

VERY LOW DROP VOLTAGE REGULATORS WITH INHIBIT

- ULTRA LOW DROPOUT VOLTAGE
(0.2V AT 100mA LOAD, 7mV AT 1mA LOAD)
- VERY LOW QUIESCENT CURRENT
(MAX 1 μ A WHEN IS IN SHUTDOWN MODE)
- OUTPUT CURRENT UP TO 100 mA
- LOGIC-CONTROLLED ELECTRONIC SHUTDOWN
- OUTPUT VOLTAGES OF 2.85; 3.0; 3.2; 3.3; 3.8; 4.85; 5.0V
- INTERNAL CURRENT AND THERMAL LIMIT
- AVAILABLE IN $\pm 0.75\%$ TOLLERANCE (AT 25°C, A VERSION)
- OUTPUT LOW NOISE VOLTAGE 160 μ Vrms
- ONLY 4.7 μ F FOR STABILITY
- TEMPERATURE RANGE: -40 TO 125 °C
- SMALLEST PACKAGE SOT23-5L
- FAST DYNAMIC RESPONSE TO LINE AND LOAD CHANGES

DESCRIPTION

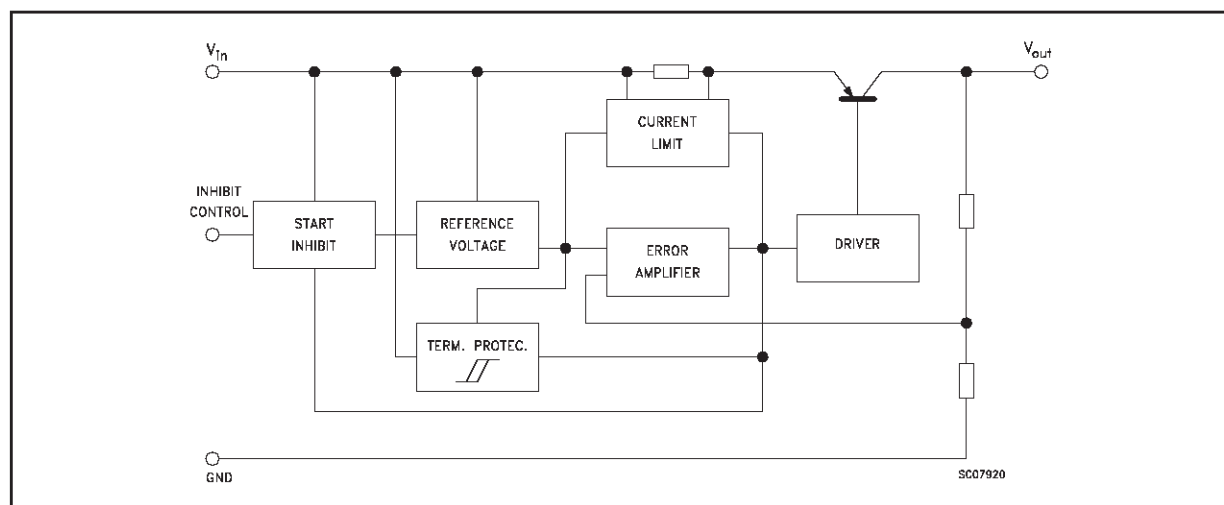
The LD2981 series are 100 mA fixed-output voltage regulator. The ultra drop-voltage and the ultra low quiescent current make them particularly suitable for low noise, low power applications and in battery powered systems.



SOT23-5L

In sleep mode quiescent current is less than 1 μ A when INHIBIT pin is pulled low. Shutdown Logic Control function is available on pin n.3 (TTL compatible). 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 application are in cellular phone, palmtop/laptop computer, personal digital assistant (PDA), personal stereo, camcorder and camera.

SCHEMATIC DIAGRAM



LD2981

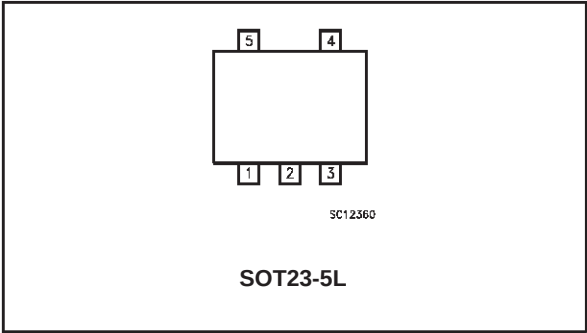
ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
V_{IN}	DC Input Voltage	16	V
V_{INH}	INHBIT Input Voltage	16	V
I_o	Output Current	Internally limited	mA
P_{tot}	Power Dissipation	Internally limited	mW
T_{stg}	Storage Temperature Range	- 55 to 150	°C
T_{op}	Operating Junction Temperature Range	- 40 to 125	°C

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal Resistance Junction-case	81	°C/W

CONNECTION DIAGRAM (top view)



