



5A Low Dropout Fixed 3.3V Output Regulator

Features

- Guaranteed < 1.3V dropout at full load current
- Fast transient response
- Voltage Reference Initial Accuracy of 1%
- Output Current Limiting
- Built-In Thermal Shutdown
- RoHS-compliant, halogen-free

Applications

- Standard 3.3V Chip Set and Logic Applications

Description

The APU1050-33-3 is a low dropout three-terminal 3.3V fixed output regulator with minimum output current capability of 5A. This product is specifically designed to provide well-regulated 3.3V supplies for low voltage IC applications.

The APU1050-33-3 is guaranteed to have <1.3V dropout at full load current making it ideal to provide a well regulated output from inputs as low as 4.6V.

Ordering Information

APU1050H-33-HF-3TR	RoHS-compliant halogen-free TO-252 on tape and reel (3000 pcs/reel)
APU1050S-33-HF-3TR	RoHS-compliant halogen-free TO-263 on tape and reel (800 pcs/reel)
APU1050P-33-HF-3TB	RoHS-compliant halogen-free TO-220 in tubes

Typical Application

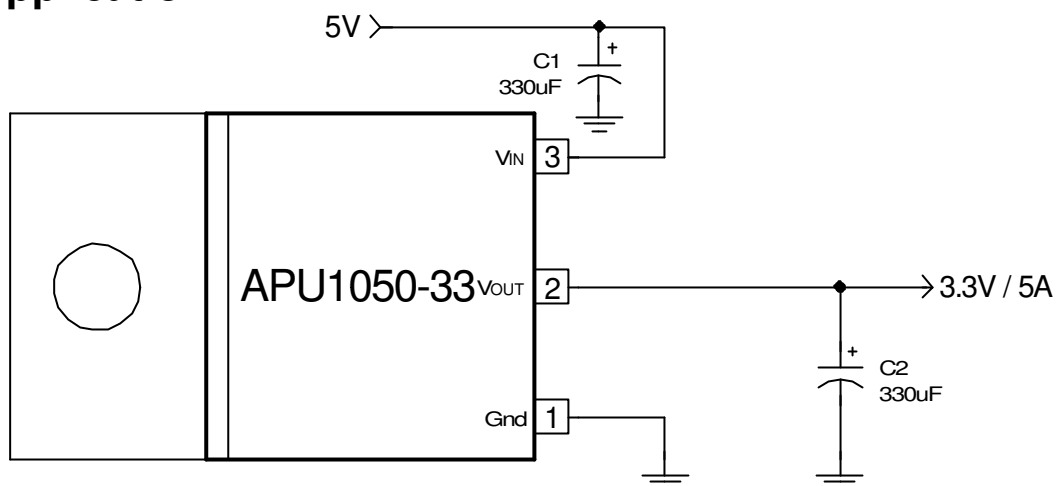


Figure 1 - Typical Application of APU1050-33-3 in a 3.3V regulator



Absolute Maximum Ratings

Input Voltage (V_{IN})	7V
Power Dissipation	Internally Limited
Storage Temperature Range	-65°C To 150°C
Operating Junction Temperature Range	0°C To 150°C

Electrical Specifications

Unless otherwise specified, these specifications apply over $C_{IN}=1\mu F$, $C_{OUT}=10\mu F$, and $T_J=0$ to 150°C. Typical values refer to $T_J=25^\circ C$.

PARAMETER	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Output Voltage	V_o	$I_o=10mA$, $T_J=25^\circ C$, $V_{IN}=5V$ $I_o=10mA$, $V_{IN}=5V$	3.267 3.234	3.3 3.3	3.333 3.366	V
Line Regulation		$I_o=10mA$, $4.7V < V_{IN} < 7V$			0.2	%
Load Regulation (Note 1)		$V_{IN}=3.3V$, $10mA < I_o < 5A$			0.4	%
Dropout Voltage (Note 2)	ΔV_o	Note 2, $I_o=5A$		1.1	1.3	V
Current Limit		$V_{IN}=5V$, $\Delta V_o=100mV$	5.1			A
Minimum Load Current (Note 3)		$V_{IN}=5V$		5	10	mA
Thermal Regulation		30ms Pulse, $V_{IN}-V_o=3V$, $I_o=5A$		0.01	0.02	%/W
Ripple Rejection		$f=120Hz$, $C_o=25\mu F$ Tantalum, $I_o=2.5A$, $V_{IN}-V_o=3V$	60	70		dB
Temperature Stability		$V_{IN}=5V$, $I_o=10mA$		0.5		%
Long Term Stability		$T_J=25^\circ C$, 1000Hrs		0.3	1	%
RMS Output Noise		$T_J=25^\circ C$, $10Hz < f < 10kHz$		0.003		% V_o

