1A Low Dropout Linear Regulator

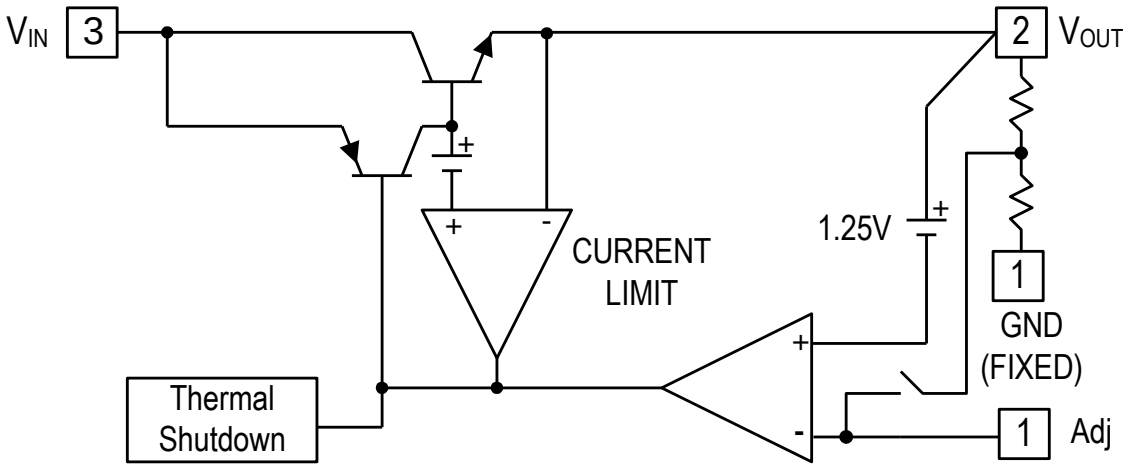
❖ GENERAL DESCRIPTION

AX1117C is a low dropout positive adjustable or fixed-mode regulator with minimum of 1A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply. AX1117C is also well suited for other applications such as VGA cards. AX1117C is guaranteed to have lower than 1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.8 to 3.3 with VOUT+1.4V to 12V input supply VOLTAGE.

❖ FEATURES

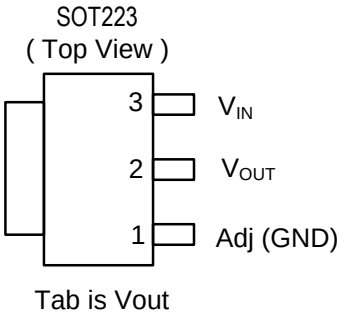
- 1.4V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- MLCC Capacitors are available.
- 3-Terminal Adjustable or Fixed 1.8V, 3.3V
- Packages: SOT223.
- RoHS and Halogen free compliance

❖ BLOCK DIAGRAM



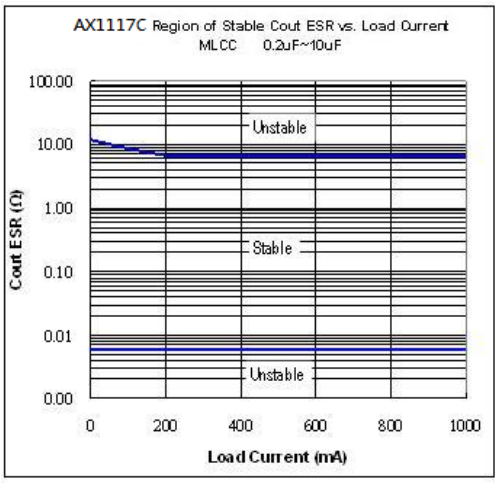
❖ PIN ASSIGNMENT

The packages of AX1117C is SOT223-3L; the pin assignment is given by:



Name	Description
Adj (GND)	A resistor divider from this pin to the V_{OUT} pin and ground sets the output voltage. (Ground only for Fixed-Mode)
V_{OUT}	The output of the regulator. **(Note1,2)**
V_{IN}	The input pin of regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.5V higher than V_{OUT} in order for the device to regulate properly. **(Note1)**

Note1: To prevent oscillation, a 0.2uF minimum X7R or X5R dielectric is strongly recommended if ceramics are used as output capacitors.



