

## 300mA Low Dropout (LDO) Linear Regulator

### ■ Features

- Input voltage range is up to 7V
- Dropout voltage 400mV at 300mA output current
- Guaranteed 300mA output current.
- Internal  $R_{ON} = 1.5\Omega$  PMOS draws no base current
- Low quiescent current 50 $\mu$ A
- Output voltage 2% accuracy, 1.5V to 5V with 0.1V step
- Fast transient response
- Good load regulation
- Current limit and thermal shutdown protection
- 3 leads SOT89, TO92 and SOT23 packages

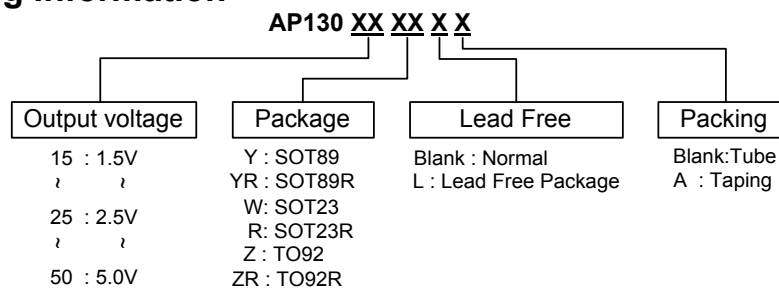
### ■ Applications

- Wireless Communication
- Battery Powered device
- CD-ROM, DVD, and LAN Card
- PC peripheral

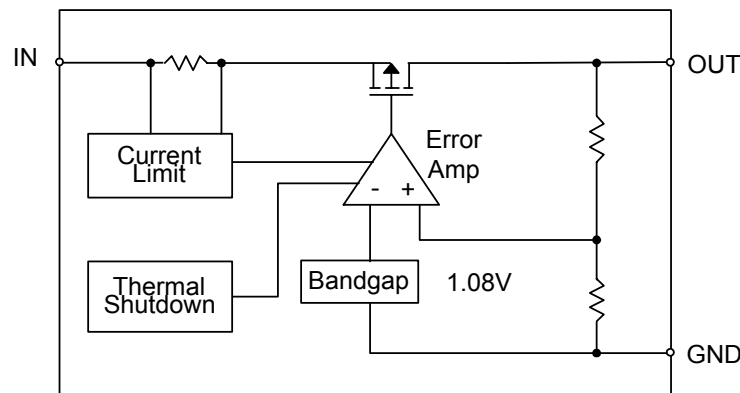
### ■ General Descriptions

The AP130 is a 300mA, fixed output voltage, low dropout linear regulator. The Device includes pass element, error amplifier, band-gap, current-limit and thermal shutdown circuitry. The characteristics of low dropout voltage and less quiescent current make it good for some critical current application, for example, some battery powered devices. The typical quiescent current is approximately 50 $\mu$ A from zero to maximum load. Due to internal flexible design, result in extensively fixed output voltage versions and make it convenient to use for applications. Built-in current-limit and thermal-shutdown functions prevent any fault condition from IC damage.

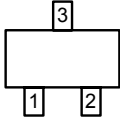
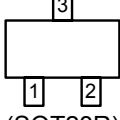
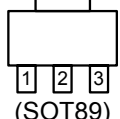
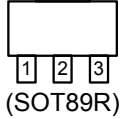
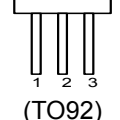
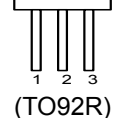
### ■ Ordering Information



### ■ Block Diagram



### ■ Pin Assignments and Pin Descriptions

Package		No.	Name	Description
Type	Code			
( Top View )  ( SOT23 )	W	1	IN	IN: Power Input OUT: Output Voltage GND: Ground
		2	OUT	
		3	GND	
( Top View )  ( SOT23R )	R	1	GND	
		2	OUT	
		3	IN	
( Top View )  ( SOT89 )	Y	1	OUT	
		2	GND	
		3	IN	
( Top View )  ( SOT89R )	YR	1	GND	
		2	IN	
		3	OUT	
(Top View)  ( TO92 )	Z	1	IN	
		2	GND	
		3	OUT	
(Top View)  ( TO92R )	ZR	1	GND	
		2	IN	
		3	OUT	

