

Low Power, High Accuracy, High PSRR LDO Regulators

Description

The ME6230 series are high accuracy, CMOS LDO Voltage Regulators, offering low power, high ripple rejection ratio and low dropout. the ME6230 series is ideal for today's cutting edge mobile phone. Internally the ME6230 includes a reference voltage source, error amplifiers, driver transistors, current limiters and phase compensators. The ME6230's current limiters' foldback circuit also operates as a short protect for the output current limiter and the output pin. The ME6230 series is also fully compatible with low ESR ceramic capacitors, reducing cost and improving output stability. This high level of output stability is maintained even during frequent load fluctuations, due to the excellent transient response performance and high PSRR achieved across a broad range of frequencies. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption.

Feature

- Maximum Output Current: 400mA
($V_{IN}=4.3V, V_{OUT}=3.3V$)
- Dropout Voltage: 110mV@ $I_{OUT}=100mA$
- Operating Voltage Range: 1.8V~5.5V
- Output Voltage Range: 1.2V~5.0V
- Highly Accuracy: $\pm 1\%$
- Low Power Consumption: 1.8uA (TYP.)
- Standby Current: 0 uA (TYP.)
- High Ripple Rejection: 70dB@1KHz (ME6230C33)
- Line Regulation: 0.035%/V (TYP.)
- Built-in temperature protection and current limiting protection

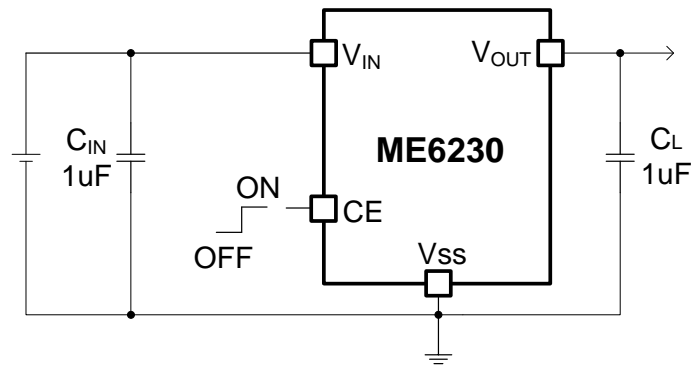
Applications

- Mobile phones
- Cordless phones, radio communication equipment
- Portable games
- Cameras, Video cameras
- Reference voltage sources
- Battery powered equipment