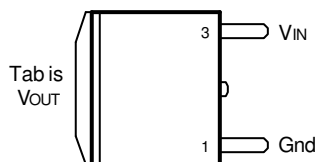
Note 1: Low duty cycle pulse testing with Kelvin connections is required in order to maintain accurate data.

Note 2: Dropout voltage is defined as the minimum differential voltage between V_{IN} and V_{OUT} required to maintain regulation at V_{OUT} . It is measured when the output voltage drops 1% below its nominal value.

Note 3: Minimum load current is defined as the minimum current required at the output in order for the output voltage to maintain regulation. Typically the resistor dividers are selected such that it automatically maintains this current.

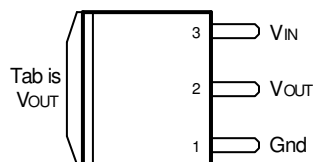
Pin Configuration

2-Pin Plastic TO-252 (D-Pak)



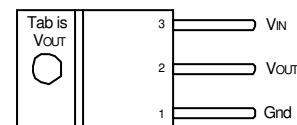
$R_{thJA}=70^\circ C/W$ for 0.5" square pad

3-Pin Plastic TO-263 (S)



$R_{thJA}=35^\circ C/W$ for 1" Square pad

3-Pin Plastic TO-220 (P)



$R_{thJT}=2.7^\circ C/W$ $R_{thJA}=60^\circ C/W$



Pin Descriptions

PIN #	PIN SYMBOL	PIN DESCRIPTION
1	Gnd	This pin must be connected to ground plane using a low inductance short connection.
2	V _{OUT}	The output of the regulator. A minimum of 10 μ F capacitor must be connected from this pin to ground to ensure stability.
3	V _{IN}	The input pin of the regulator. Typically a large storage capacitor is connected from this pin to ground to ensure that the input voltage does not sag below the minimum drop out voltage during the load transient response. This pin must always be 1.3V higher than V _{OUT} in order for the device to regulate properly.

