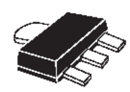
LD2981 SERIES

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 1µA 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 ± 0.75% TOLLERANCE (AT 25°C, A VERSION)
- OUTPUT LOW NOISE VOLTAGE 160µVrms
- ONLY 4.7µF FOR STABILITY
- TEMPERATURE RANGE: -40 TO 125 °C
- SMALLEST PACKAGE SOT23-5L AND SOT-89
- FAST DYNAMIC RESPONCE TO LINE AND LOAD CHANGES

SOT23-5L



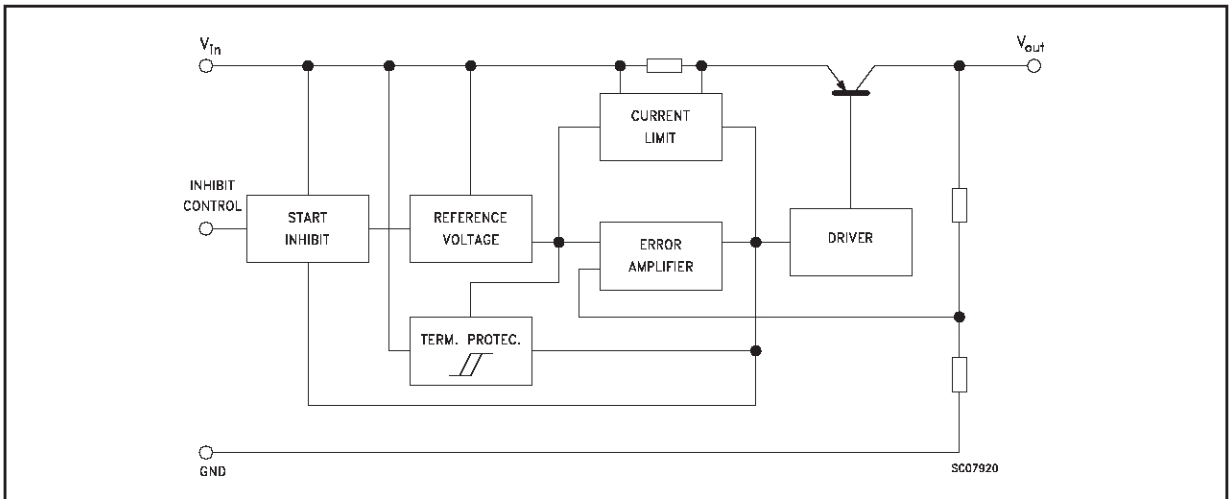
SOT-89

DESCRIPTION

The LD2981 series are 100mA 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.

In sleep mode quiescent current is less than 1µA when INHIBIT pis 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



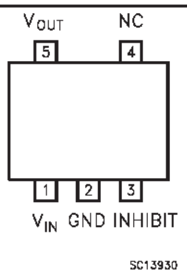
ABSOLUTE MAXIMUM RATING

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	^oC
T_{op}	Operating Junction Temperature Range	- 40 to 125	^oC

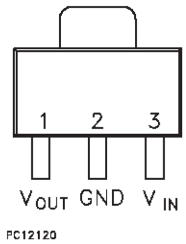
THERMAL DATA

Symbol	Parameter	SOT-89	SOT23-5L	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	15	81	$^oC/W$

CONNECTION DIAGRAM (top view)



SOT23-5L



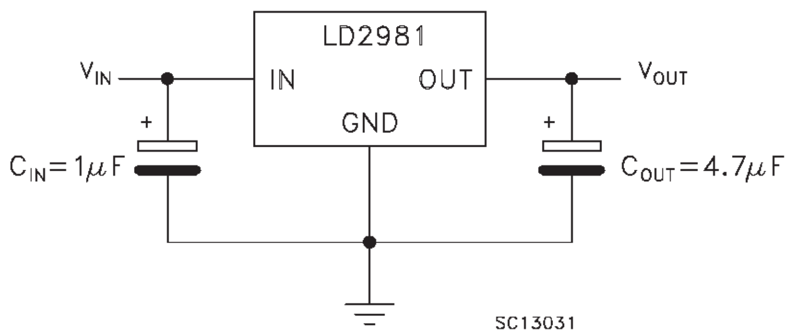
SOT-89

(*) Inhibit pin is not internally pulled-up then it must not be left floating. Disable the device when connected to GND or to a positive voltage less than 0.18V