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### ■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
$V_{CC}$	Input voltage	-0.1 to +7	V
$T_{OP}$	Operating junction temperature range	-40 to +125	°C
$T_{ST}$	Storage temperature range	-65 to +150	°C
$P_D$	Power dissipation, $P_D$ @ $T_A=25^\circ\text{C}$		
	TO-92	+0.6	W
	SOT-89	+0.5	W
	SOT-23	+0.25	W
$\theta_{JA}$	Package thermal resistance		
	TO-92	+100	°C/W
	SOT-89	+100	°C/W
	SOT-23	+250	°C/W

### ■ Electrical Characteristics

$T_A=25^\circ\text{C}$ ,  $C_{IN}=1\mu\text{F}$ ,  $C_{OUT}=10\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{DROP}$	Dropout voltage (Note 1)	$I_L=300\text{mA}$	--	400	500	mV
$I_{LIMIT}$	Current Limit (Note 2)	$V_{IN}=5\text{V}, V_{OUT}=0\text{V}$	350	450	--	mA
$\Delta V_{LINE}$	Line regulation	$I_L=1\text{mA}, V_{IN}=5\sim 7\text{V}$	--	0.1	0.3	%
PSRR	Ripple Rejection	$F=100\text{Hz}$ , $C_{IN}=1\mu\text{F}$ , $C_O=10\mu\text{F}$ , $I_L=100\text{mA}$	--	58	--	dB
$\Delta V_{LOAD}$	Load regulation (Note 3)	$I_L=1\sim 300\text{mA}, V_{IN}=5\text{V}$	--	30	40	mV
$\Delta V_{OUT}$	Output voltage accuracy	$I_L=1\text{mA}, V_{IN}=5\text{V}$	-2	--	+2	%
	Output voltage temperature coefficient (Note 4)		--	50	150	PPM/°C
$I_{SB}$	Standby current	$I_L=0, V_{IN}=5\text{V}$	--	50	100	$\mu\text{A}$

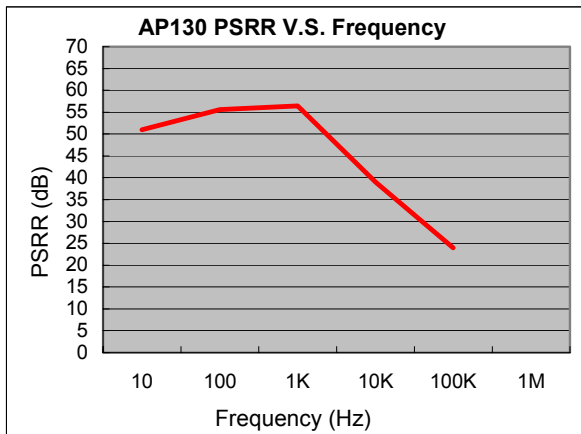
**Note 1.** Dropout voltage is defined as the input to output differential voltage. Dropout is measured at constant junction temperature by using pulsed ON time, and the criterion is  $V_{OUT}$  inside target value  $\pm 2\%$ . This test is skipped at the condition of  $V_{IN}<3\text{V}$ .

**Note 2.** Current limit is measured at constant junction temperature by using pulsed testing with a low ON time.

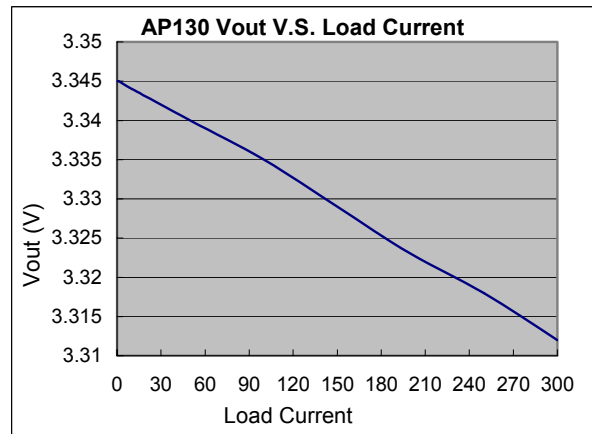
**Note 3.** Regulation is measured at constant junction temperature by using pulsed testing with a low ON time.