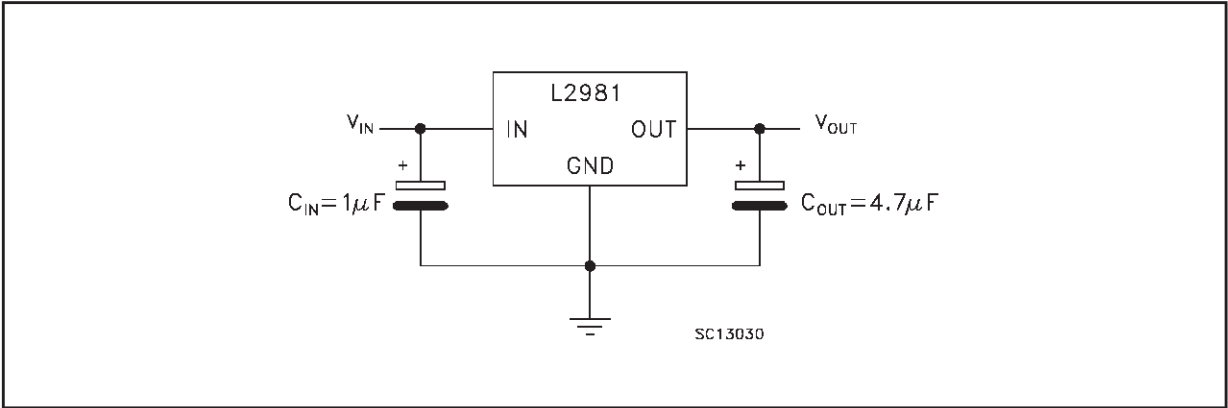
SYMBOL	NAME AND FUNCTION	PIN NUMBER
V_{IN}	Input Voltage	1
GND	Ground	2
INHIBIT	Control Switch ON/OFF(*)	3
NC	Not to be connected	4
V_{OUT}	Output Voltage	5

(*) Disable the device when connected to GND or to a positive voltage less than 0.18V

ORDERING NUMBERS

"AB" VERSION	"C" VERSION	Output Voltage
LD2981ABM28TR	LD2981CM28TR	2.85 V
LD2981ABM30TR	LD2981CM30TR	3.0 V
LD2981ABM32TR	LD2981CM32TR	3.2 V
LD2981ABM33TR	LD2981CM33TR	3.3 V
LD2981ABM38TR	LD2981CM38TR	3.8 V
LD2981ABM48TR	LD2981CM48TR	4.85 V
LD2981ABM50TR	LD2981CM50TR	5.0 V

APPLICATION CIRCUIT



ELECTRICAL CHARACTERISTICS FOR LD2981AB (refer to the test circuits, $T_J = 25\text{ }^{\circ}\text{C}$,
 $V_{IN} = V_{O(NOM)} + 1$, $C_O = 1\text{ }\mu\text{F}$, $I_O = 1\text{ mA}$, $V_{INH} = 2\text{ V}$, unless otherwise specified)

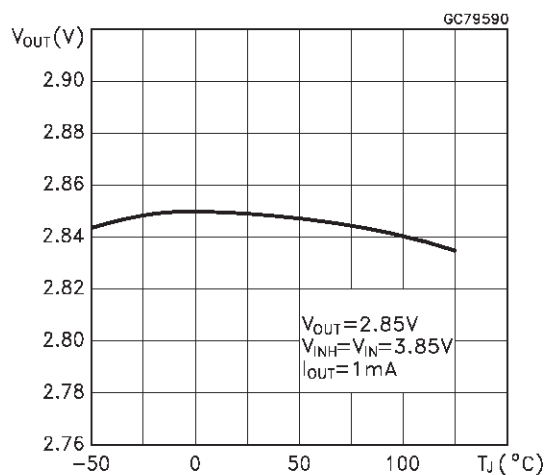
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$V_{IN} = 3.85\text{ V}$	2.828	2.85	2.872	V
		$1 < I_O < 100\text{ mA}$	2.822		2.878	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	2.779		2.921	V
V_O	Output Voltage	$V_{IN} = 4\text{ V}$	2.977	3	3.023	V
		$1 < I_O < 100\text{ mA}$	2.970		3.030	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	2.925		3.075	V
V_O	Output Voltage	$V_{IN} = 4.2\text{ V}$	3.176	3.2	3.224	V
		$1 < I_O < 100\text{ mA}$	3.168		3.232	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	3.12		3.28	V
V_O	Output Voltage	$V_{IN} = 4.3\text{ V}$	3.275	3.3	3.325	V
		$1 < I_O < 100\text{ mA}$	3.267		3.333	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	3.217		3.383	V
V_O	Output Voltage	$V_{IN} = 4.8\text{ V}$	3.771	3.8	3.829	V
		$1 < I_O < 100\text{ mA}$	3.762		3.838	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	3.705		3.895	V
V_O	Output Voltage	$V_{IN} = 5.85\text{ V}$	4.813	4.85	4.887	V
		$1 < I_O < 100\text{ mA}$	4.801		4.899	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	4.729		4.971	V
V_O	Output Voltage	$V_{IN} = 6\text{ V}$	4.962	5	5.038	V
		$1 < I_O < 100\text{ mA}$	4.950		5.050	V
		$1 < I_O < 100\text{ mA}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$	4.875		5.125	V
I_{out}	Output Current Limit		150			mA
ΔV_O	Line Regulation	$V_{O(NOM)} + 1 < V_{IN} < 16\text{ V}$, $I_O = 1\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$		0.003	0.014 0.032	%/ V_{in}
I_d	Quiescent Current	ON MODE				
		$I_O = 0\text{ mA}$		80	100	μA
		$I_O = 0\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			150	μA
		$I_O = 1\text{ mA}$		100	150	μA
		$I_O = 1\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			200	μA
		$I_O = 25\text{ mA}$		250	400	μA
		$I_O = 25\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			800	μA
		$I_O = 100\text{ mA}$		800	1300	μA
		$I_O = 100\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			2600	μA
		OFF MODE				
		$V_{INH} < 0.3\text{ V}$			0.8	μA
		$V_{INH} < 0.15\text{ V}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			2	μA
SVR	Supply Voltage Rejection	$f = 1\text{ KHz}$, $C_{out} = 10\text{ }\mu\text{F}$		63		dB
V_d	Dropout Voltage	$I_O = 0\text{ mA}$		1	3	mV
		$I_O = 0\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			5	mV
		$I_O = 1\text{ mA}$		7	10	mV
		$I_O = 1\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			15	mV
		$I_O = 25\text{ mA}$		70	100	mV
		$I_O = 25\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			150	mV
		$I_O = 100\text{ mA}$		200	250	mV
		$I_O = 100\text{ mA}$ $-40 < T_J < 125\text{ }^{\circ}\text{C}$			375	mV
V_{il}	Control Input Logic Low	LOW = Output OFF $-40 < T_J < 125\text{ }^{\circ}\text{C}$			0.18	V
V_{ih}	Control Input Logic High	HIGH = Output ON $-40 < T_J < 125\text{ }^{\circ}\text{C}$	2			V
I_i	Control Input Current	$V_{INH} = 0\text{ V}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$		0	-1	μA
		$V_{INH} = 5\text{ V}$, $-40 < T_J < 125\text{ }^{\circ}\text{C}$		5	15	μA
eN	Output Noise Voltage (RMS)	BW = 300 Hz to 50 KHz, $C_{out} = 10\text{ }\mu\text{F}$		160		μV
I_{SC}	Short Circuit Current	$R_L = 0$	150			mA