Note2: A minimum of 3.3uF EL capacitor to 100uF (10mΩ ≤ ESR ≤ 1Ω) must be connected from this pin to ground to insure stability.

❖ ORDER/MARKING INFORMATION

Order Information

AX1117C X XX X

Package	Vout	Packing
E : SOT223-3L	Blank : ADJ 18 : 1.8V 33 : 3.3V	Blank: Tube A : Taping

Top Marking

ADJ

Logo← AX 1 1 1 7 C → Part number

Y WW X → ID code: internal

WW: 01~52

Year: A=2010
1=2011
2=2012
⋮
9=2019

FIX

Output Voltage ← AX 1 1 1 7 C - V V → ID code: internal

AX1117C-18: 1.8V
AX1117C-33: 3.3V

Y WW X → WW: 01~52

Year: A=2010
1=2011
2=2012
⋮
9=2019

❖ ABSOLUTE MAXIMUM RATINGS

Characteristics		Symbol	Rating	Unit
DC Supply Voltage		V_{IN}	-0.3 to 15	V
Operating Junction Temperature Range		Top	-40 to +125	°C
Maximum junction Temperature		T_{MJ}	150	°C
Power Dissipation (Heat sink area 5mm*5mm.) T_A=25°C, T_J=125°C	SOT-223	P_D	1300	mW
Power Dissipation (No heat sink ;No air flow) T_A=25°C, T_J=125°C	SOT-223	P_D	850	mW
Storage Temperature		T_{ST}	-65 to 150	°C

❖ ELECTRICAL CHARACTERISTICS

(T_A=25°C, Under Operating Conditions)

Characteristics	Conditions		Min	Typ	Max	Units
V_{IN}-V_{OUT} Resistance			1	-	-	KΩ
Operation Input Voltage			2.7	-	12	V
Reference Voltage	AX1117C-ADJ	I_{OUT} = 10mA, T_J=25°C, (V_{IN-OUT})=1.5V	1.225	1.250	1.275	V
Output Voltage	AX1117C-1.8	I_{OUT} = 10mA, T_J = 25°C, 3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	AX1117C-3.3	I_{OUT} = 10mA, T_J = 25°C, 4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
Line Regulation	AX1117C-XXX	I_{OUT} =10mA, V_{OUT}+1.5V< V_{IN}<12V, T_J=25°C **(Note 1,2)**	-	0.2	0.5	%

ELECTRICAL CHARACTERISTICS (CONTINUOUS)

(T_A=25°C, Under Operating Conditions)

Characteristics	Conditions		Min	Typ	Max	Units
Load Regulation	AX1117C-ADJ	V_{IN}=2.7V,10mA≦I_{OUT} ≦1A, T_J=25°C **(Note 1,2)**	-	0.4	1	%
	AX1117C-1.8	V_{IN}=3.3V, 0mA≦I_{OUT}≦1A, T_J=25°C **(Note 1,2)**	-	15	18	mV
	AX1117C-3.3	V_{IN}=5V,10mA ≦ I_{OUT} ≦ 1A, T_J=25°C **(Note 1,2)**	-	26	33	mV
Dropout Voltage (V_{IN}-V_{OUT})	AX1117C-ADJ/1.8/ 3.3	I_{OUT} = 1A , ΔV_{OUT}=1%V_{OUT}	-	1.2	1.4	V
Current Limit	AX1117C-ADJ/1.8/ 3.3	(V_{IN}-V_{OUT}) = 1.5V	1.0	-	-	A
Minimum Load Current	AX1117C-XXX	0°C≦Tj≦125°C	-	5	7	mA
Adjust pin current	AX1117C-ADJ	(V_{IN}-V_{OUT}) = 1.5V, I_{OUT}=10mA	-	50	100	uA
Ripple Rejection	F=120Hz, C_{OUT}=10μf, 0.2μf AX1117C-XX, (V_{IN}-V_{OUT}) = 1.5V		50	60	70	dB
Temperature Stability	I_{OUT}=10mA		-	0.5	-	%
Thermal shutdown Temp (Over temperature protect)			-	145	-	°C
Thermal Shutdown Hysteresis			-	40	-	°C