ORDERING NUMBERS

AB VERSION		C VERSION		Output Voltage
SOT23-5L	SOT-89	SOT23-5L	SOT-89	
LD2981ABM28TR	LD2981ABU28TR	LD2981CM28TR	LD2981CU28TR	2.85 V
LD2981ABM30TR	LD2981ABU30TR	LD2981CM30TR	LD2981CU30TR	3.0 V
LD2981ABM32TR	LD2981ABU32TR	LD2981CM32TR	LD2981CU32TR	3.2 V
LD2981ABM33TR	LD2981ABU33TR	LD2981CM33TR	LD2981CU33TR	3.3 V
LD2981ABM38TR	LD2981ABU38TR	LD2981CM38TR	LD2981CU38TR	3.8 V
LD2981ABM48TR	LD2981ABU48TR	LD2981CM48TR	LD2981CU48TR	4.85 V
LD2981ABM50TR	LD2981ABU50TR	LD2981CM50TR	LD2981CU50TR	5.0 V

APPLICATION CIRCUIT



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

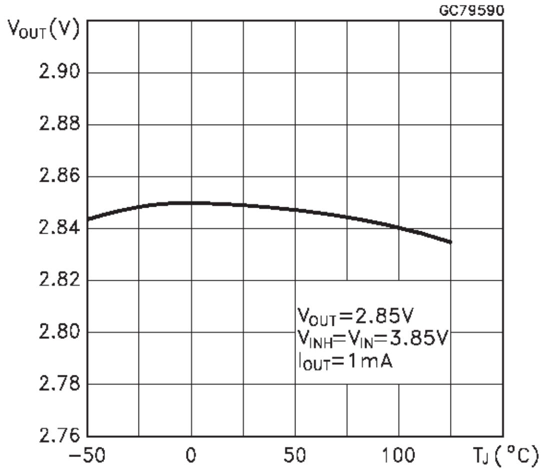
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	V_{IN} = 3.85 V 1 < I_o < 100 mA 1 < I_o < 100 mA, -40 < T_J < 125 °C	2.828 2.822 2.779	2.85	2.872 2.878 2.921	V V V
V_o	Output Voltage	V_{IN} = 4 V 1 < I_o < 100 mA 1 < I_o < 100 mA, -40 < T_J < 125 °C	2.977 2.970 2.925	3	3.023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

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

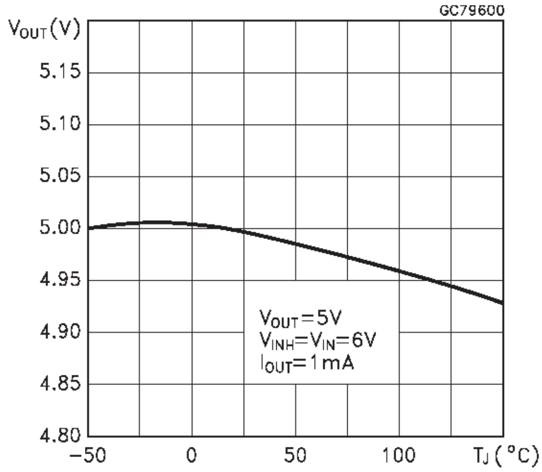
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	$V_{IN} = 3.85$ V $1 < I_o < 100$ mA $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	2.814 2.793 2.750	2.85	2.886 2.907 2.950	V V V
V_o	Output Voltage	$V_{IN} = 4$ V $1 < I_o < 100$ mA $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	2.962 2.940 2.895	3	3.038 3.060 3.105	V V V
V_o	Output Voltage	$V_{IN} = 4.2$ V $1 < I_o < 100$ mA $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	3.160 3.136 3.088	3.2	3.240 3.264 3.312	V V V
V_o	Output Voltage	$V_{IN} = 4.3$ V $1 < I_o < 100$ mA, $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	3.259 3.234 3.184	3.3	3.341 3.366 3.416	V V V
V_o	Output Voltage	$V_{IN} = 4.8$ V $1 < I_o < 100$ mA, $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	3.752 3.724 3.667	3.8	3.848 3.876 3.933	V V V
V_o	Output Voltage	$V_{IN} = 5.85$ V $1 < I_o < 100$ mA, $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	4.789 4.753 4.680	4.85	4.911 4.947 5.020	V V V
V_o	Output Voltage	$V_{IN} = 6$ V $1 < I_o < 100$ mA, $1 < I_o < 100$ mA, $-40 < T_J < 125\ ^oC$	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	$V_{O(NOM)} +1 < V_{IN} < 16V$, $I_o = 1$ mA $-40 < T_J < 125\ ^oC$		0.003	0.014 0.032	%/V_{in}
I_d	Quiescent Current	ON MODE $I_o = 0$ mA $I_o = 0$ mA $-40 < T_J < 125\ ^oC$ $I_o = 1$ mA $I_o = 1$ mA $-40 < T_J < 125\ ^oC$ $I_o = 25$ mA $I_o = 25$ mA $-40 < T_J < 125\ ^oC$ $I_o = 100$ mA $I_o = 100$ mA $-40 < T_J < 125\ ^oC$		 80 100 250 800 	 100 150 150 200 400 800 1300 2600	 µA µA µA µA µA µA µA µA
		OFF MODE $V_{INH} < 0.3$ V $V_{INH} < 0.15$ V $-40 < T_J < 125\ ^oC$			 0.8 2	 µA µA
SVR	Supply Voltage Rejection	f = 1 KHz, $C_{out} = 10\ \mu F$		63		dB
V_d	Dropout Voltage	$I_o = 0$ mA $I_o = 0$ mA $-40 < T_J < 125\ ^oC$ $I_o = 1$ mA $I_o = 1$ mA $-40 < T_J < 125\ ^oC$ $I_o = 25$ mA $I_o = 25$ mA $-40 < T_J < 125\ ^oC$ $I_o = 100$ mA $I_o = 100$ mA $-40 < T_J < 125\ ^oC$		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 $-40 < T_J < 125\ ^oC$			0.18	V
V_{ih}	Control Input Logic High	HIGH = Output ON $-40 < T_J < 125\ ^oC$	2			V
I_i	Control Input Current	$V_{INH} = 0$ V, $-40 < T_J < 125\ ^oC$ $V_{INH} = 5$ V, $-40 < T_J < 125\ ^oC$		0 5	-1 15	µA µA
eN	Output Noise Voltage (RMS)	BW = 300 Hz to 50 KHz, $C_{out} = 10\ \mu F$		160		µV
I_{SC}	Short Circuit Current	$R_L = 0$	150			mA