**Note 4.** Guaranteed by design.

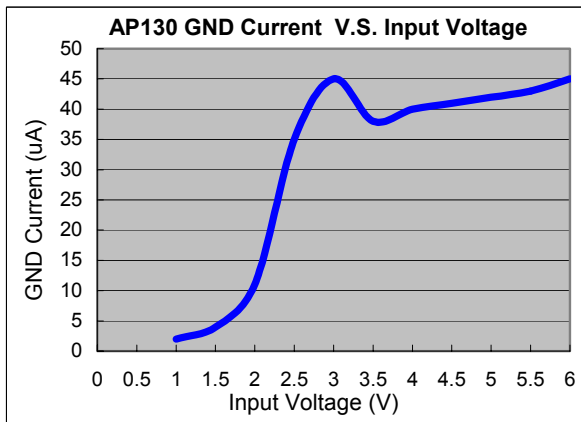
### ■ Typical Characteristics



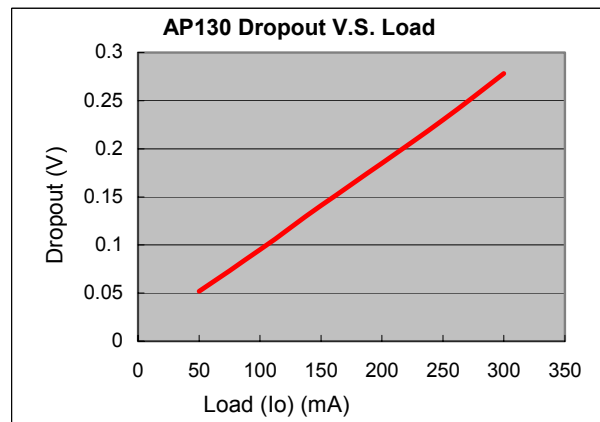
**PSRR V.S. Frequency**



**Vout V.S. Load Current**

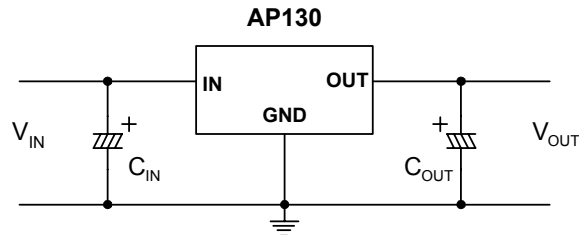


**GND Current V.S. Input Voltage**



**Dropout V.S. Load**

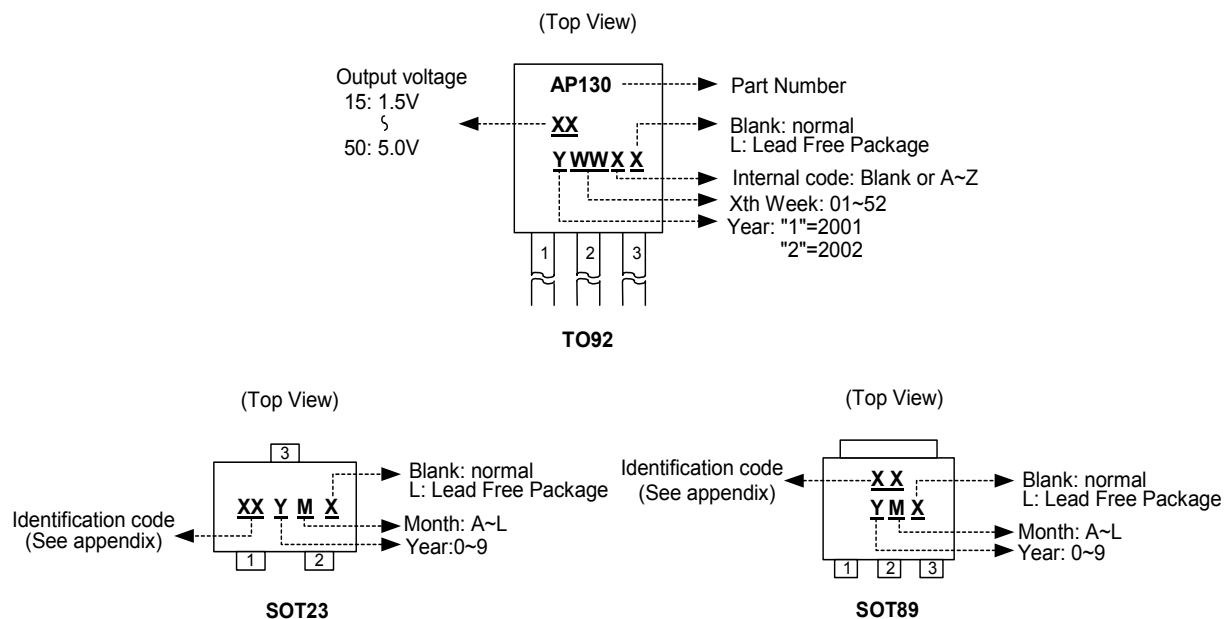
### ■ Typical Application Circuit



### ■ Function Description

A minimum of 10 $\mu$ F capacitor must be connected from OUT to ground to insure stability. Typically a large storage capacitor is connected from  $V_{IN}$  to ground to ensure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 0.7V higher than  $V_{OUT}$  in order for the device to regulate properly.

### ■ Marking Information





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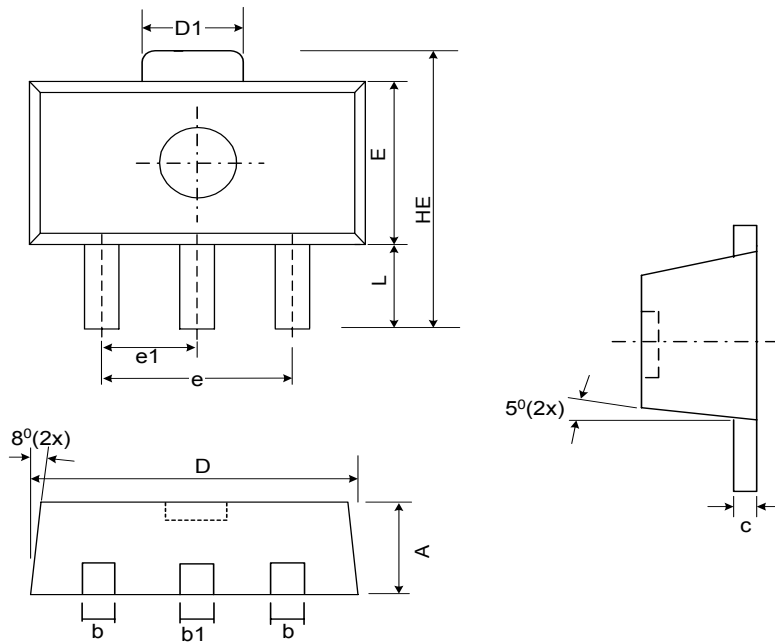
### Appendix