ELECTRICAL CHARACTERISTICS (CONTINUOUS)

(T_A=25°C, Under Operating Conditions)

Characteristics	Conditions	Min	Typ	Max	Units
θ_{JA} Thermal Resistance Junction-to-Ambient **(Note4)**	SOT-223	-	75		°C/W
Thermal Resistance Junction-to-Ambient (No heat sink ;No air flow)	SOT-223	-	117	-	°C/W
θ_{JC} Thermal Resistance Junction-to-Case	SOT-223	-	15	-	°C/W

Note1: See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

Note2: Line and load regulation are guaranteed up to the maximum power dissipation of 6W. Power dissipation is determined by the difference between input and output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

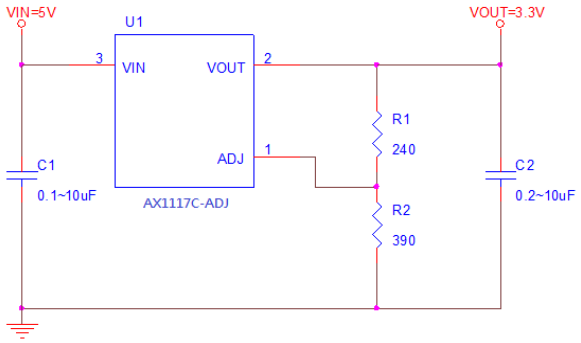
Note3: Quiescent current is defined as the minimum output current required in maintaining regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.

Note4: Tab is connected to the multi-layer PCB cupper area 5mm*5mm.

❖ APPLICATION CIRCUIT

(1) Using Multilayer Ceramic Capacitor (MLCC)

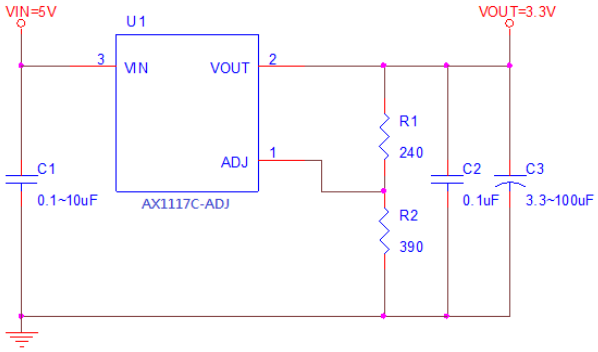
ADJ Output



$$V_{OUT} = V_{REF} \times (1 + \frac{R2}{R1}); V_{REF} = 1.250V$$

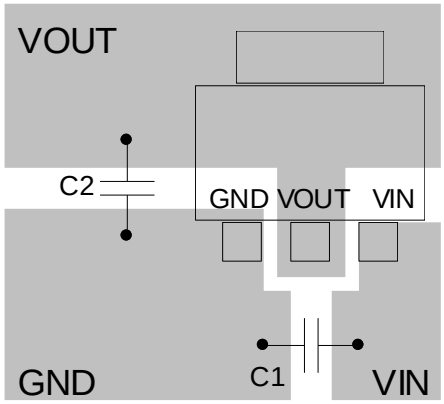
(2) Using Aluminum Electrolytic Capacitor (AL)