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

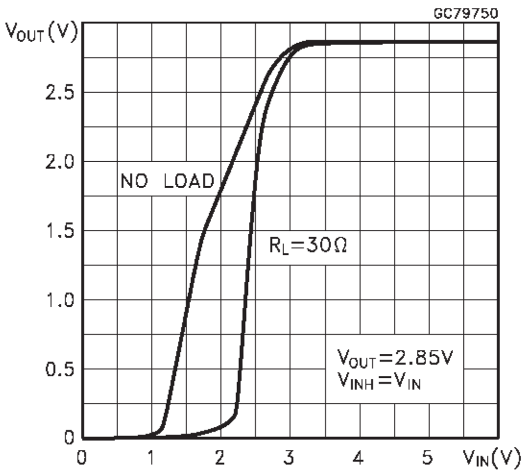
Output Voltage vs Temperature



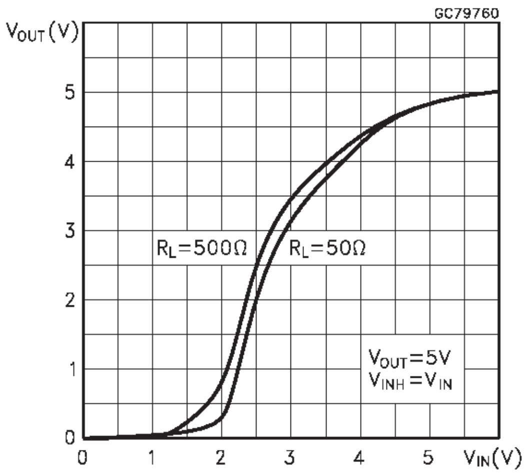
Output Voltage vs Temperature



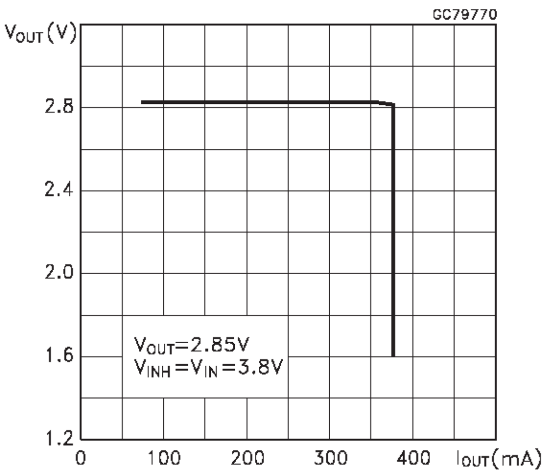
Output Voltage vs Input Voltage



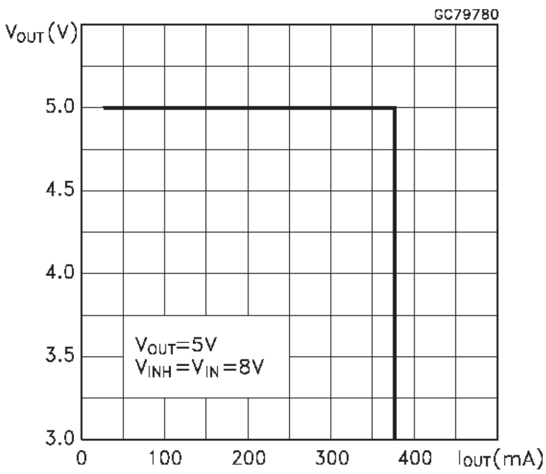
Output Voltage vs Input Voltage



Output Voltage vs Output Current