Block Diagram

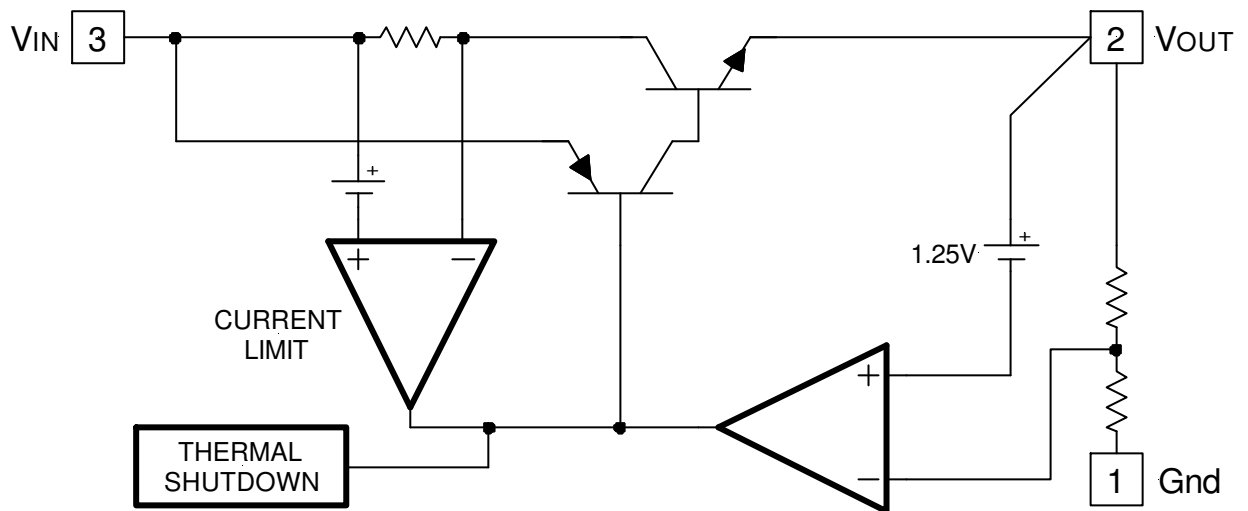


Figure 2 - Simplified block diagram of the APU1050-33-3.

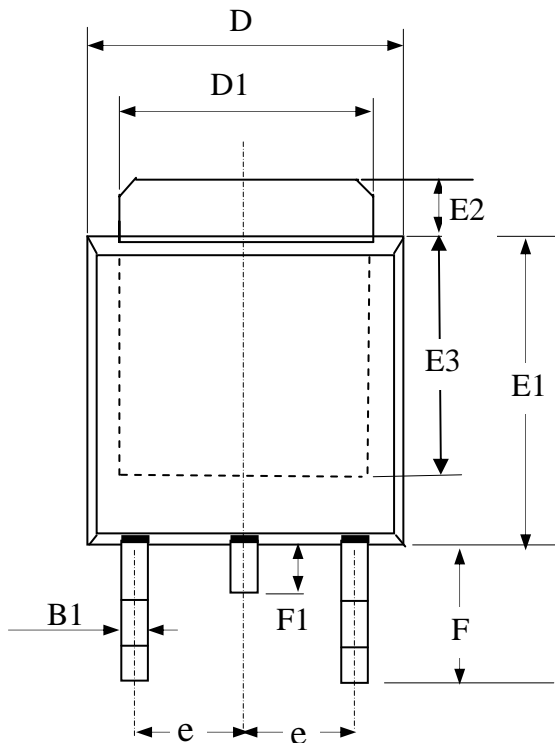
Application Information

Stability

The APU1050-33 requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. Typical designs for microprocessor applications use standard electrolytic capacitors with a typical ESR in the range of 50 to 100m Ω and an output capacitance of 500 to 1000 μ F. Fortunately as the capacitance increases, the ESR decreases resulting in a fixed RC time constant. The APU1050-33 takes advantage of this phenomena in making the overall regulator loop stable. For most applications a minimum of 100 μ F aluminum electrolytic capacitor such as Sanyo MVGX series, Panasonic FA series as well as the Nichicon PL series insures both stability and good transient response.