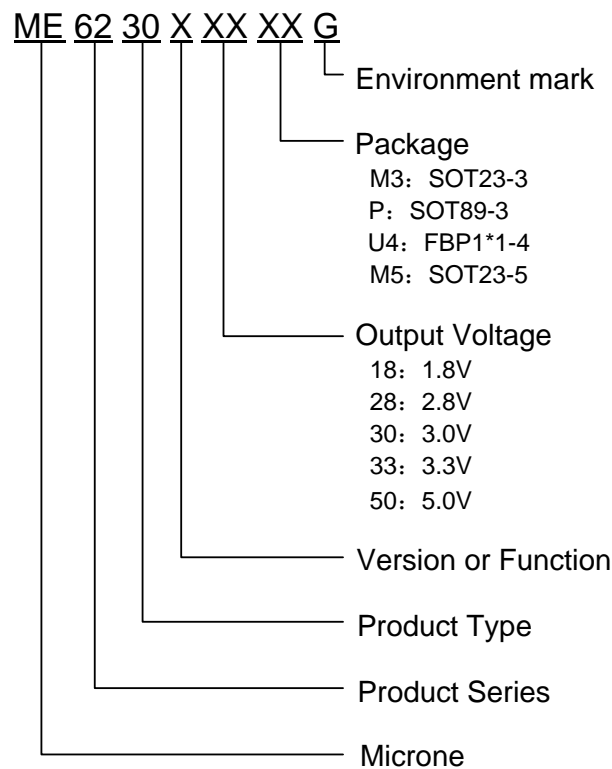
Package

- 3-pin SOT23-3、SOT89-3
- 4-pin FBP1*1-4
- 5-pin SOT23-5

Typical Application Circuit



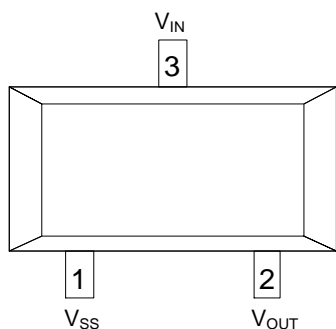
Selection Guide



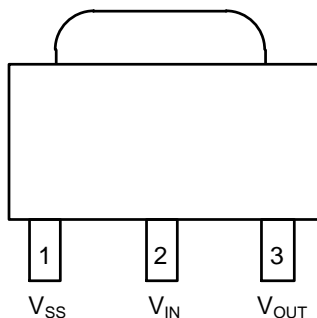
product serie	Product Function
ME6230A33M3G	$V_{OUT}=3.3V$; Package: SOT23-3
ME6230A33PG	$V_{OUT}=3.3V$; Package: SOT89-3
ME6230C18U4AG	Enable can be set; $V_{OUT}=1.8V$; Package: FBP1*1-4
ME6230C28M5G	Enable can be set; $V_{OUT}=2.8V$; Package: SOT23-5
ME6230C30M5G	Enable can be set; $V_{OUT}=3.0V$; Package: SOT23-5
ME6230C33U4AG	Enable can be set; $V_{OUT}=3.3V$; Package: FBP1*1-4
ME6230C33M5G	Enable can be set; $V_{OUT}=3.3V$; Package: SOT23-5
ME6230C50M5G	Enable can be set; $V_{OUT}=5.0V$; Package: SOT23-5

NOTE: At present ,there are five kinds of voltage value: 1.8V, 2.8V, 3.0V, 3.3V, 5.0V.
If you need other voltage and package, please contact our sales staff.

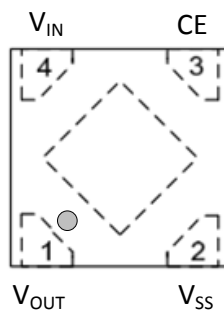
Pin Configuration (Top View)



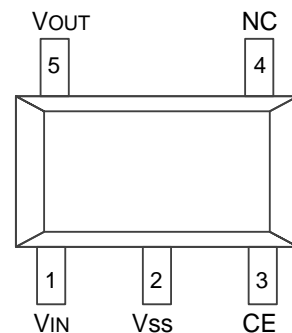
SOT23-3



SOT89-3



FBP1*1-4

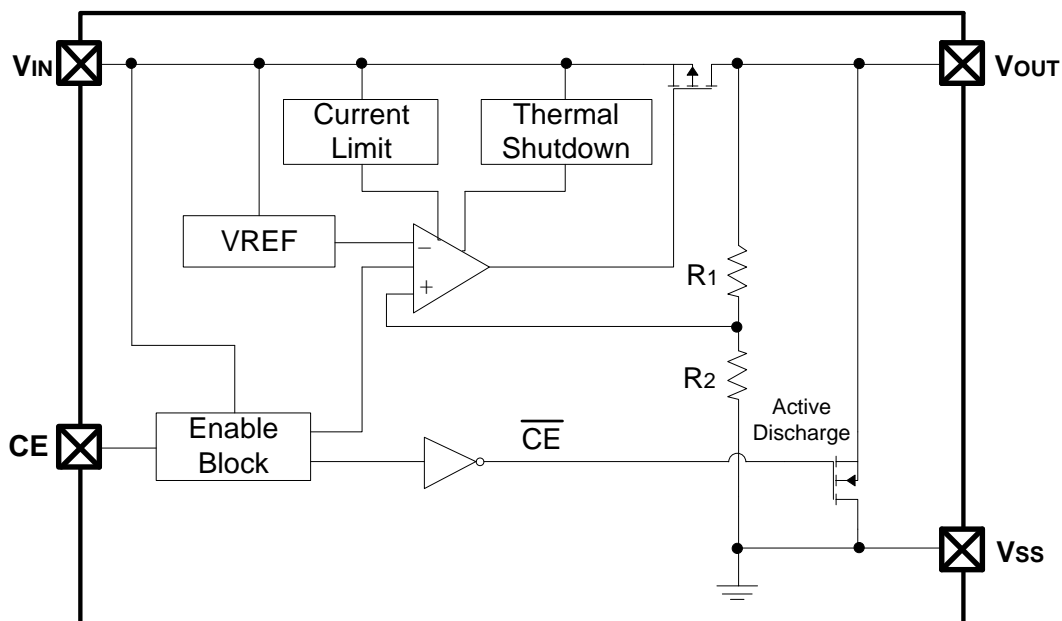


SOT23-5

Pin Assignment

PIN Number SOT23-3	PIN Number SOT89-3	PIN Number FBP1*1-4	PIN Number SOT23-5	symbol	Function
3	2	4	1	V_{IN}	Power Input
1	1	2	2	V_{SS}	Ground
		3	3	CE	ON/OFF Control
			4	NC	No Connect
2	3	1	5	V_{OUT}	Output