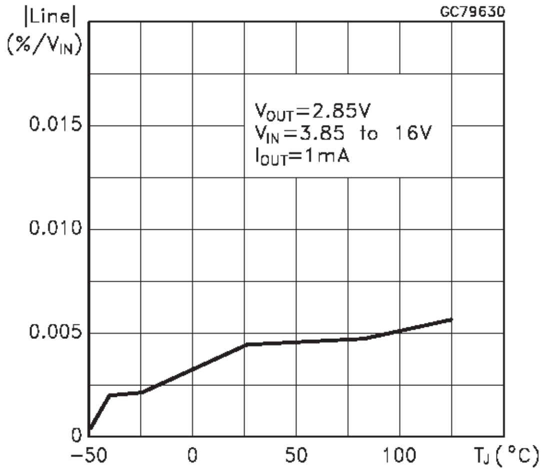


Output Voltage vs Output Current

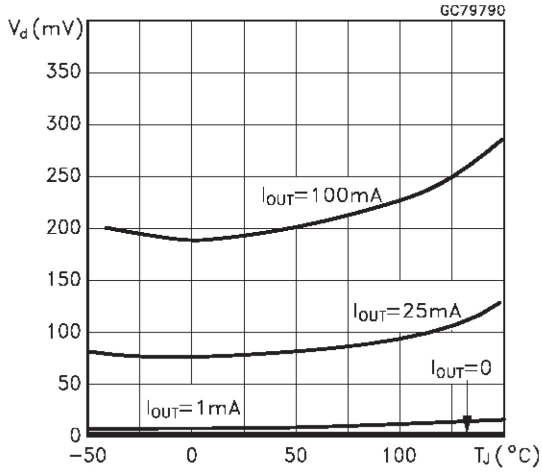


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

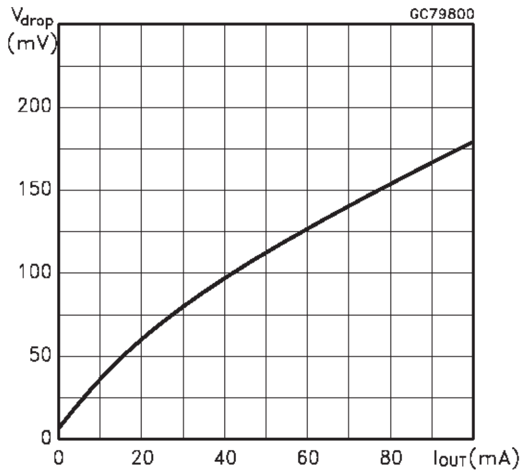
Line Regulation vs Temperature



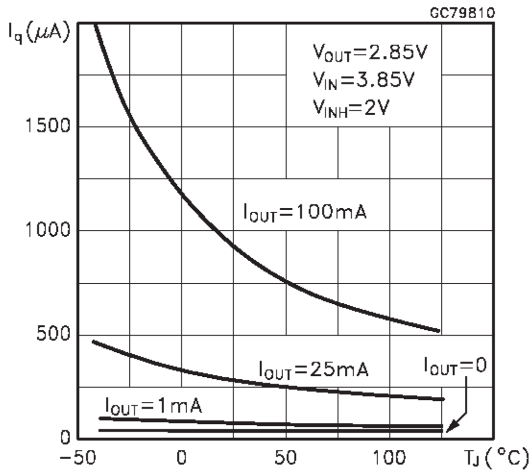
Dropout Voltage vs Temperature



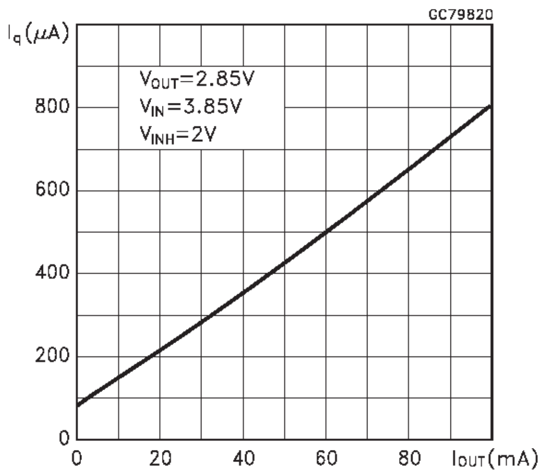