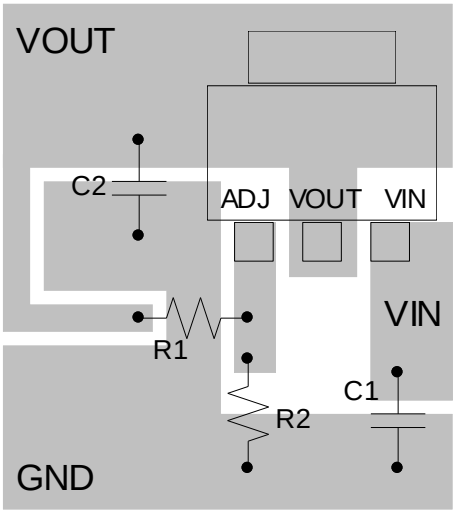
ADJ Output



$$V_{OUT} = V_{REF} \times (1 + \frac{R2}{R1}); V_{REF} = 1.250V$$

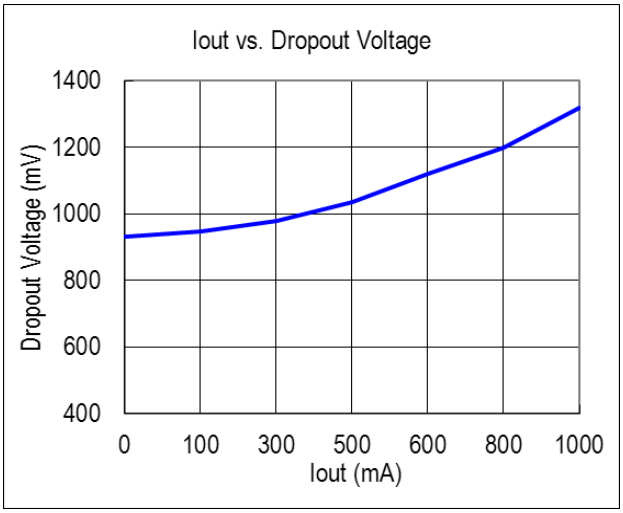
Layout Guide

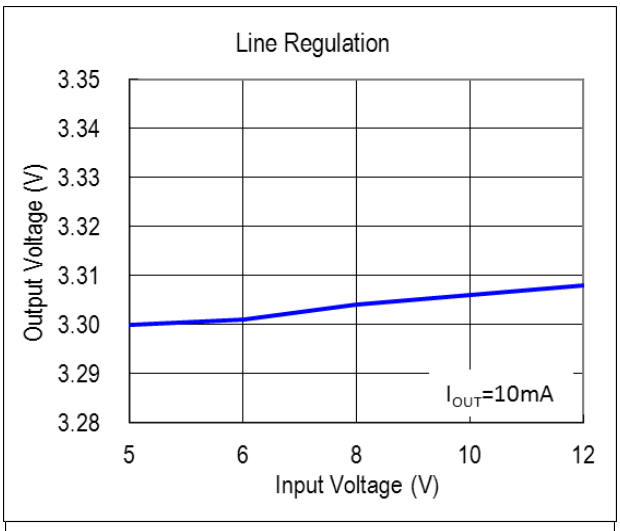


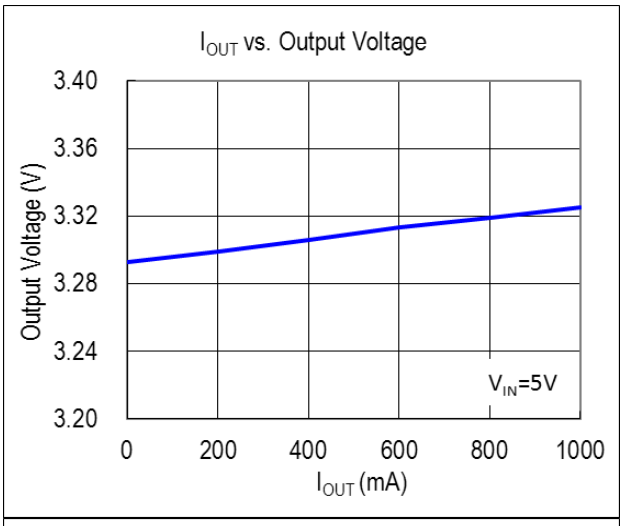


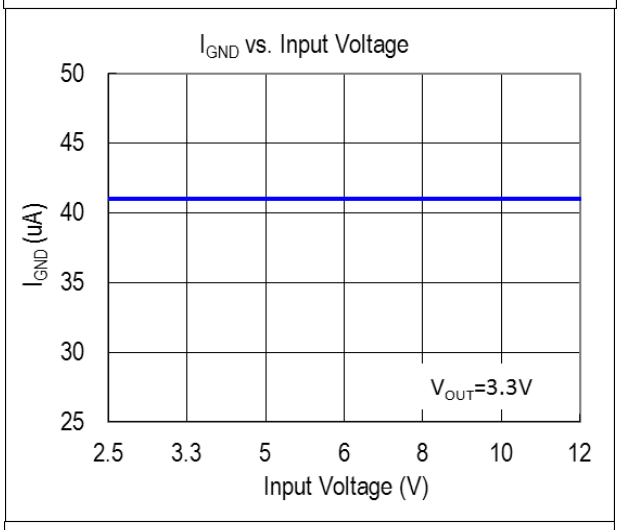
Best performance is achieved by placing C1 and C2 on the same side of the PCB as the AX1117C, and as close as is practical to the package. The ground connections for C1 and C2 should be back to the AX1117C ground plane using as wide, and as short, of a copper trace as is practical. To ensure the device does not overheat, connect the pad to VOUT plane with an appropriate amount of copper PCB area.