Block Diagram



Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Voltage		V_{IN}	-0.3~6.5	V
CE Pin Voltage		V_{CE}	$V_{IN} - 0.3 \sim V_{IN} + 0.3$	V
V_{OUT} Voltage		V_{OUT}	$V_{IN} - 0.3 \sim V_{IN} + 0.3$	V
V_{OUT} Current		I_{OUT}	600	mA
Internal Power Dissipation	SOT23-3	Pd	0.54	W
	SOT89-3		1.25	
	FBP1*1-4		0.5	
	SOT23-5		0.6	
Thermal resistance (Junction to air)	SOT23-3	θ_{JA}	230	°C/W
	SOT89-3		100	
	FBP1*1-4		250	
	SOT23-5		210	
Operating Ambient Temperature Range		T_{Opr}	-40~+85	°C
Storage Temperature Range		T_{stg}	-55~+150	°C
Maximum junction temperature		T_J	-40~+150	°C

Electrical Characteristic

($V_{IN} = V_{OUT} + 1V$, $V_{CE} = V_{IN}$, $C_{IN} = C_L = 1\mu F$, $T_a = 25^\circ C$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Operating Input Voltage	V_{IN}		1.8	-	5.5	V	
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 10mA, V_{IN} = V_{OUT} + 1V$	X 0.99	$V_{OUT(T)}$ (Note 1)	X 1.01	V	
Maximum Output Current	I_{OUTMAX}	$V_{IN} = V_{OUT} + 1V$	-	400	-	mA	
Load Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1V,$ $1mA \leq I_{OUT} \leq 100mA$	-	7	20	mV	
Dropout Voltage (Note 3) $I_{OUT} = 100mA$	VDIF	$1.8V \leq V_{OUT} < 2.5V$	-	180	-	mV	
		$2.5V \leq V_{OUT} < 3.0V$	-	130	-		
		$3.0V \leq V_{OUT}$	-	110	-		
Dropout Voltage (Note 3) $I_{OUT} = 200mA$	VDIF	$1.8V \leq V_{OUT} < 2.5V$	-	340	-	mV	
		$2.5V \leq V_{OUT} < 3.0V$	-	250	-		
		$3.0V \leq V_{OUT}$	-	220	-		
Supply Current	I_{SS}	$V_{IN} = V_{OUT} + 1V$	-	1.8	3.6	μA	
Stand-by Current	I_{CEL}	$V_{CE} = 0V$	-	0	0.2	μA	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 30mA,$ $V_{OUT} + 1V \leq V_{IN} \leq 5.5V$	-	0.035	-	%/V	
Output Current Limit	I_{LIM}	Peak Output Current	-	510	-	mA	
CE "High" Voltage	V_{CEH}	Start up	1.5	-	-	V	
CE "Low" Voltage	V_{CEL}	Shut down	-	-	0.5	V	
Active Output Discharge Resistance	R_{DIS}	$V_{CE} < 0.5V$	-	500	-	Ω	
Ripple Rejection Rate (Note 4)	PSRR	$V_{IN} = (V_{OUT} + 1)V + 1V_{ppAC},$ $I_{OUT} = 10mA$	f=1kHz	-	70	-	dB
			f=10kHz	-	55	-	
Thermal Shutdown Temperature (Note 4)	T_{SD}	Temperature increasing, $I_{OUT} = 15mA$	-	150	-	$^\circ C$	
Thermal Shutdown Hysteresis (Note 4)	ΔT_{SD}	Temperature falling	-	20	-	$^\circ C$	

NOTES:

- $V_{OUT(T)}$: Specified Output Voltage
- $V_{OUT(E)}$: Effective Output Voltage (i.e. The output voltage when " $V_{OUT(T)} + 1.0V$ " is provided at the Vin pin while maintaining a certain Iout value.)
- $V_{DIF} = V_{IN1} - V_{OUT(E)}$
 V_{IN1} : The input voltage when $V_{OUT(E)}$ appears as input voltage is gradually decreased.
 $V_{OUT(E)}$ = A voltage equal to 98% of the output voltage whenever an amply stabilized Iout { $V_{OUT(T)} + 1.0V$ } is input.
- guaranteed by design.

Typical Performance Characteristics

ME6230C33M5G ($V_{CE} = V_{IN}$, $T_a = 25^\circ\text{C}$, unless otherwise noted.)