ELECTRICAL CHARACTERISTICS FOR LD2981C (refer to the test circuits, $T_J = 25^\circ\text{C}$,
 $V_{IN} = V_{O(NOM)} + 1$, $C_O = 1\ \mu\text{F}$, $I_O = 1\text{mA}$, $V_{INH} = 2\text{V}$, unless otherwise specified)

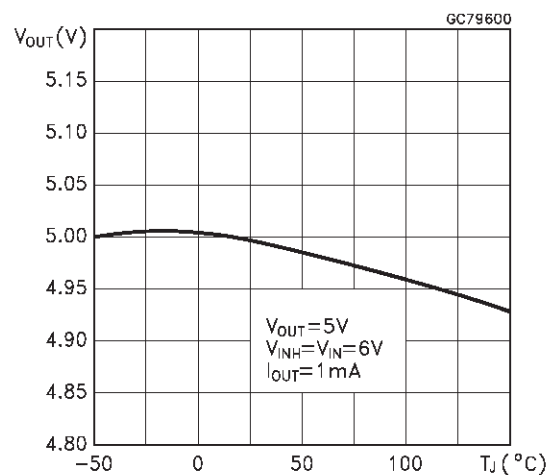
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$V_{IN} = 3.85\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	2.814 2.793 2.750	2.85	2.886 2.907 2.950	V V V
V_O	Output Voltage	$V_{IN} = 4\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	2.962 2.940 2.895	3	3.038 3.060 3.105	V V V
V_O	Output Voltage	$V_{IN} = 4.2\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	3.160 3.136 3.088	3.2	3.240 3.264 3.312	V V V
V_O	Output Voltage	$V_{IN} = 4.3\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	3.259 3.234 3.184	3.3	3.341 3.366 3.416	V V V
V_O	Output Voltage	$V_{IN} = 4.8\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	3.752 3.724 3.667	3.8	3.848 3.876 3.933	V V V
V_O	Output Voltage	$V_{IN} = 5.85\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	4.789 4.753 4.680	4.85	4.911 4.947 5.020	V V V
V_O	Output Voltage	$V_{IN} = 6\text{ V}$ $1 < I_O < 100\text{ mA}$ $1 < I_O < 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$	4.937 4.900 4.825	5	5.063 5.100 5.175	V V V
I_{out}	Output Current Limit		150			mA
ΔV_O	Line Regulation	$V_{O(NOM)} + 1 < V_{IN} < 16\text{V}$, $I_O = 1\text{ mA}$ $-40 < T_J < 125^\circ\text{C}$		0.003	0.014 0.032	%/ V_{in}
I_d	Quiescent Current	ON MODE $I_O = 0\text{ mA}$ $I_O = 0\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 1\text{ mA}$ $I_O = 1\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 25\text{ mA}$ $I_O = 25\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 100\text{ mA}$ $I_O = 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$ OFF MODE $V_{INH} < 0.3\text{ V}$ $V_{INH} < 0.15\text{ V}, -40 < T_J < 125^\circ\text{C}$		80 100 250 800	100 150 150 200 400 800 1300 2600	μA μA μA μA μA μA μA μA μA μA
SVR	Supply Voltage Rejection	$f = 1\text{ KHz}$, $C_{out} = 10\ \mu\text{F}$		63		dB
V_d	Dropout Voltage	$I_O = 0\text{ mA}$ $I_O = 0\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 1\text{ mA}$ $I_O = 1\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 25\text{ mA}$ $I_O = 25\text{ mA}, -40 < T_J < 125^\circ\text{C}$ $I_O = 100\text{ mA}$ $I_O = 100\text{ mA}, -40 < T_J < 125^\circ\text{C}$		1 7 70 200	3 5 10 15 100 150 250 375	mV mV mV mV mV mV mV mV
V_{il}	Control Input Logic Low	LOW = Output OFF $-40 < T_J < 125^\circ\text{C}$			0.18	V
V_{ih}	Control Input Logic High	HIGH = Output ON $-40 < T_J < 125^\circ\text{C}$	2			V
I_i	Control Input Current	$V_{INH} = 0\text{ V}$, $-40 < T_J < 125^\circ\text{C}$ $V_{INH} = 5\text{ V}$, $-40 < T_J < 125^\circ\text{C}$		0 5	-1 15	μA μA
eN	Output Noise Voltage (RMS)	BW = 300 Hz to 50 KHz, $C_{out} = 10\ \mu\text{F}$		160		μV
I_{sc}	Short Circuit Current	$R_L = 0$	150			mA

TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified $T_J=25^{\circ}\text{C}$, $C_{IN}=C_{OUT}=1\mu\text{F}$)

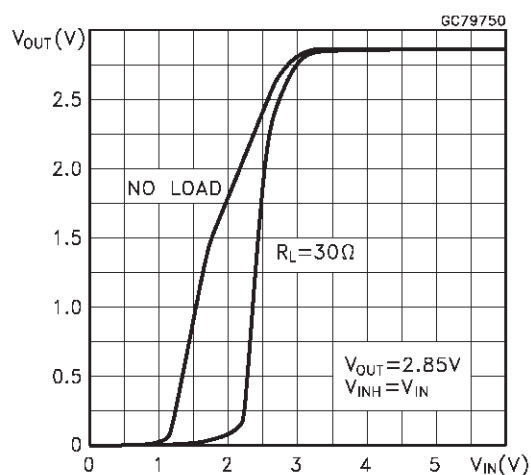
Output Voltage vs Temperature



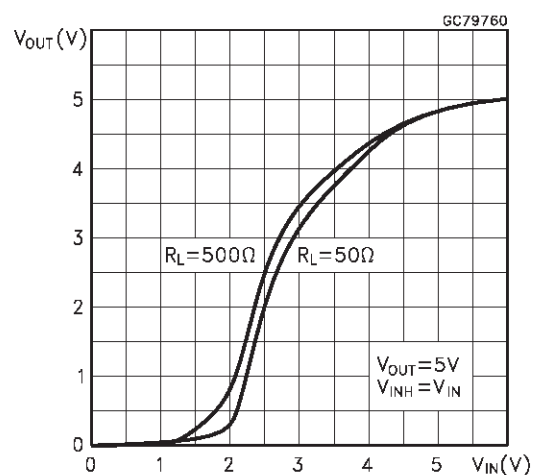
Output Voltage vs Temperature



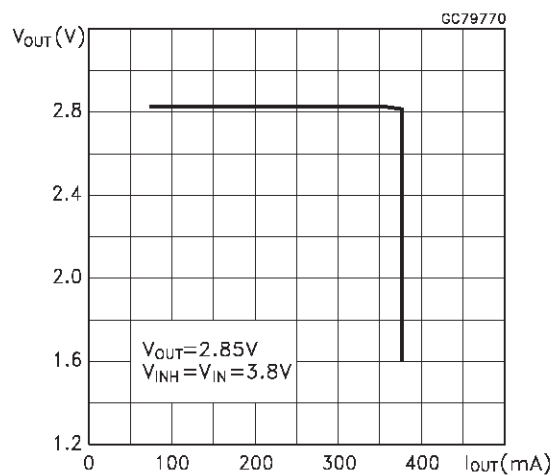
Output Voltage vs Input Voltage



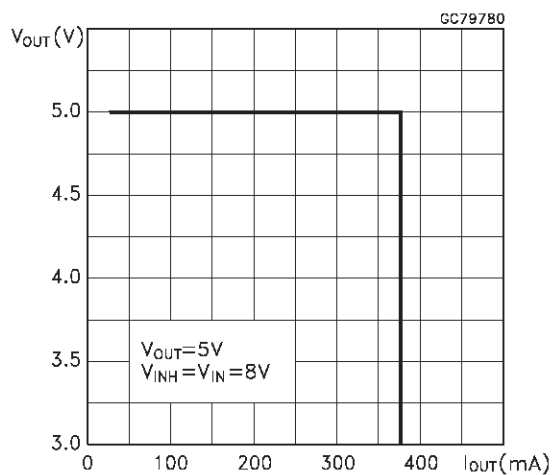
Output Voltage vs Input Voltage



Output Voltage vs Output Current

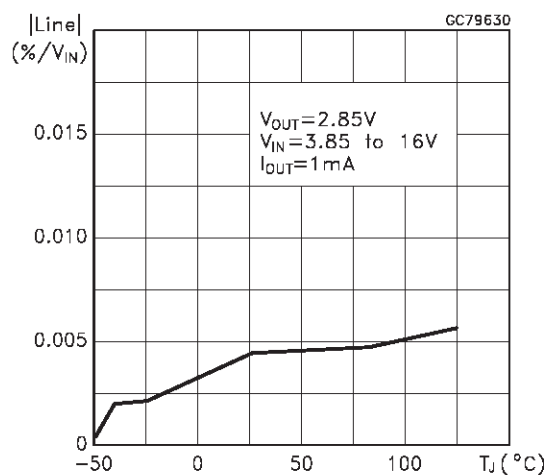


Output Voltage vs Output Current

