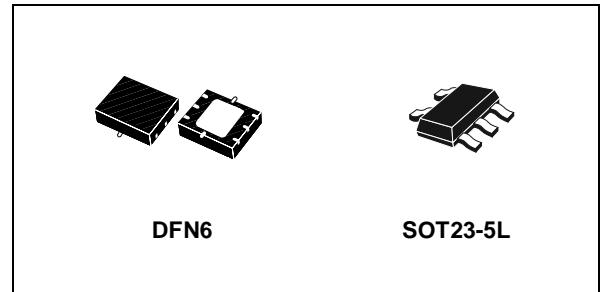


## ULTRA LOW DROP-LOW NOISE BICMOS 300mA V.REG. FOR USE WITH VERY LOW ESR OUTPUT CAPACITOR

- INPUT VOLTAGE FROM 2.5V TO 6V
- STABLE WITH LOW ESR CERAMIC CAPACITORS
- ULTRA LOW DROPOUT VOLTAGE (150mV TYP. AT 300mA LOAD, 0.4mV TYP. AT 1mA LOAD)
- VERY LOW QUIESCENT CURRENT (85 $\mu$ A TYP. AT NO LOAD, 200 $\mu$ A TYP. AT 300mA LOAD; MAX 1.5 $\mu$ A IN OFF MODE)
- GUARANTEED OUTPUT CURRENT UP TO 300mA
- WIDE RANGE OF OUTPUT VOLTAGE: 1.25V; 1.35; 1.5V; 1.8V; 2V; 2.1V; 2.2V; 2.5V; 2.6V; 2.7V; 2.8V; 2.85V; 2.9V; 3V; 3.1V; 3.2V; 3.3V; 4.7V
- FAST TURN-ON TIME: TYP. 240 $\mu$ s [C<sub>O</sub>=2.2 $\mu$ F, C<sub>BYP</sub>= 33nF AND I<sub>O</sub>=1mA]
- LOGIC-CONTROLLED ELECTRONIC SHUTDOWN
- INTERNAL CURRENT AND THERMAL LIMIT
- OUTPUT LOW NOISE VOLTAGE 30 $\mu$ V<sub>RMS</sub> OVER 10Hz to 100KHz
- S.V.R. OF 55dB AT 1KHz, 50dB AT 10KHz
- TEMPERATURE RANGE: -40°C TO 125°C

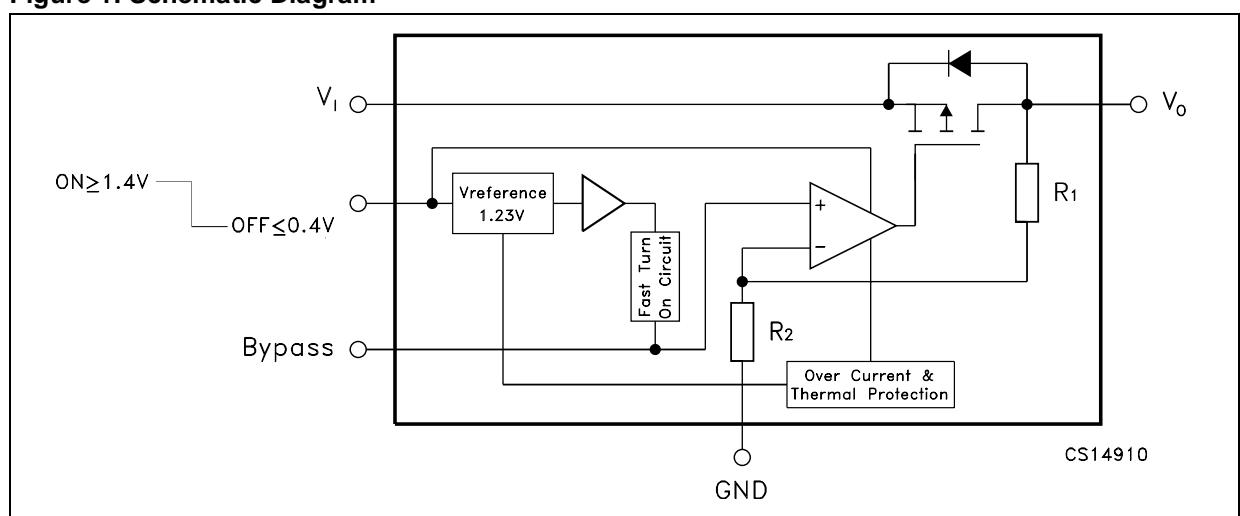


It is stable with ceramic and high quality tantalum capacitor. The ultra low drop-voltage, low quiescent current and low noise makes it suitable for low power applications and in battery powered systems. Regulator ground current increases only slightly in dropout, further prolonging the battery life. Shutdown Logic Control function is available, this means that when the device is used as local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption. Typical applications are in mobile phone and similar battery powered wireless systems, portable information appliances.

### DESCRIPTION

The LDS3985 provides up to 300mA, from 2.5V to 6V input voltage.

**Figure 1: Schematic Diagram**



**Table 1: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$V_I$	DC Input Voltage	-0.3 to 6 (*)	V
$V_O$	DC Output Voltage	-0.3 to $V_I+0.3$	V
$V_{INH}$	INHIBIT Input Voltage	-0.3 to $V_I+0.3$	V
$I_O$	Output Current	Internally limited	
$P_D$	Power Dissipation	Internally limited	
$T_{STG}$	Storage Temperature Range	-65 to 150	°C
$T_{OP}$	Operating Junction Temperature Range	-40 to 125	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(\*) The input pin is able to withstand non repetitive spike of 6.5V for 200ms.