Part Number		Identification code
SOT23	SOT89	
AP130-15W	AP130-15Y	CA
AP130-16W	AP130-16Y	CB
AP130-17W	AP130-17Y	CC
AP130-18W	AP130-18Y	CD
AP130-19W	AP130-19Y	CE
AP130-20W	AP130-20Y	CF
AP130-21W	AP130-21Y	CG
AP130-22W	AP130-22Y	CH
AP130-23W	AP130-23Y	CI
AP130-24W	AP130-24Y	CJ
AP130-25W	AP130-25Y	CK
AP130-26W	AP130-26Y	CL
AP130-27W	AP130-27Y	CM
AP130-28W	AP130-28Y	CN
AP130-29W	AP130-29Y	CO
AP130-30W	AP130-30Y	CP
AP130-31W	AP130-31Y	CQ
AP130-32W	AP130-32Y	CR
AP130-15R	AP130-15YR	GO
AP130-16R	AP130-16YR	GP
AP130-17R	AP130-17YR	GQ
AP130-18R	AP130-18YR	GR
AP130-19R	AP130-19YR	GS
AP130-20R	AP130-20YR	GT
AP130-21R	AP130-21YR	GU
AP130-22R	AP130-22YR	GV
AP130-23R	AP130-23YR	GW
AP130-24R	AP130-24YR	GX
AP130-25R	AP130-25YR	GY
AP130-26R	AP130-26YR	GZ
AP130-27R	AP130-27YR	H0
AP130-28R	AP130-28YR	H1
AP130-29R	AP130-29YR	H2
AP130-30R	AP130-30YR	H3
AP130-31R	AP130-31YR	H4
AP130-32R	AP130-32YR	H5

Part Number		Identification code
SOT23	SOT89	
AP130-33W	AP130-33Y	CS
AP130-34W	AP130-34Y	CT
AP130-35W	AP130-35Y	CU
AP130-36W	AP130-36Y	CV
AP130-37W	AP130-37Y	CW
AP130-38W	AP130-38Y	CX
AP130-39W	AP130-39Y	CY
AP130-40W	AP130-40Y	CZ
AP130-41W	AP130-41Y	C0
AP130-42W	AP130-42Y	C1
AP130-43W	AP130-43Y	C2
AP130-44W	AP130-44Y	C3
AP130-45W	AP130-45Y	C4
AP130-46W	AP130-46Y	C5
AP130-47W	AP130-47Y	C6
AP130-48W	AP130-48Y	C7
AP130-49W	AP130-49Y	C8
AP130-50W	AP130-50Y	C9
AP130-33R	AP130-33YR	H9
AP130-34R	AP130-34YR	HA
AP130-35R	AP130-35YR	HB
AP130-36R	AP130-36YR	HC
AP130-37R	AP130-37YR	HD
AP130-38R	AP130-38YR	HE
AP130-39R	AP130-39YR	HF
AP130-40R	AP130-40YR	HG
AP130-41R	AP130-41YR	HH
AP130-42R	AP130-42YR	HI
AP130-43R	AP130-43YR	HJ
AP130-44R	AP130-44YR	HK
AP130-45R	AP130-45YR	HL
AP130-46R	AP130-46YR	HM
AP130-47R	AP130-47YR	HN
AP130-48R	AP130-48YR	HO
AP130-49R	AP130-49YR	HP
AP130-50R	AP130-50YR	HQ