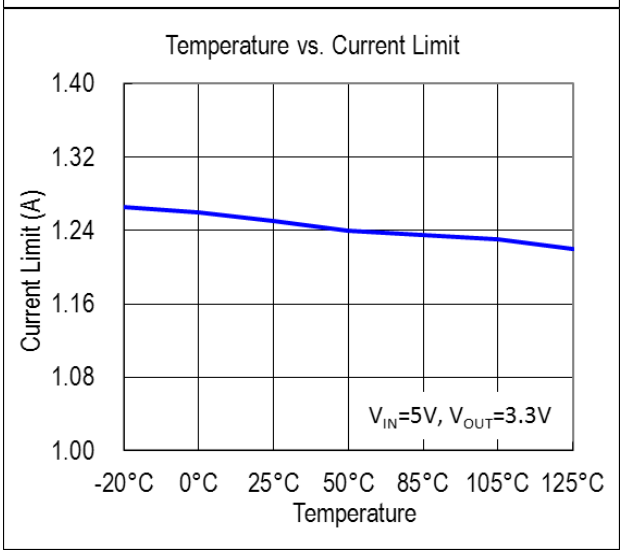
❖ TYPICAL CHARACTERISTICS

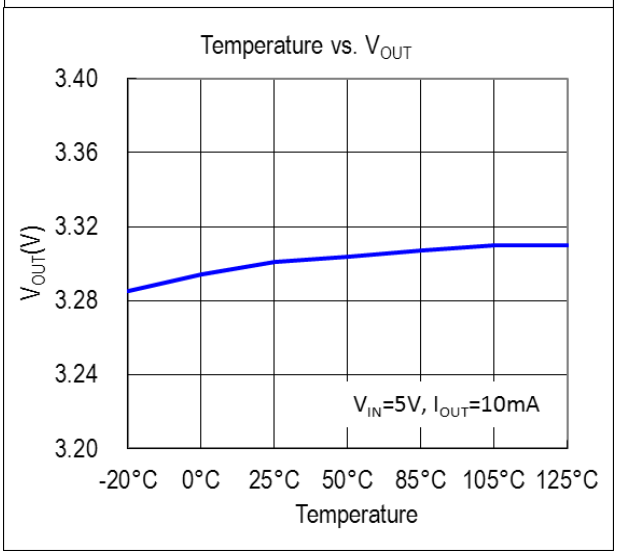






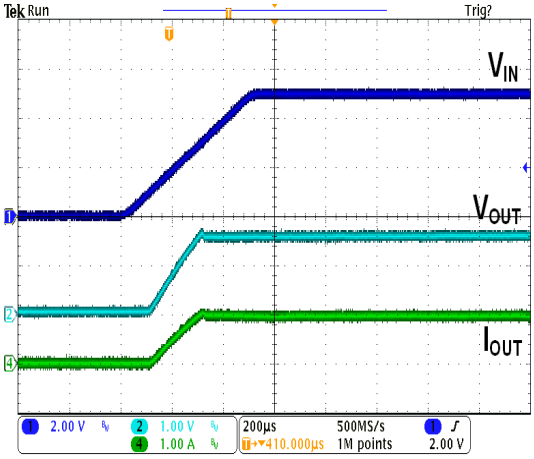




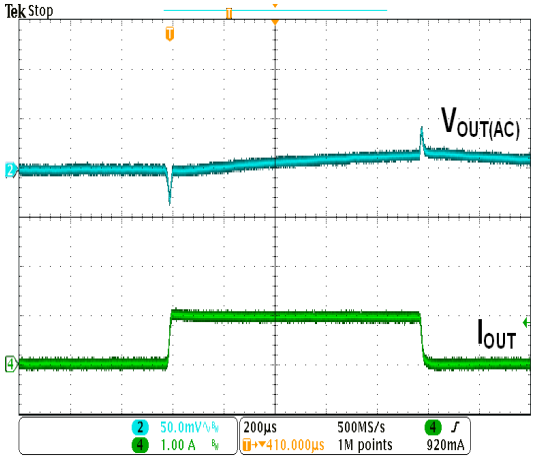


❖ TYPICAL CHARACTERISTICS (CONTINUOUS)