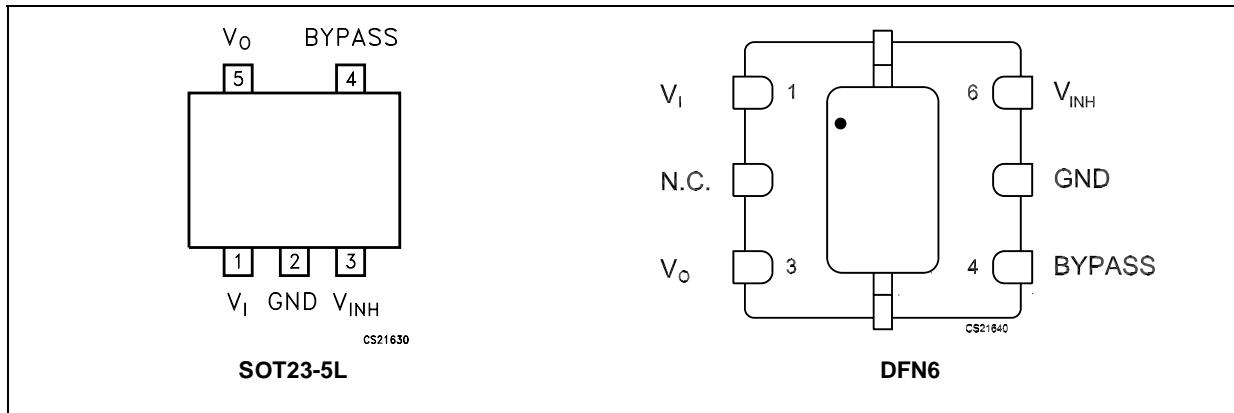
**Table 2: Thermal Data**

Symbol	Parameter	SOT23-5L	DFN6	Unit
$R_{thj-case}$	Thermal Resistance Junction-case	81	10	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	255	55	°C/W

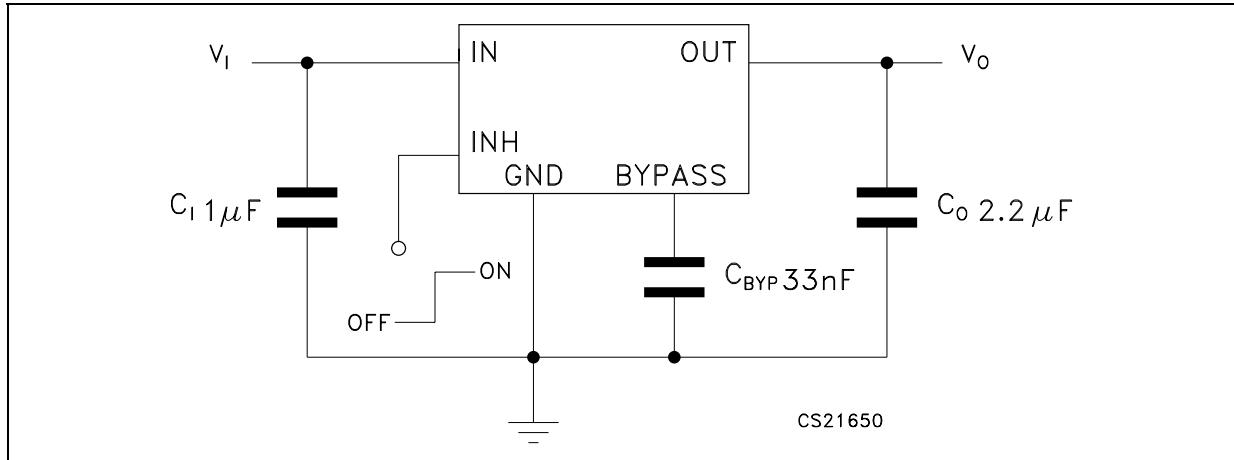
**Table 3: Order Codes**

SOT23-5L	DFN6	OUTPUT VOLTAGES
LDS3985M125R (*)	LDS3985PM12R (*)	1.25 V
LDS3985M135R (*)	LDS3985PM13R (*)	1.35 V
LDS3985M15R (*)	LDS3985PM15R (*)	1.5 V
LDS3985M18R	LDS3985PM18R	1.8 V
LDS3985M20R (*)	LDS3985PM20R (*)	2.0 V
LDS3985M21R (*)	LDS3985PM21R (*)	2.1 V
LDS3985M22R (*)	LDS3985PM22R (*)	2.2 V
LDS3985M25R	LDS3985PM25R	2.5 V
LDS3985M26R (*)	LDS3985PM26R (*)	2.6 V
LDS3985M27R (*)	LDS3985PM27R (*)	2.7 V
LDS3985M28R	LDS3985PM28R	2.8 V
LDS3985M285R (*)	LDS3985PM285R (*)	2.85 V
LDS3985M29R	LDS3985PM29R (*)	2.9 V
LDS3985M30R (*)	LDS3985PM30R (*)	3.0 V
LDS3985M31R (*)	LDS3985PM31R (*)	3.1 V
LDS3985M32R (*)	LDS3985PM32R (*)	3.2 V
LDS3985M33R	LDS3985PM33R	3.3 V
LDS3985M47R (*)	LDS3985PM47R (*)	4.7 V
LDS3985M48R (*)	LDS3985PM48R (*)	4.8 V
LDS3985M49R (*)	LDS3985PM49R (*)	4.9 V
LDS3985M50R (*)	LDS3985PM50R (*)	5.0 V

(\*) Available on request.