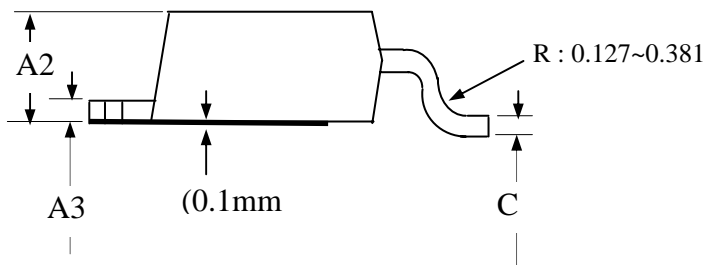


Package Dimensions: TO-252

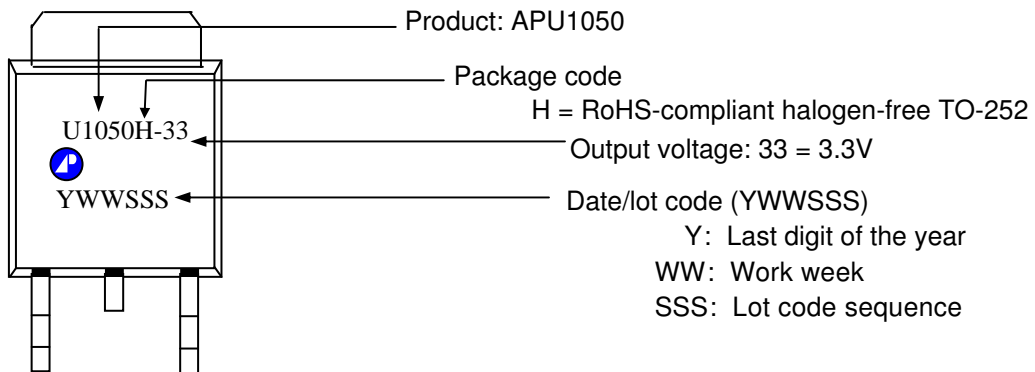


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	3.50	4.00	4.50
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.80
e	--	2.30	--
C	0.35	0.50	0.65