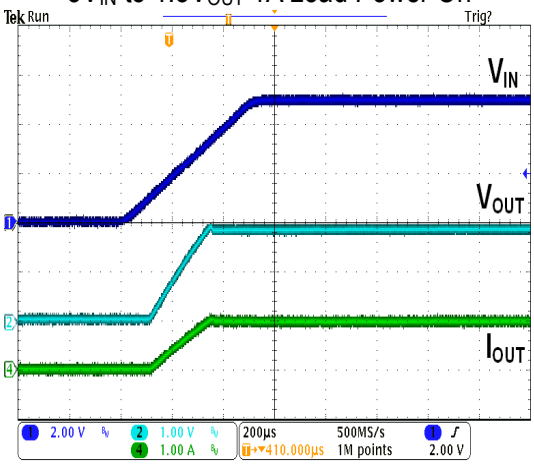
5VIN to 1.5VOUT 1A Load Power On



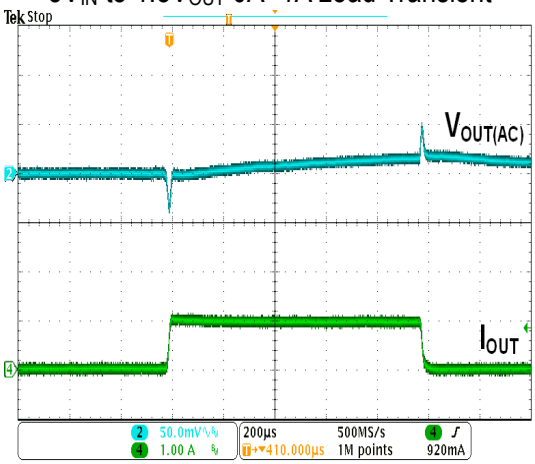
5VIN to 1.5VOUT 0A~1A Load Transient



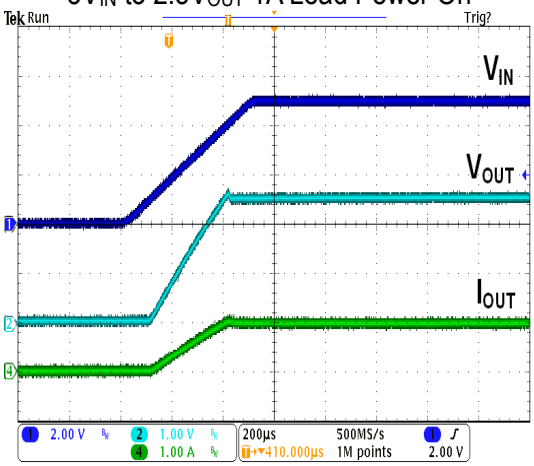
5VIN to 1.8VOUT 1A Load Power On



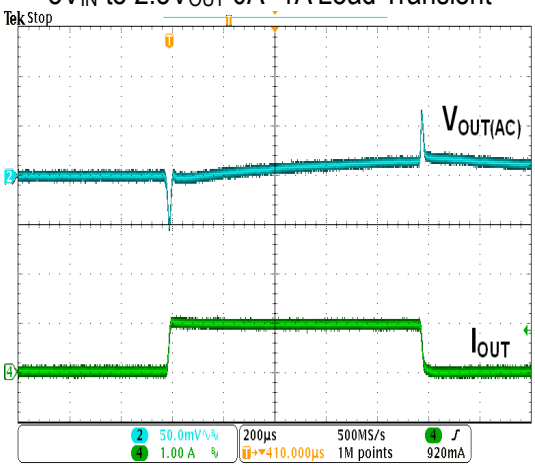
5VIN to 1.8VOUT 0A~1A Load Transient



5VIN to 2.5VOUT 1A Load Power On