**Figure 2: Connection Diagram** (top view for SOT, top through view for DFN6)**Table 4: Pin Description**

Pin N° SOT23-5L	Pin N° DFN6	Symbol	Name and Function
1	1	$V_I$	Input Voltage of the LDO
2	5	GND	Common Ground
3	6	$V_{INH}$	Inhibit Input Voltage: ON MODE when $V_{INH} \geq 1.2V$ , OFF MODE when $V_{INH} \leq 0.4V$ (Do not leave floating, not internally pulled down/up)
4	4	BYPASS	Bypass Pin: Connect an external capacitor (usually 10nF) to minimize noise voltage
5	3	$V_O$	Output Voltage of the LDO
-	2	N.C.	Not Connect.

**Figure 3: Typical Application Circuit**

**Table 5: Electrical Characteristics For LDS3985** ( $T_j = 25^\circ\text{C}$ ,  $V_I = V_{O(\text{NOM})} + 0.5\text{V}$ ,  $C_1 = 1\mu\text{F}$ ,  $C_O = 2.2\mu\text{F}$ ,  $C_{\text{BYP}} = 33\text{nF}$ ,  $I_O = 1\text{mA}$ ,  $V_{\text{INH}} = 1.4\text{V}$ , unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$V_I$	Operating Input Voltage			2.5		6	V
$V_O$	Output Voltage $< 2.5\text{V}$	$I_O = 1\text{ mA}$		-50		50	mV
		$T_j = -40 \text{ to } 125^\circ\text{C}$		-75		75	
$V_O$	Output Voltage $\geq 2.5\text{V}$	$I_O = 1\text{ mA}$		-2		2	% of $V_{O(\text{NOM})}$
		$T_j = -40 \text{ to } 125^\circ\text{C}$		-3		3	
$\Delta V_O$	Line Regulation (Note 1)	$V_I = V_{O(\text{NOM})} + 0.5 \text{ to } 6\text{V}$		$T_j = -40 \text{ to } 125^\circ\text{C}$	-0.1	0.1	%/V
		$V_O = 4.7 \text{ to } 5\text{V}$			-0.19	0.19	
$\Delta V_O$	Load Regulation	$I_O = 1\text{ mA to } 300\text{mA}$	$V_O \leq 2.5\text{V}$		0.005	0.01	%/mA
$\Delta V_O$	Load Regulation	$I_O = 1\text{ mA to } 300\text{mA}$	$V_O \geq 2.5\text{V}$		0.0008	0.004	%/mA
$\Delta V_O$	Output AC Line Regulation (Note 2)	$V_I = V_{O(\text{NOM})} + 1\text{V}$ , $I_O = 300\text{mA}$ , $t_R = t_F = 30\mu\text{s}$			5		mV <sub>PP</sub>
$I_Q$	Quiescent Current ON MODE: $V_{\text{INH}} = 1.24\text{V}$	$I_O = 0$			85		$\mu\text{A}$
		$I_O = 0$		$T_j = -40 \text{ to } 125^\circ\text{C}$		150	
		$I_O = 0 \text{ to } 300\text{mA}$			200		
		$I_O = 0 \text{ to } 300\text{mA}$		$T_j = -40 \text{ to } 125^\circ\text{C}$		300	
	OFF MODE: $V_{\text{INH}} = 0.4\text{V}$				0.003		
		$T_j = -40 \text{ to } 125^\circ\text{C}$				1.5	
$V_{\text{DROP}}$	Dropout Voltage (Note 3)	$I_O = 1\text{mA}$			0.4		mV
		$I_O = 1\text{mA}$		$T_j = -40 \text{ to } 125^\circ\text{C}$		2	
		$I_O = 150\text{mA}$			60		
		$I_O = 150\text{mA}$		$T_j = -40 \text{ to } 125^\circ\text{C}$		100	
		$I_O = 300\text{mA}$			150		
		$I_O = 300\text{mA}$		$T_j = -40 \text{ to } 125^\circ\text{C}$		250	
$I_{\text{SC}}$	Short Circuit Current	$R_L = 0$			600		mA
SVR	Supply Voltage Rejection	$V_I = V_{O(\text{NOM})} + 0.25\text{V} \pm$		$f = 1\text{KHz}$	55		dB
		$V_{\text{RIPPLE}} = 0.1\text{V}$ , $I_O = 50\text{mA}$		$f = 10\text{KHz}$	50		
For $V_{O(\text{NOM})} < 2.5\text{V}$ , $V_I = 2.55\text{V}$							
$I_{O(\text{PK})}$	Peak Output Current	$V_O \geq V_{O(\text{NOM})} - 5\%$		300	550		mA
$V_{\text{INH}}$	Inhibit Input Logic Low	$V_I = 2.5\text{V} \text{ to } 6\text{V}$		$T_j = -40 \text{ to } 125^\circ\text{C}$		0.4	V
	Inhibit Input Logic High				1.4		
$I_{\text{INH}}$	Inhibit Input Current	$V_{\text{INH}} = 0.4\text{V}$		$V_I = 6\text{V}$		$\pm 1$	nA
$eN$	Output Noise Voltage	$B_W = 10\text{ Hz to } 100\text{ KHz}$		$C_O = 2.2\mu\text{F}$		30	$\mu\text{VRMS}$
$t_{\text{ON}}$	Turn On Time (Note 4)	$C_{\text{BYP}} = 33\text{nF}$			240		$\mu\text{s}$
$T_{\text{SHDN}}$	Thermal Shutdown	Note 5			160		$^\circ\text{C}$
$C_O$	Output Capacitor	Capacitance (Note 6)		2.2		22	$\mu\text{F}$
		ESR		5		5000	$\text{m}\Omega$