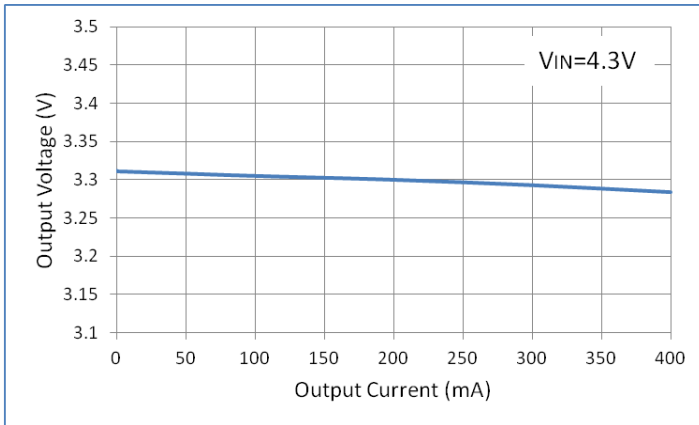


Figure 1. Output Voltage vs. Output Current

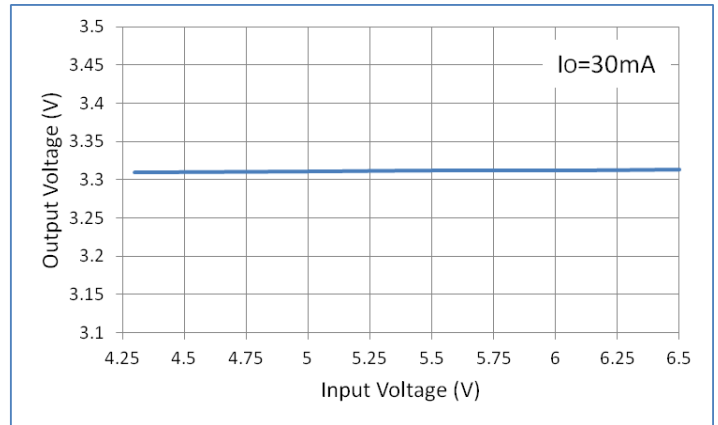


Figure 2. Output Voltage vs. Input Voltage

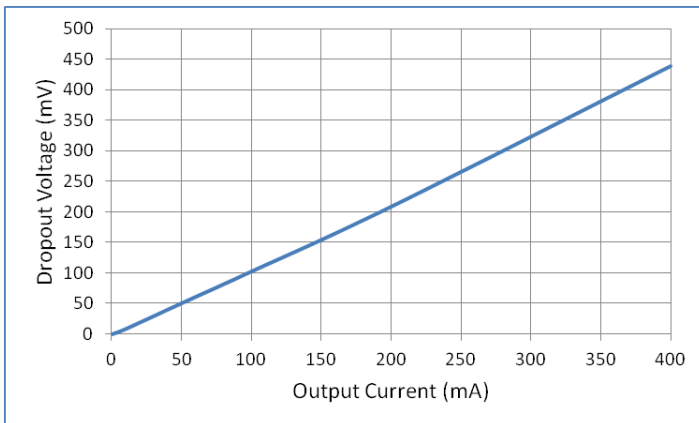


Figure 3. Dropout Voltage vs. Output Current

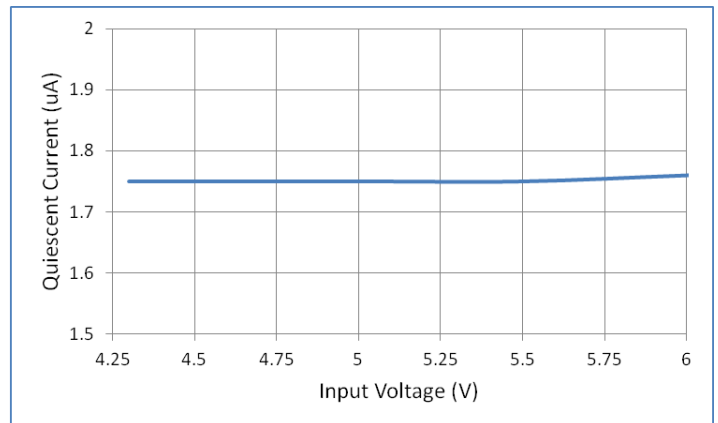