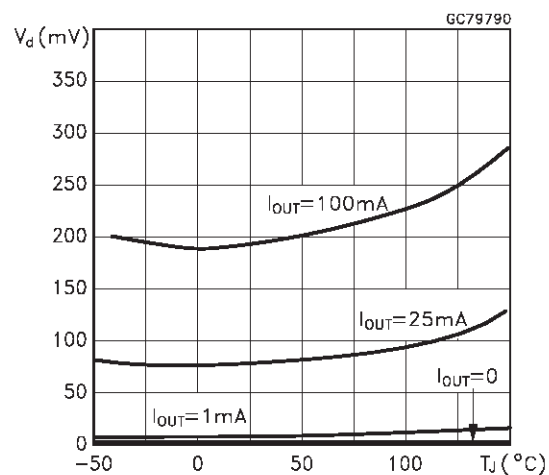


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

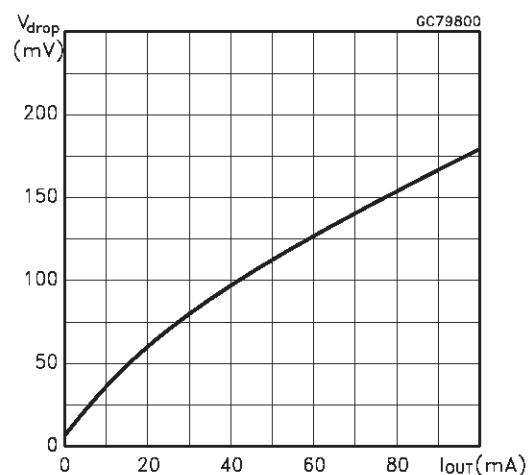
Line Regulation vs Temperature



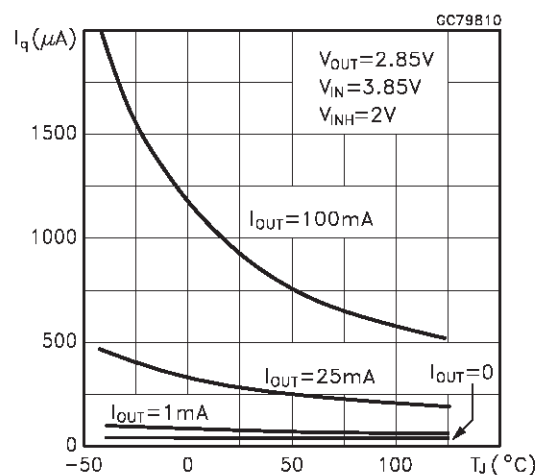
Dropout Voltage vs Temperature



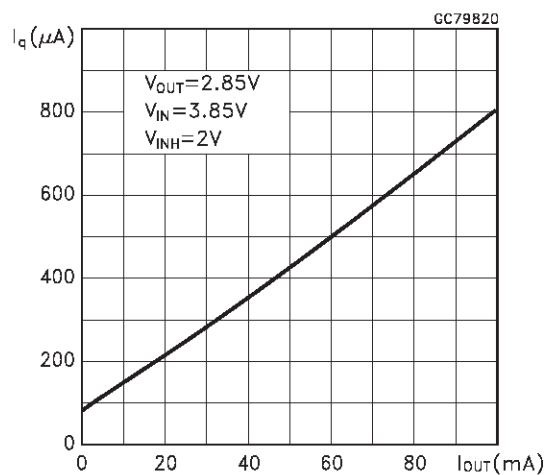
Dropout Voltage vs Output Current



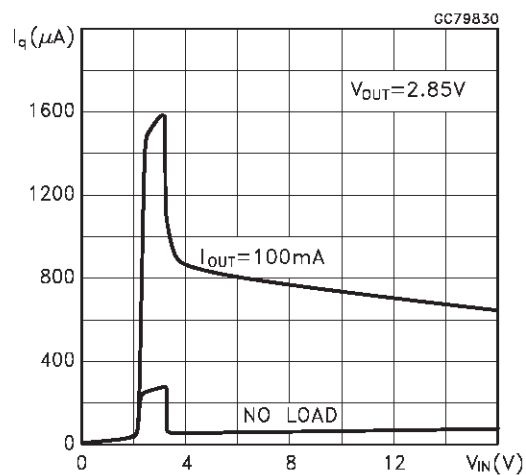
Quiescent Current vs Temperature



Quiescent Current vs Output Current

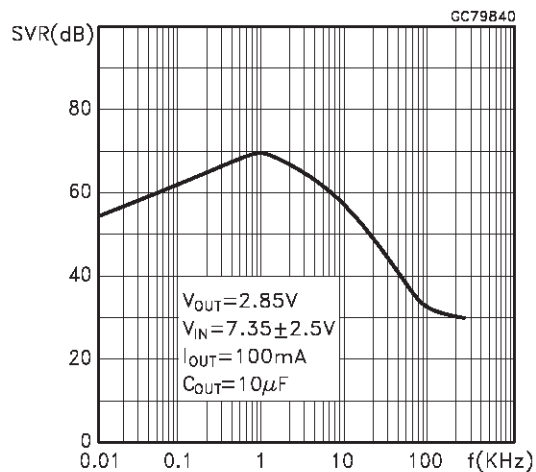


Quiescent Current vs Input Voltage

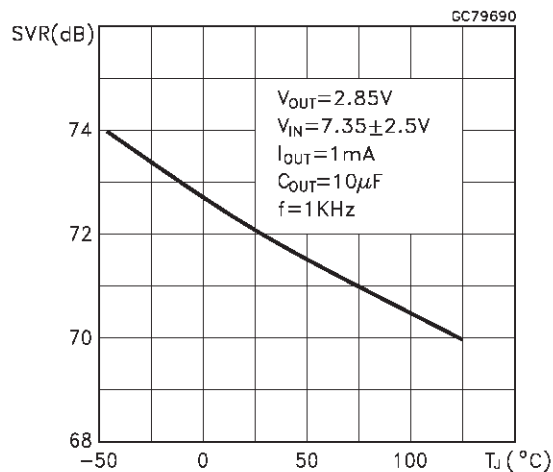