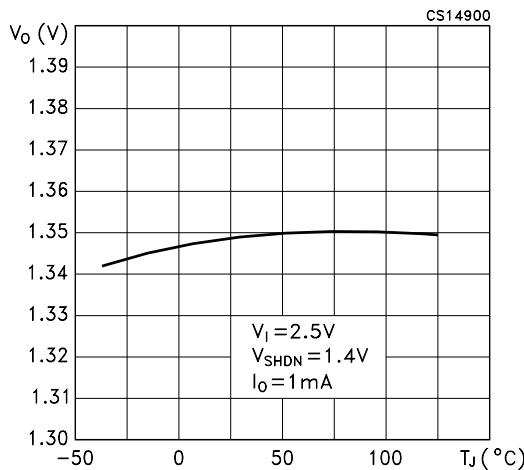
Note 1: For  $V_{O(\text{NOM})} < 2\text{V}$   $V_I = 2.5\text{V}$ Note 2: For  $V_{O(\text{NOM})} = 1.25\text{V}$   $V_I = 2.5\text{V}$ 

Note 3: Dropout voltage is the input-to-output voltage difference at which the output voltage is 100mV below its nominal value. This specification does not apply for input voltages below 2.5V.

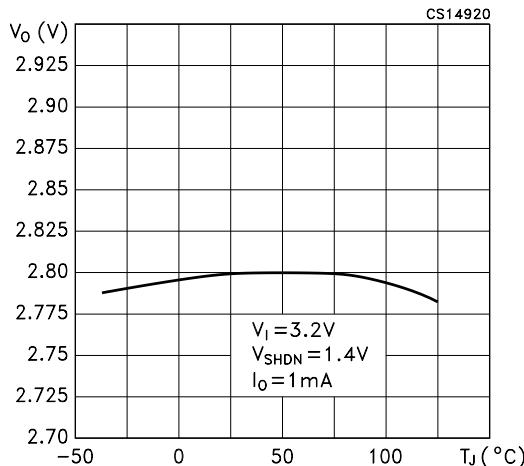
Note 4: Turn-on time is time measured between the enable input just exceeding  $V_{\text{INH}}$  High Value and the output voltage just reaching 95% of its nominal valueNote 5: Typical thermal protection hysteresis is  $20^\circ\text{C}$

**TYPICAL PERFORMANCE CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$ ,  $V_I = V_{O(\text{NOM})} + 0.5\text{V}$ ,  $C_I = 1\mu\text{F}$ ,  $C_O = 2,2\mu\text{F}$ ,  $C_{\text{BYP}} = 33\text{nF}$ ,  $I_O = 1\text{mA}$ ,  $V_{\text{INH}} = 1.4\text{V}$ , unless otherwise specified)

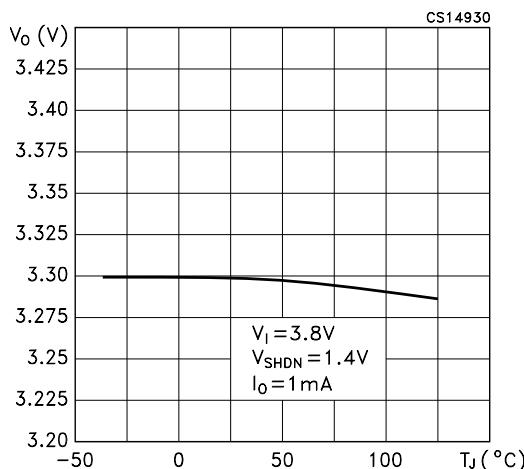
**Figure 4:** Output Voltage vs Temperature



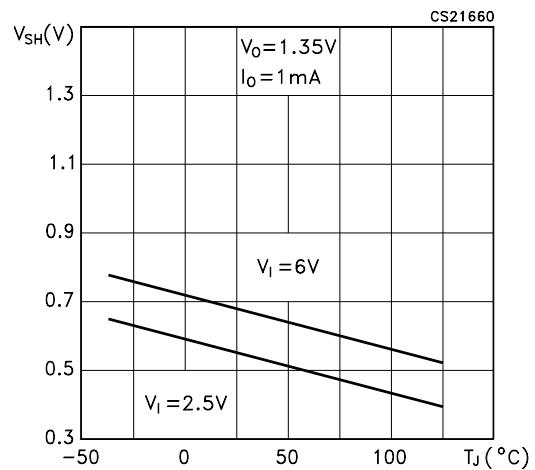
**Figure 5:** Output Voltage vs Temperature



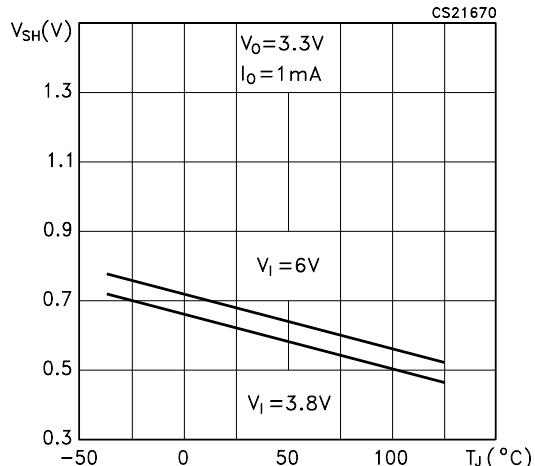
**Figure 6:** Output Voltage vs Temperature