Figure 4. Quiescent Current vs. Input Voltage

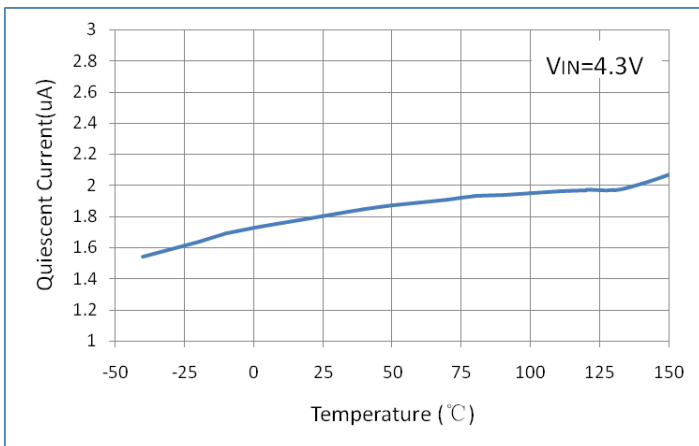


Figure 5. Quiescent Current vs. Temperature

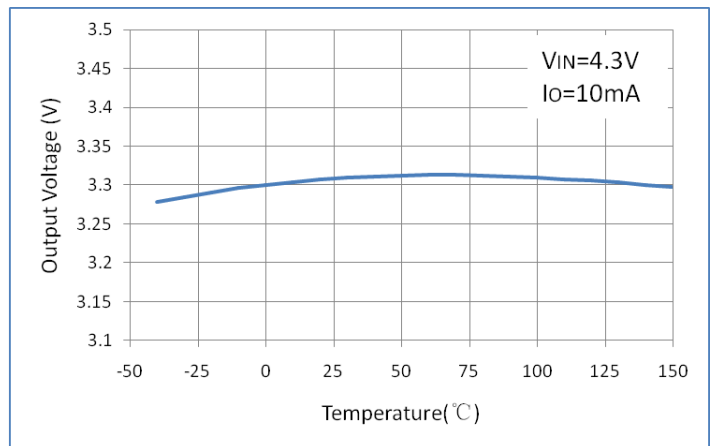


Figure 6. Output Voltage vs. Temperature

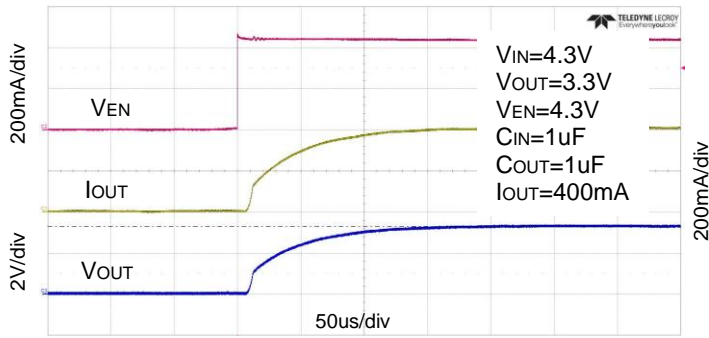


Figure 7. Enable Turn-on Response

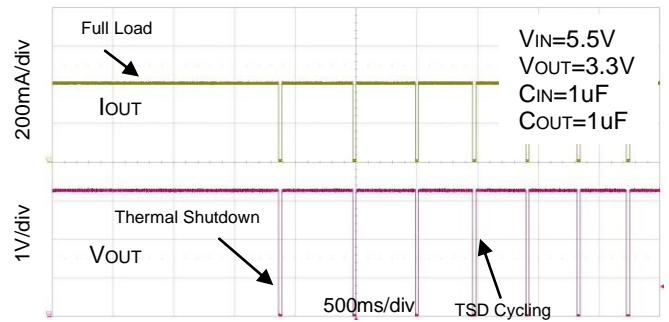