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

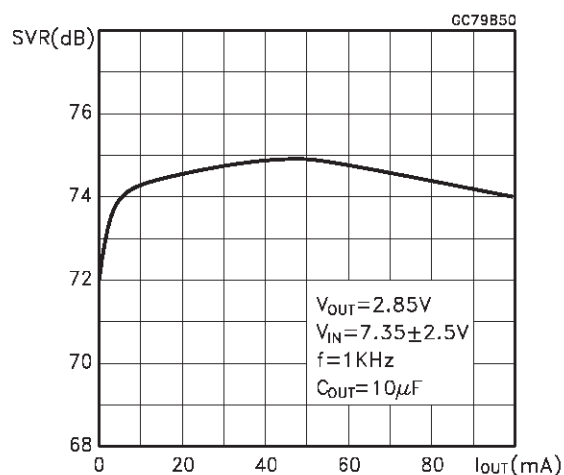
S.V.R. vs Frequency



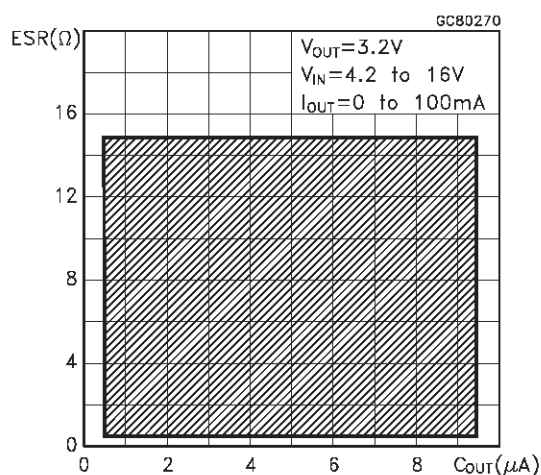
S.V.R. vs Temperature



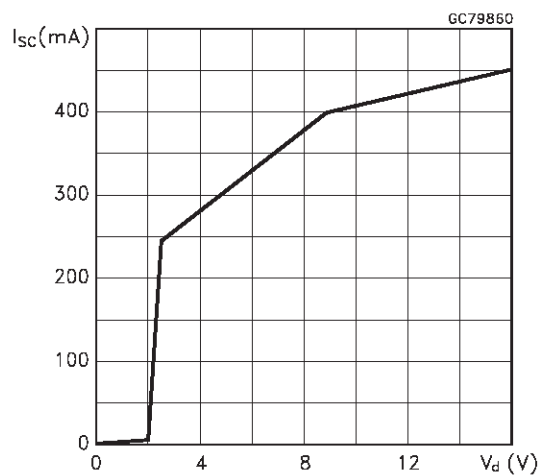
S.V.R. vs Output Current



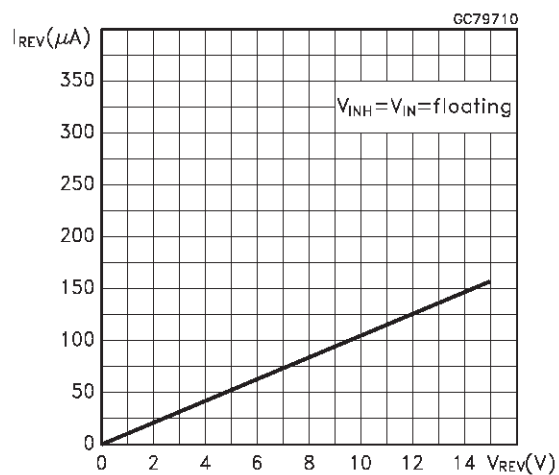
Stability



Short Circuit Current vs Dropout Voltage

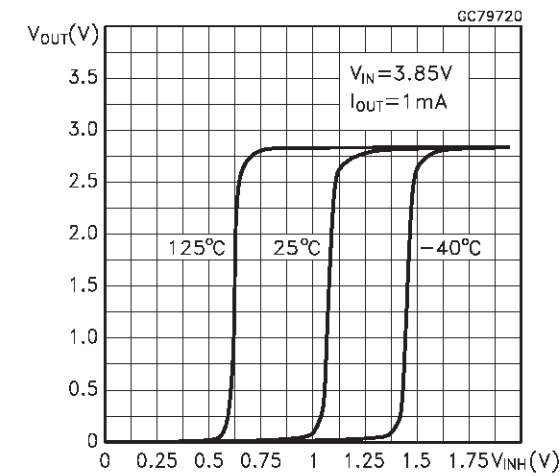


Reverse Current vs Reverse Voltage

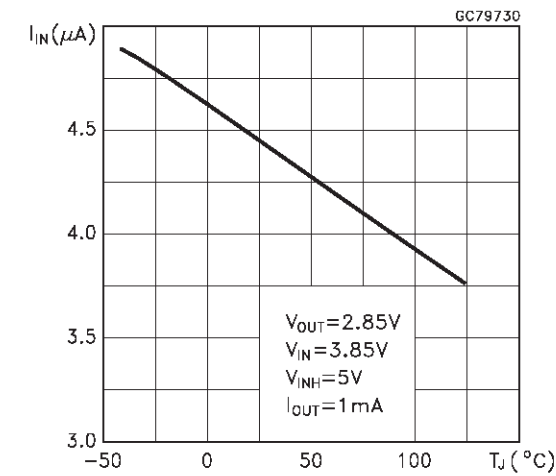


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