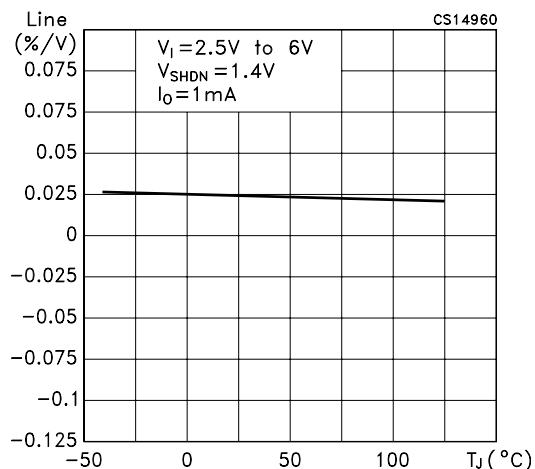
**Figure 7:** Shutdown Voltage vs Temperature



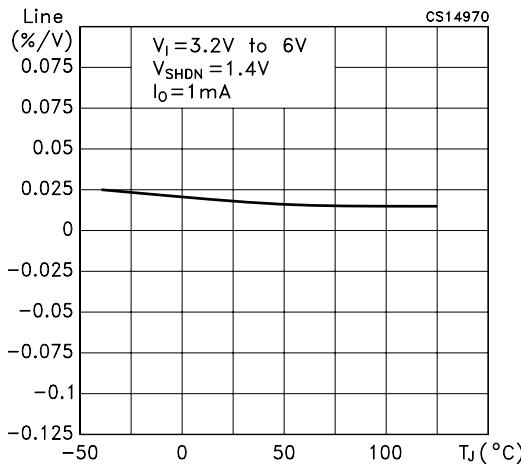
**Figure 8:** Shutdown Voltage vs Temperature



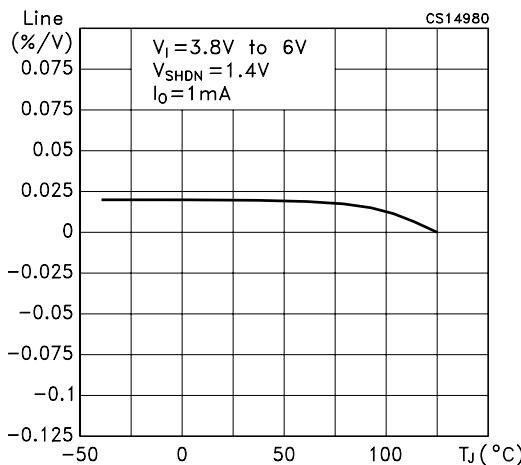
**Figure 9:** Line Regulation vs Temperature



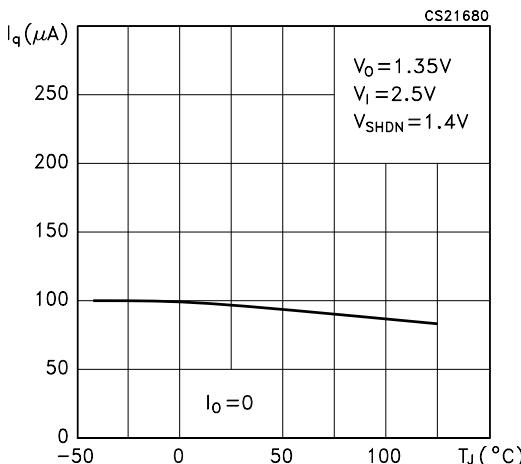
**Figure 10: Line Regulation vs Temperature**



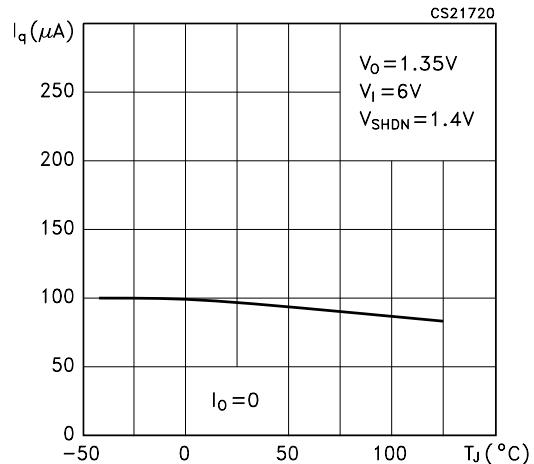
**Figure 11: Line Regulation vs Temperature**



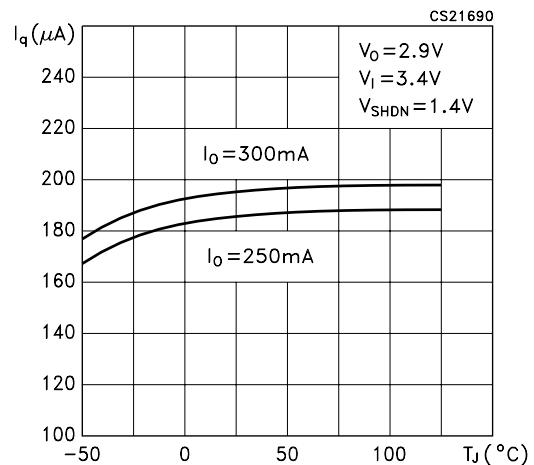
**Figure 12: Quiescent Current vs Temperature**