Figure 8. Thermal Shutdown

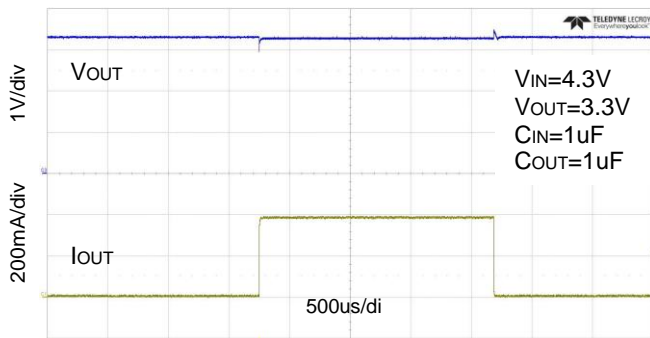


Figure 9. Load Transient Response
IOUT=1mA to 400mA

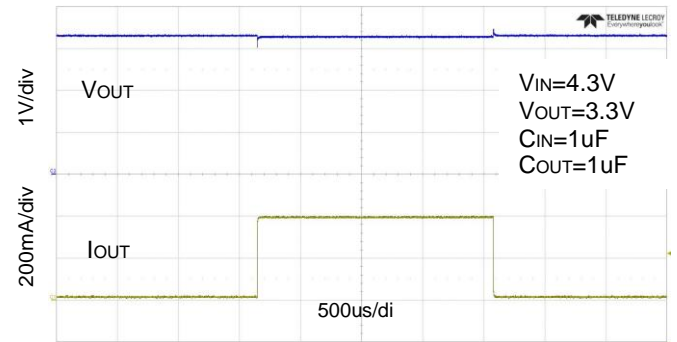


Figure 10. Load Transient Response
IOUT=10mA to 400mA

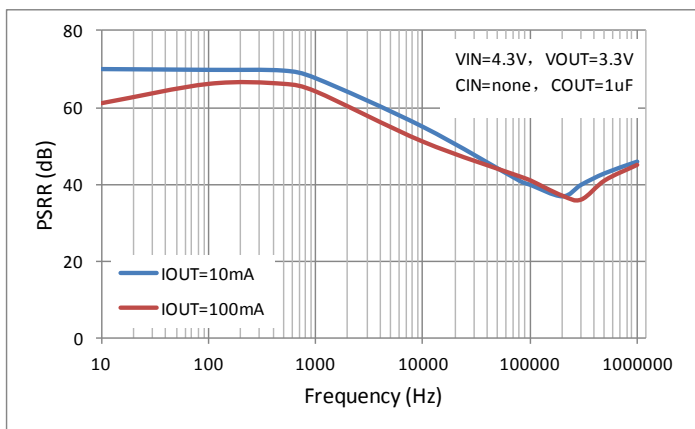
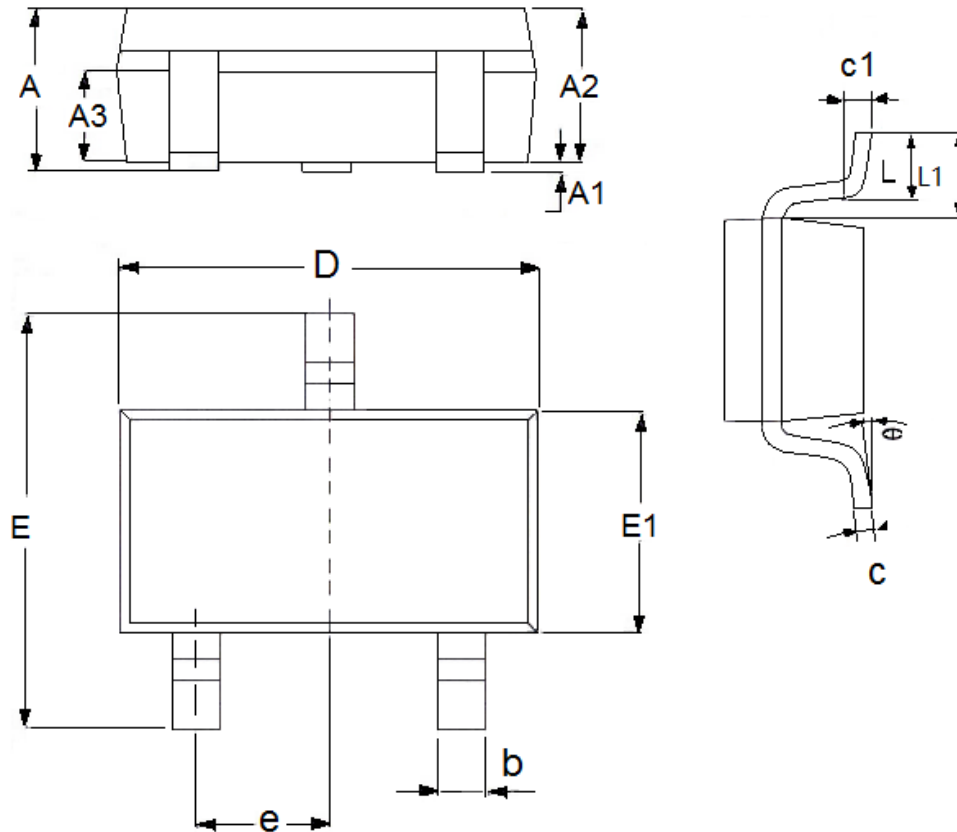


