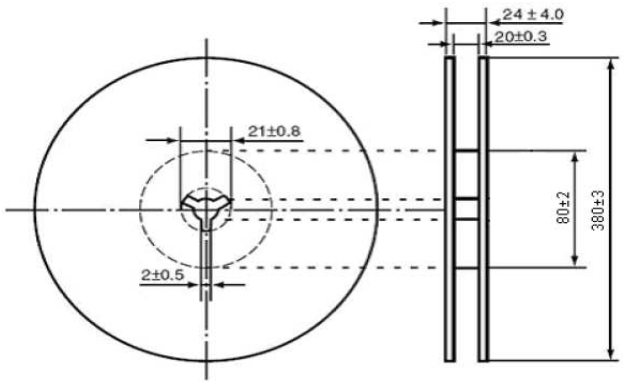
Dimension in TO-263-2 (Unit: mm)



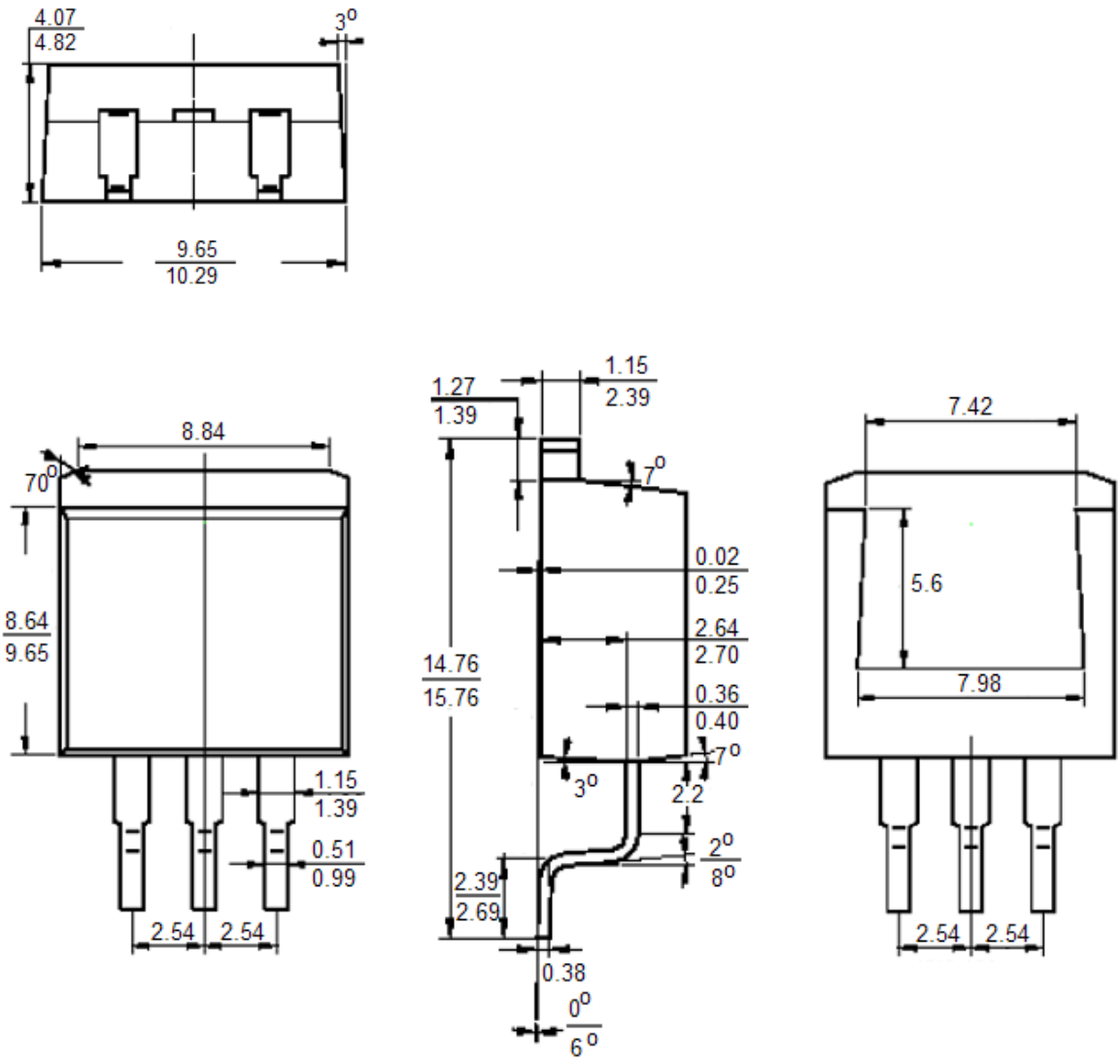
Tape Dimension



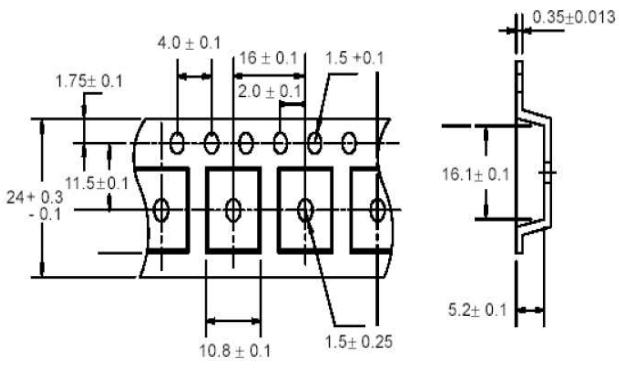
Reel Dimension



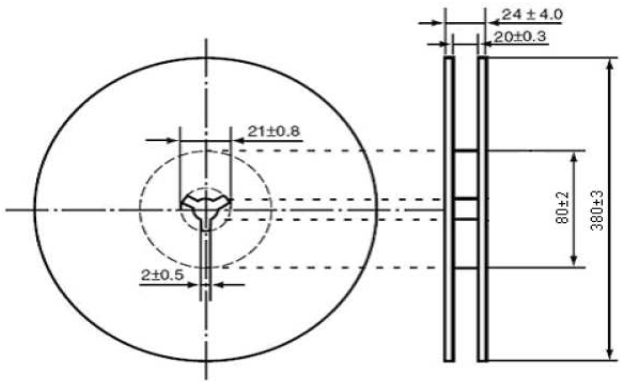
Dimension in TO-263-3 (Unit: mm)



Tape Dimension



Reel Dimension



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