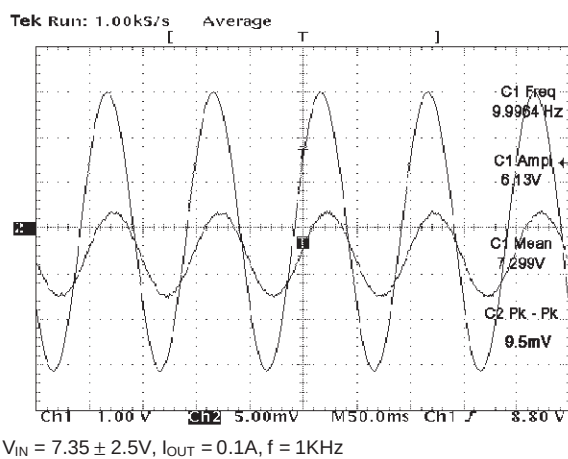
Output Voltage vs Inhibit Voltage



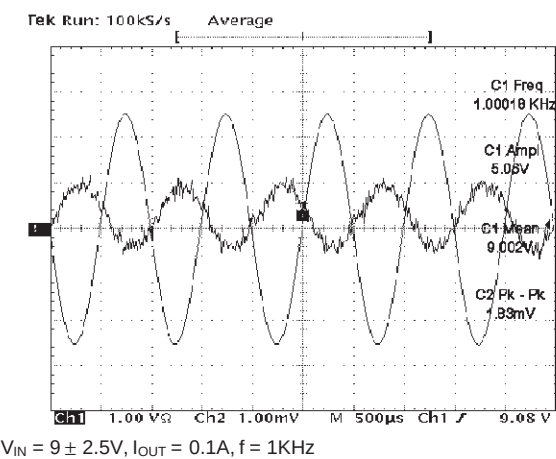
Inhibit Current vs Temperature



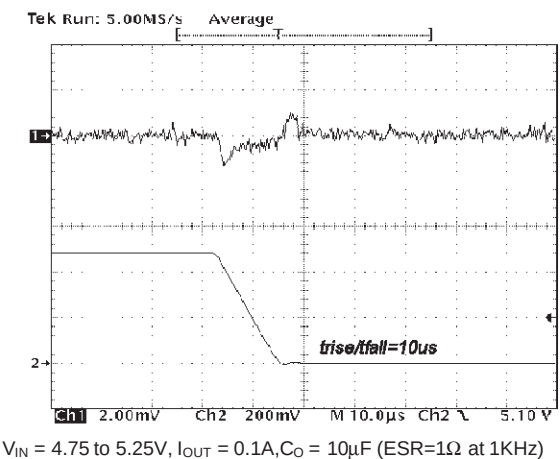
Supply Voltage Rejection at $V_{OUT}=2.85V$



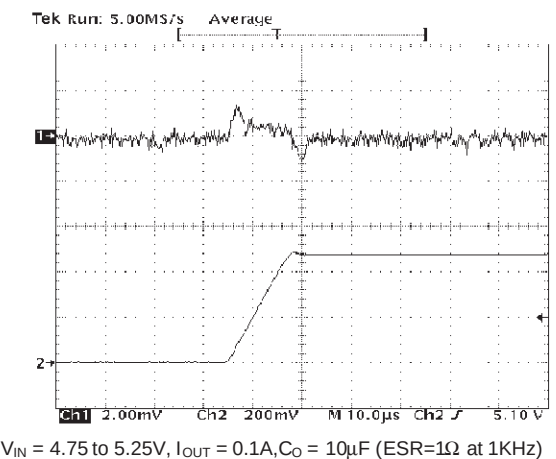
Supply Voltage Rejection at $V_{OUT}=5V$



Line Transient Response

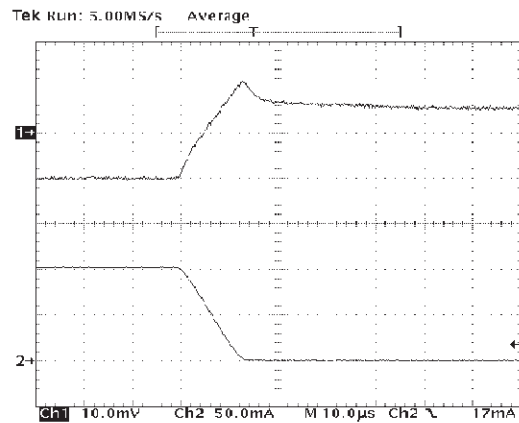


Line Transient Response



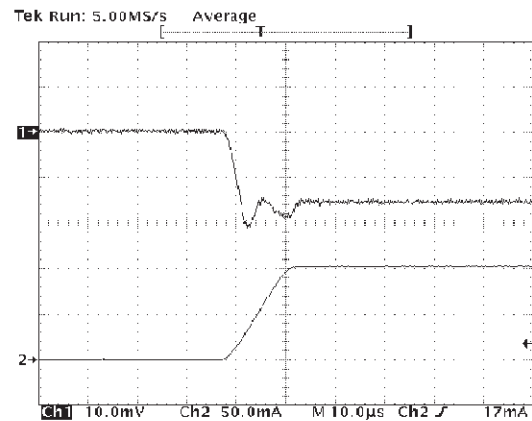
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Load Transient Response