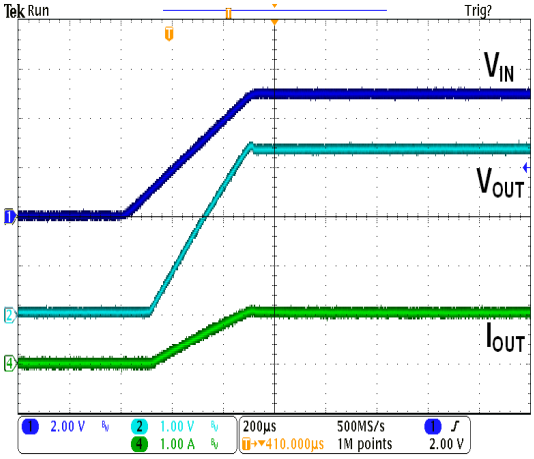


5VIN to 2.5VOUT 0A~1A Load Transient

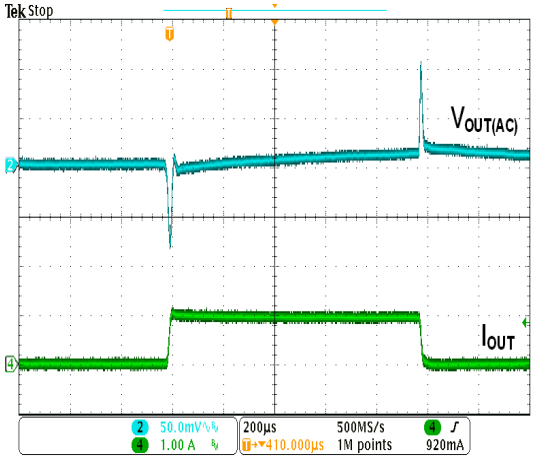


❖ TYPICAL CHARACTERISTICS (CONTINUOUS)

$5V_{IN}$ to $3.3V_{OUT}$ 1A Load Power On

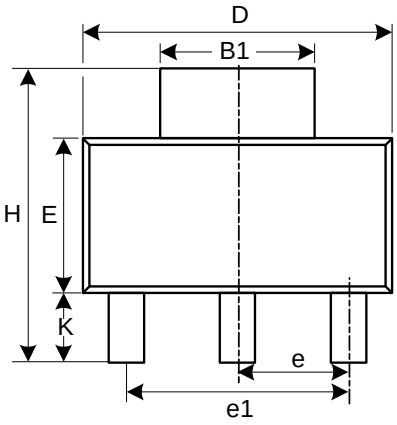


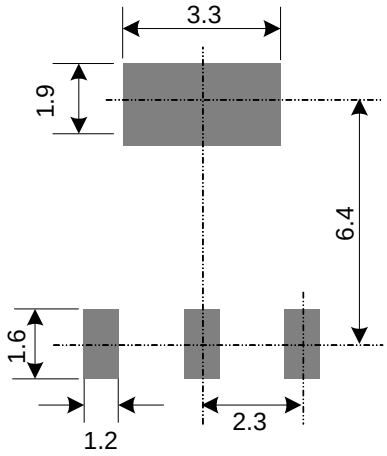
$5V_{IN}$ to $3.3V_{OUT}$ 0A~1A Load Transient