Figure 11. PSRR vs. Frequency

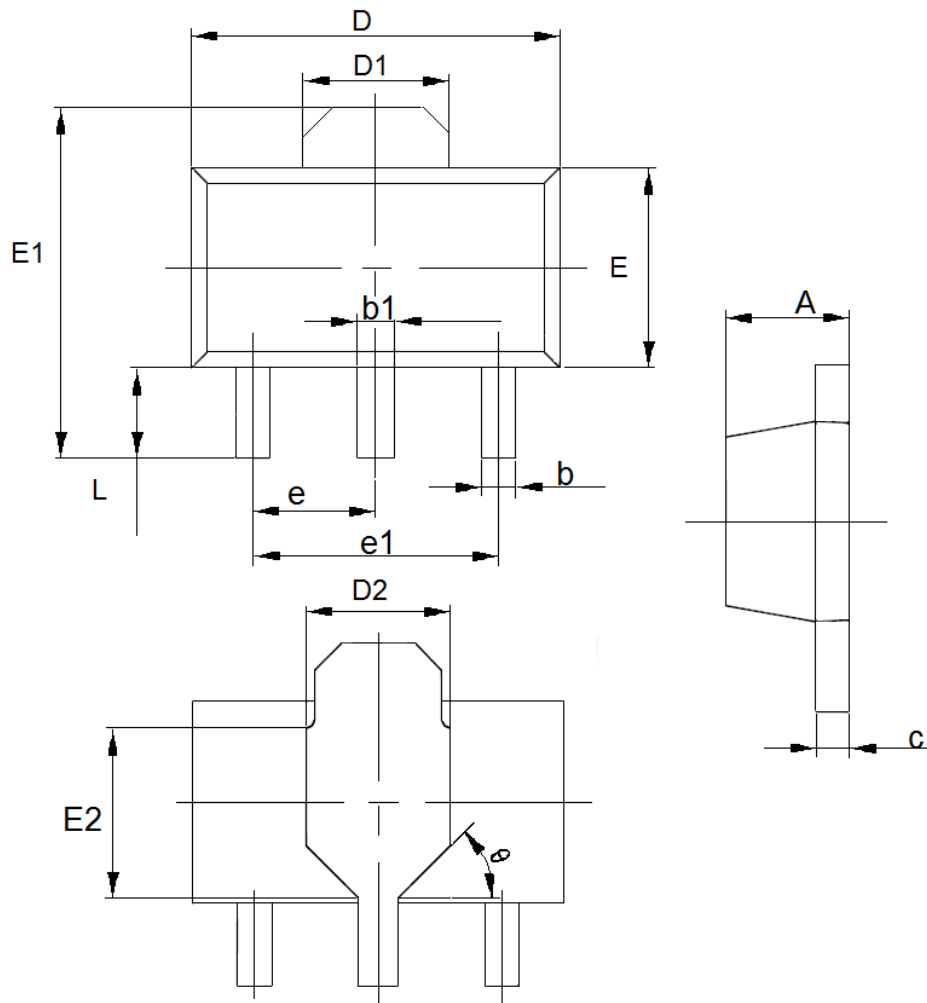
Packaging Information

- Package Type: SOT23-3



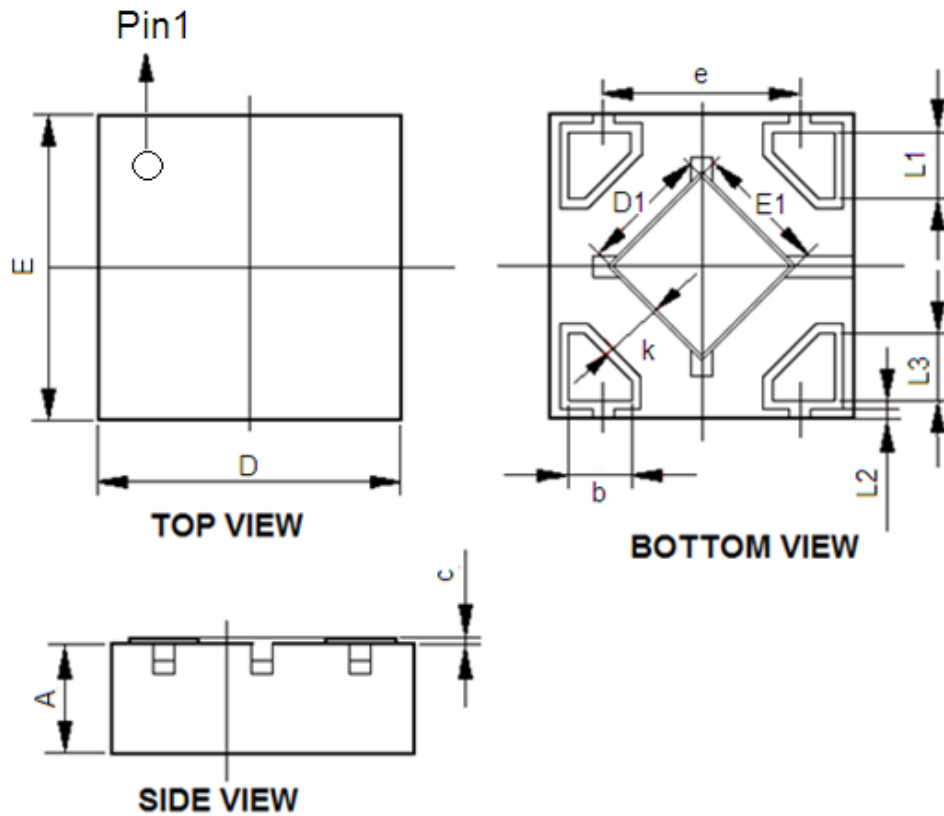
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.25	0.0039	0.0098
D	2.8	3.1	0.1102	0.1220
E	2.6	3.1	0.1023	0.1220
E1	1.5	1.8	0.0591	0.0709
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