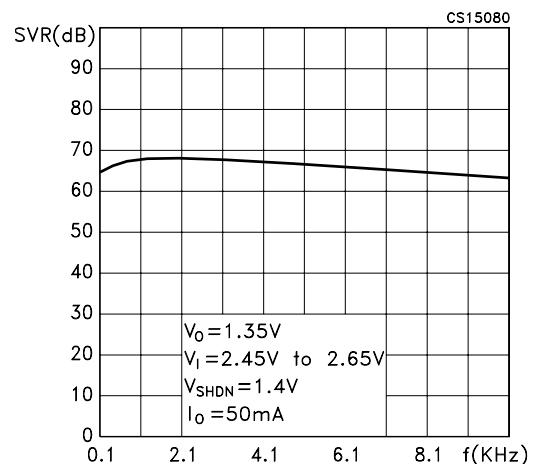
**Figure 13: Quiescent Current vs Temperature**

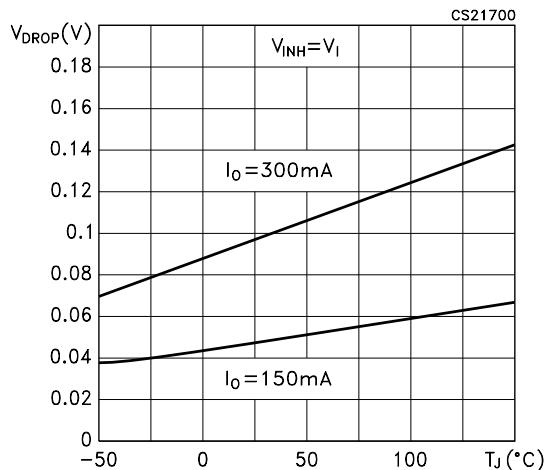
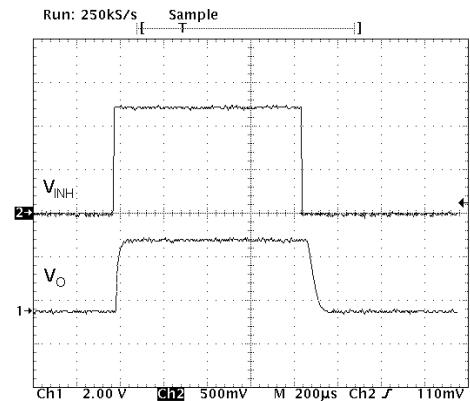


**Figure 14: Quiescent Current vs Temperature**

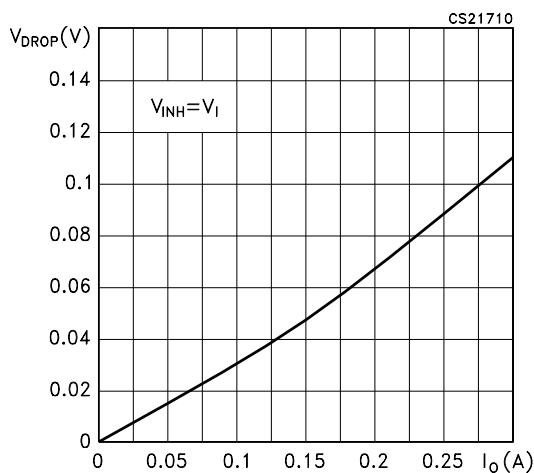


**Figure 15: Supply Voltage Rejection vs Frequency**



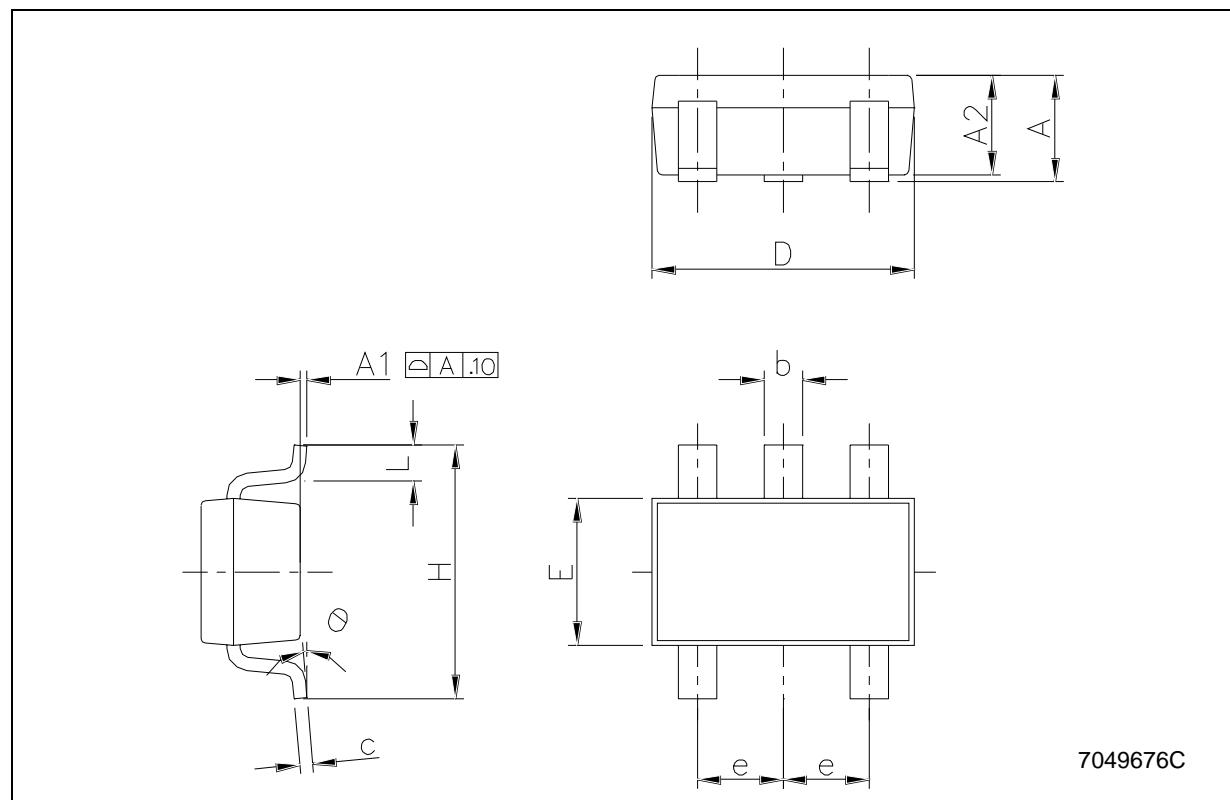
**Figure 16:** Dropout Voltage vs Temperature**Figure 18:** Inhibit Transient