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

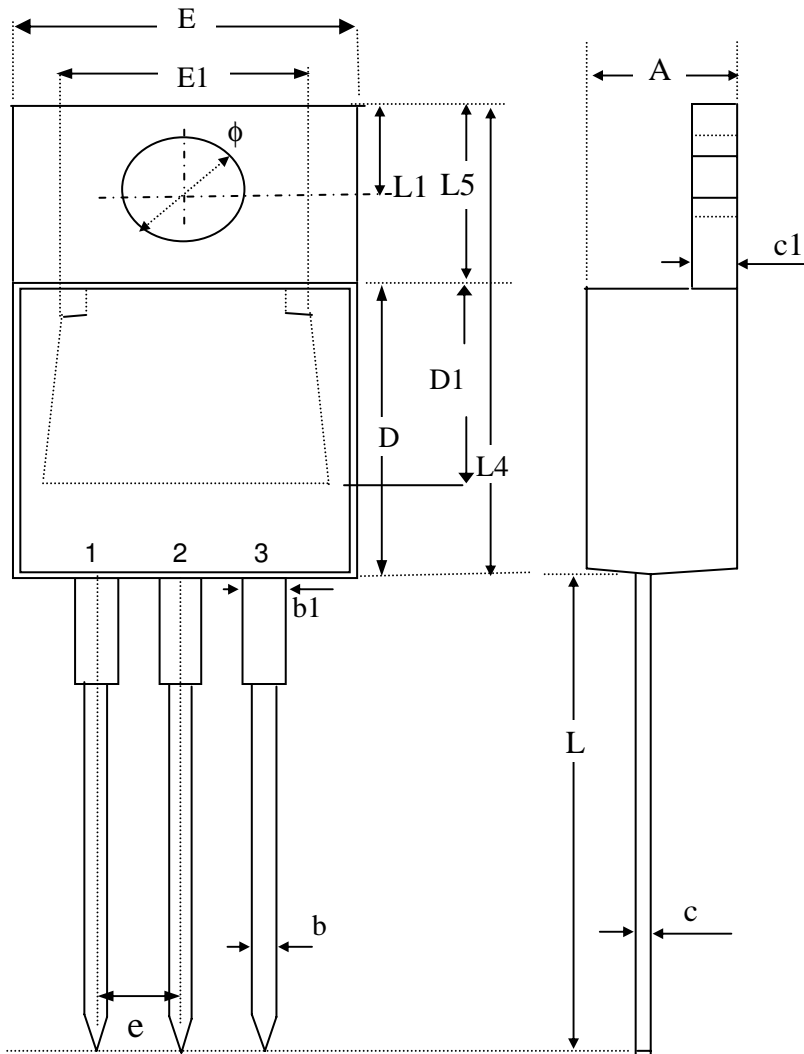


Marking Information: TO-252





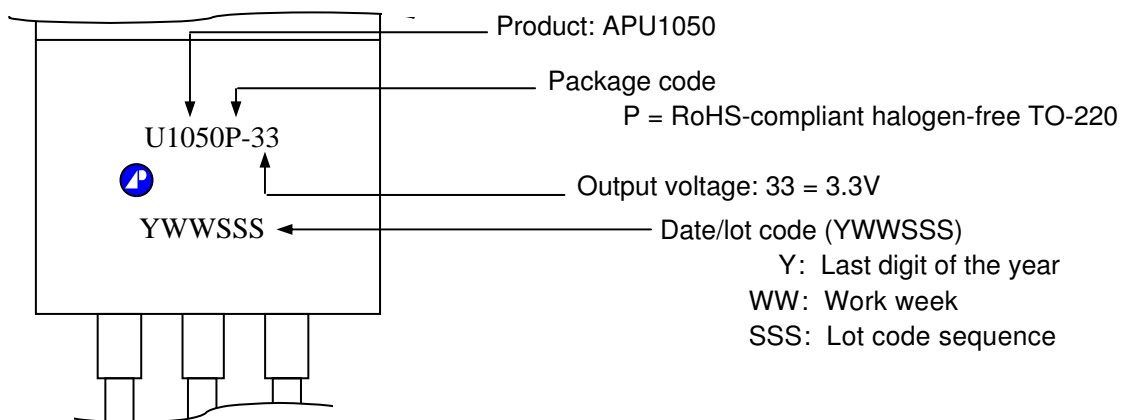
Package Dimensions: TO-220



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.40	4.60	4.80
b	0.76	0.88	1.00
D	8.60	8.80	9.00
c	0.36	0.43	0.50
E	9.80	10.10	10.40
L4	14.70	15.00	15.30
L5	6.20	6.40	6.60
D1	5.10 REF.		
c1	1.25	1.35	1.45
b1	1.17	1.32	1.47
L	13.25	13.75	14.25
e	2.54 REF.		
L1	2.60	2.75	2.89
phi	3.71	3.84	3.96
E1	7.4 REF.		

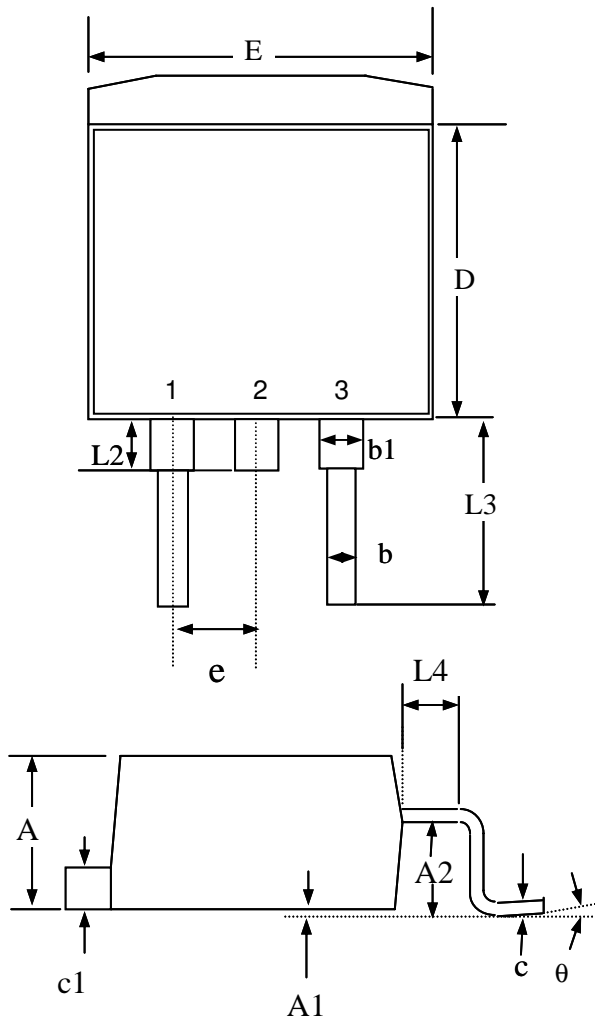
1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-220





Package Dimensions: TO-263



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.25	4.75	5.20
A1	0.00	0.15	0.30
A2	2.20	2.45	2.70
b	0.70	0.90	1.10
b1	1.07	1.27	1.47
c	0.30	0.45	0.60
c1	1.15	1.30	1.45
D	8.30	8.90	9.40
E	9.70	10.10	10.50
e	2.04	2.54	3.04
L2	-----	1.50	-----
L3	4.50	4.90	5.30
L4	-----	1.50	----

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-263