### ■ Package Information

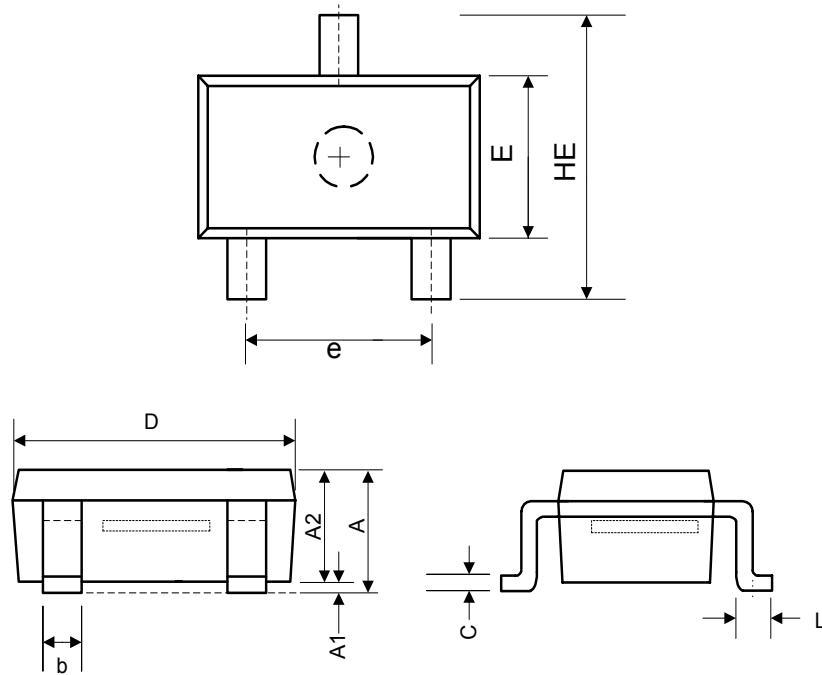
(1) Package Type: SOT89-3L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.50	1.60	0.055	0.059	0.063
B	0.36	0.42	0.48	0.014	0.016	0.018
b1	0.41	0.47	0.53	0.016	0.043	0.051
C	0.35	0.39	0.43	0.014	0.015	0.017
D	4.40	4.50	4.60	0.173	0.177	0.181
D1	1.40	1.60	1.75	0.055	0.062	0.069
e	2.90	3.00	3.10	0.114	0.118	0.122
e1	1.45	1.50	1.55	0.057	0.059	0.061
E	2.40	2.50	2.60	0.094	0.098	0.102
HE	3.94	-	4.25	0.155	-	0.167
L	0.80	-	1.20	0.031	-	0.047

**■ Package Information (Continued)**

(2) Package Type: SOT23-3L

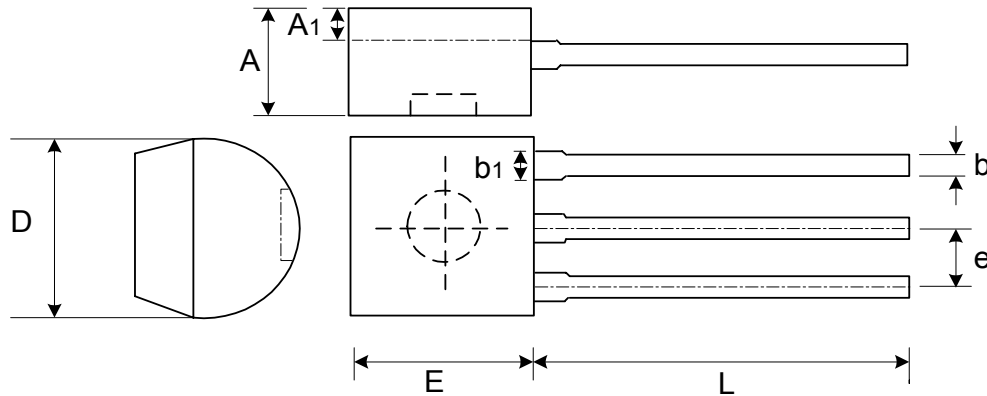


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.00	1.20	1.40	0.039	0.047	0.055
A1	0.00	-	0.10	0.000	-	0.004
A2	1.00	1.15	1.30	0.039	0.045	0.051
b	0.35	-	0.50	0.014	-	0.020
C	0.10	0.175	0.25	0.004	0.007	0.010
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.40	1.60	1.80	0.055	0.063	0.071
e	1.70	2.00	2.30	0.067	0.079	0.091
HE	2.40	2.70	3.00	0.094	0.106	0.118
L	0.30	-	0.55	0.012	-	0.022



### ■ Package Information (Continued)

(3) Package Type: TO92-3L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.302	3.556	3.810	0.130	0.140	0.150
A1	1.016	-	-	0.040	-	-
b	0.330	0.381	0.432	0.013	0.015	0.017
b1	0.406	0.457	0.506	0.016	0.018	0.020
D	4.445	4.572	4.699	0.175	0.180	0.185
E	4.445	4.572	4.699	0.175	0.180	0.185
L	13.00	-	15.500	0.512	-	0.610
e	1.150	1.270	1.390	0.045	0.050	0.055