V<sub>I</sub> = 5V, I<sub>O</sub> = 1mA, V<sub>INH</sub> = 0 to 1.2V, C<sub>I</sub> = C<sub>O</sub> = 1μF (cer),  
C<sub>BYP</sub> = 10nF, T<sub>R</sub> = T<sub>F</sub> = 1μs

**Figure 17:** Dropout Voltage vs Output Current

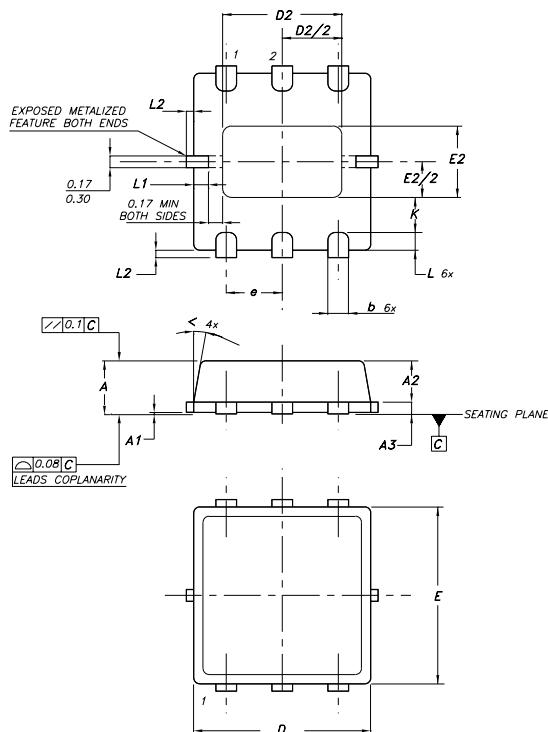
## SOT23-5L MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



## DFN6 (3x3) MECHANICAL DATA

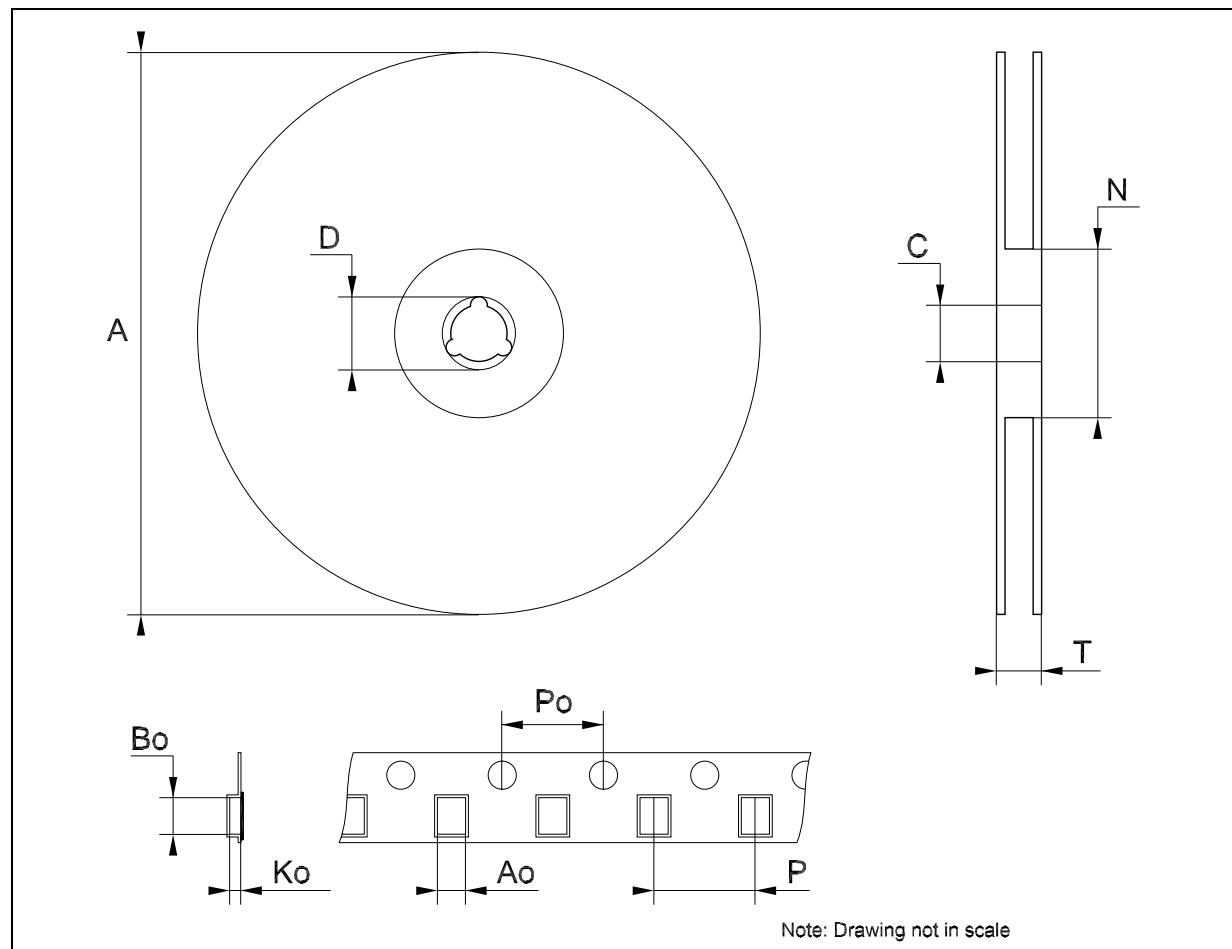
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.80		1.00	31.5		39.4
A1	0		0.05	0.0		2.0
A2	0.65		0.75	25.6		29.5
A3		0.20			7.9	
b	0.33		0.43	13.0		16.9
D	2.90	3.00	3.10	114.2	118.1	122.0
D2	1.92		2.12	75.6		83.5
E	2.90	3.00	3.10	114.2	118.1	122.0
E2	1.11		1.31	43.7		51.6
e		0.95			37.4	
L	0.20		0.45	7.9		17.7
L1		0.24			9.4	
L2			0.13			5.1
K	0.20			7.9		