- Package Type: SOT89-3



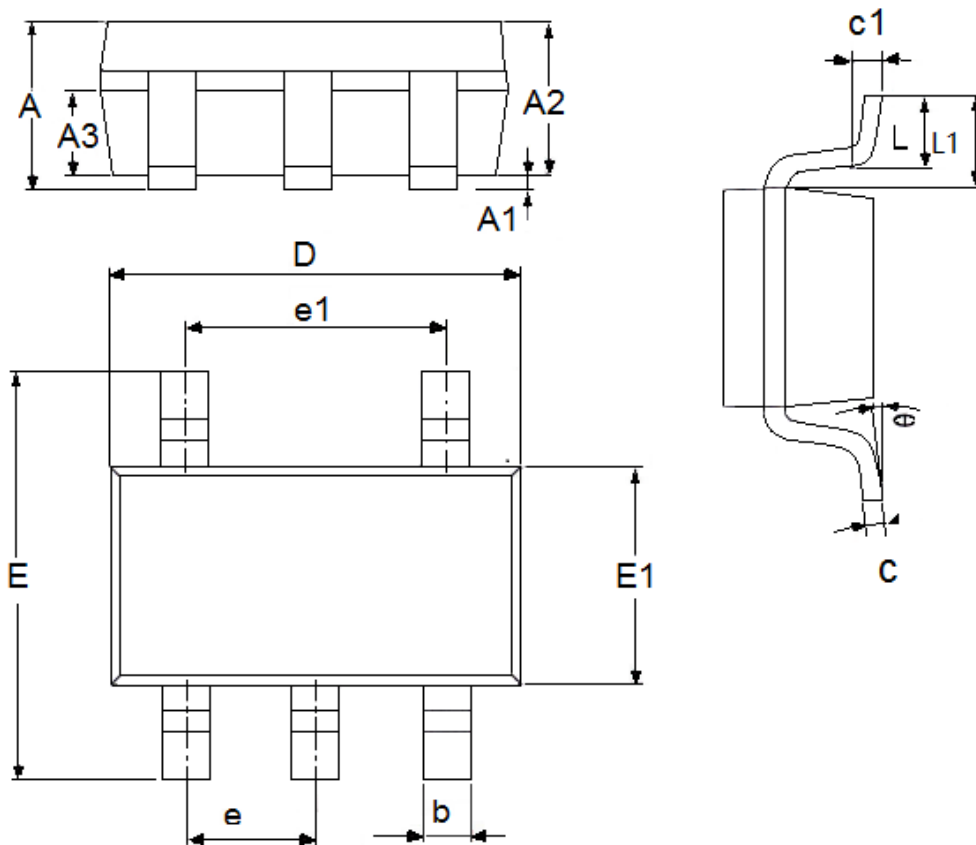
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
θ	45°		45°	

- Package Type: FBP1*1-4



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.335	0.410	0.013	0.016
D	0.950	1.100	0.037	0.043
E	0.950	1.100	0.037	0.043
D1	0.370	0.470	0.015	0.019
E1	0.370	0.470	0.015	0.019
k	0.170MIN		0.007MIN	
b	0.160	0.260	0.060	0.010
C	0.010	0.090	0.000	0.004
e	0.600	0.700	0.024	0.028
L1	0.185	0.255	0.007	0.010
L2	0.03REF		0.001REF	
L3	0.185	0.255	0.007	0.010

● Package Type:SOT23-5



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.23	0.0039	0.0091
D	2.82	3.05	0.1110	0.1201
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.05	0.1024	0.1201
E1	1.5	1.75	0.0512	0.0689
e	0.95(TYP)		0.0374(TYP)	
L	0.3	0.6	0.0118	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

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