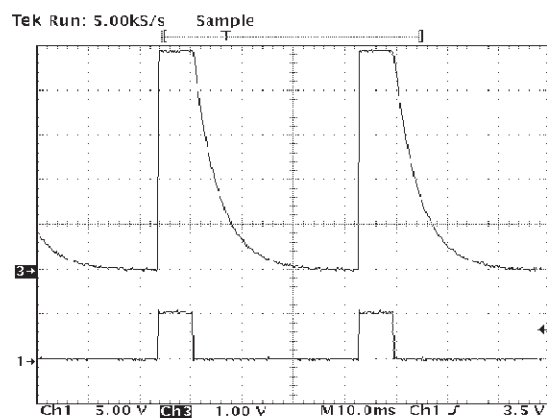
$V_{CC} = 5V$, $I_{OUT} = 1$ to $100mA$, $C_{IN} = 150nF$ $C_{OUT} = 10\mu F$
(ESR=1Ω at 1KHz)

Load Transient Response



$V_{CC} = 5V$, $I_{OUT} = 1$ to $100mA$, $C_{IN} = 150nF$ $C_{OUT} = 10\mu F$
(ESR=1Ω at 1KHz)

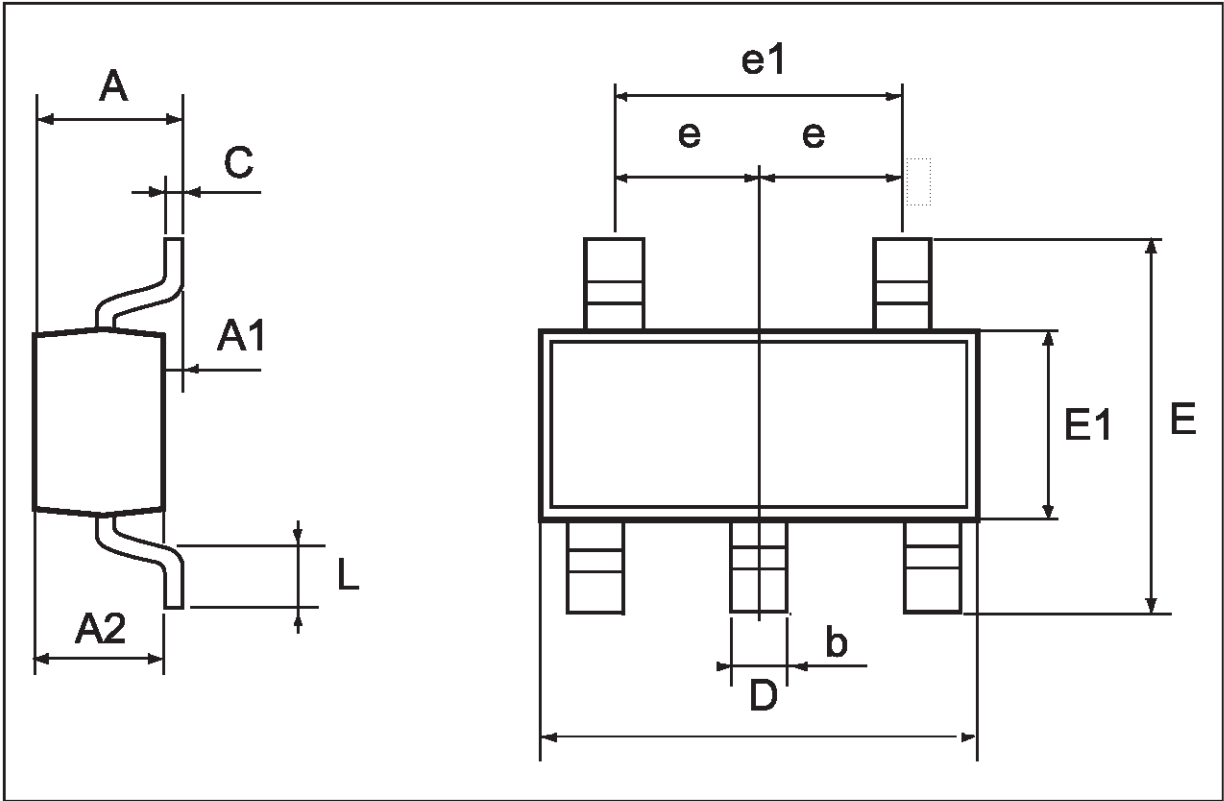
Shutdown Transient Response



$V_{OUT} = 5V$, $V_{IN} = 6V$, $V_{INH} = 0$ to $5V$, $C_{IN} = C_{OUT} = 1\mu F$ (Tant.)

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		0.15	0.0		5.9
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	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
L	0.35		0.55	13.7		21.6
e		0.95			37.4	
e1		1.9			74.8	



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