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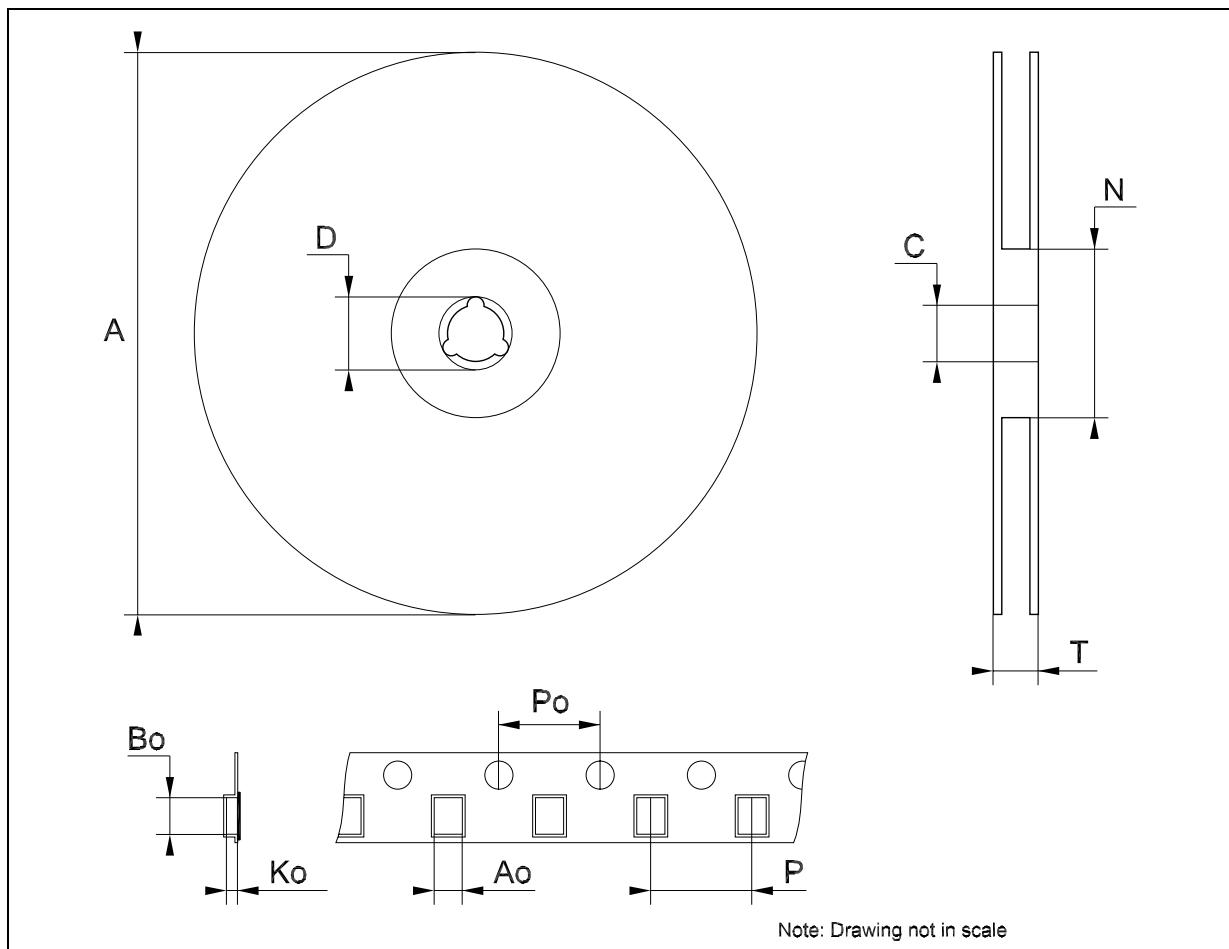
## Tape &amp; Reel SOT23-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	3.13	3.23	3.33	0.123	0.127	0.131
Bo	3.07	3.17	3.27	0.120	0.124	0.128
Ko	1.27	1.37	1.47	0.050	0.054	0.058
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	3.9	4.0	4.1	0.153	0.157	0.161



## Tape &amp; Reel QFNxx/DFNxx (3x3) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			18.4			0.724
Ao		3.3			0.130	
Bo		3.3			0.130	
Ko		1.1			0.043	
Po		4			0.157	
P		8			0.315	



**Table 6: Revision History**

Date	Revision	Description of Changes
02-Dic-2004	1	First Release.

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