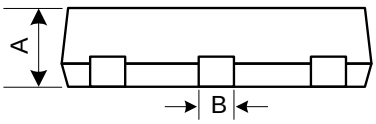
❖ PACKAGE OUTLINES

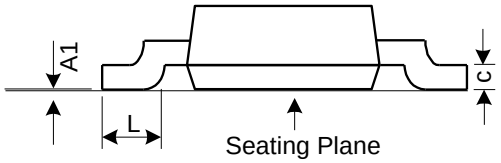
SOT223-3L





Land Pattern Recommendation (Unit: mm)



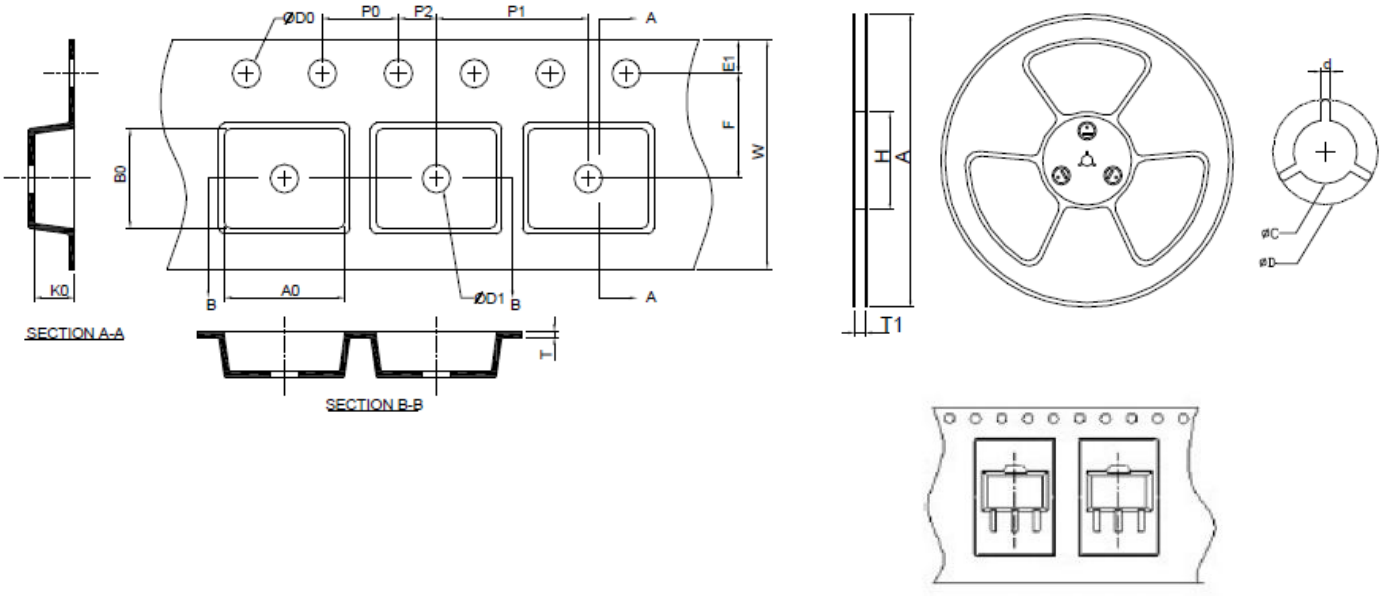


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.8	-	-	0.071
A1	0.02	0.06	0.1	0.001	0.002	0.004
B	0.66	0.75	0.84	0.026	0.03	0.033
B1	2.9	3	3.1	0.114	0.118	0.122
C	0.23	0.315	0.35	0.009	0.012	0.014
D	6.3	6.5	6.7	0.248	0.256	0.264
E	3.3	3.5	3.7	0.13	0.138	0.146
H	6.7	7	7.3	0.264	0.278	0.287
L	0.75	-	-	0.03	-	-
K	1.5	1.75	2	0.059	0.069	0.079
e	2.3 Basic			0.091 Basic		
e1	4.6 Basic			0.181 Basic		

JEDEC outline: TO-261 AB

❖ Carrier tape dimension

SOT223-3L



Application	A	H	T1	C	d	D	W	E1	F
SOT-223	320.0±2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.00±0.30	1.75±0.10	5.50±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.00±0.10	8.00±0.10	2.00±0.50	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	6.90±0.20	7.50±0.20	2.10±0.20