Dropout Voltage vs Output Current



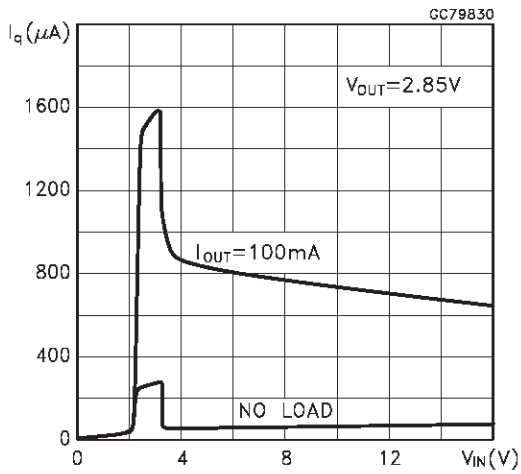
Quiescent Current vs Temperature



Quiescent Current vs Output Current

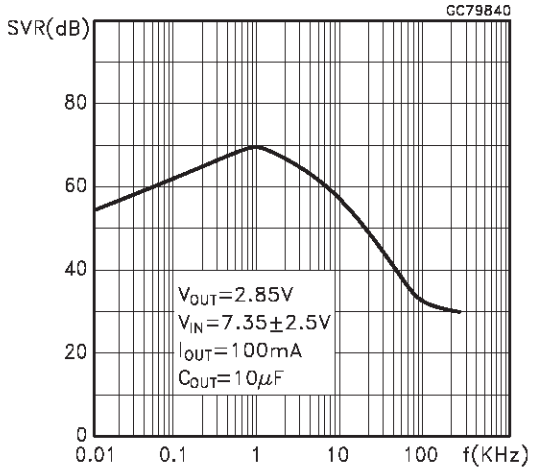


Quiescent Current vs Input Voltage

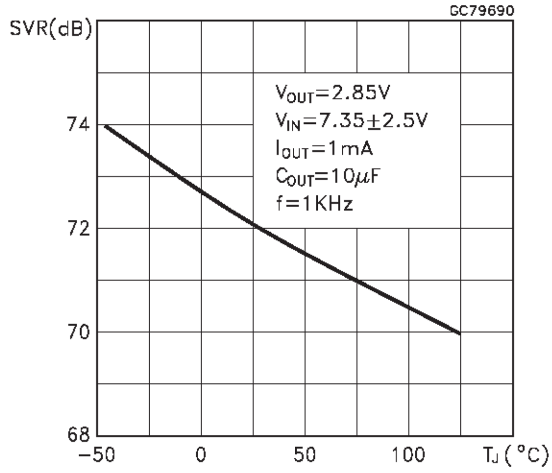


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

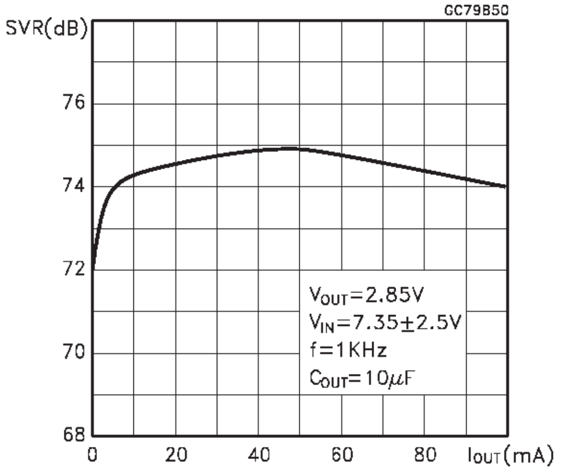
S.V.R. vs Frequency



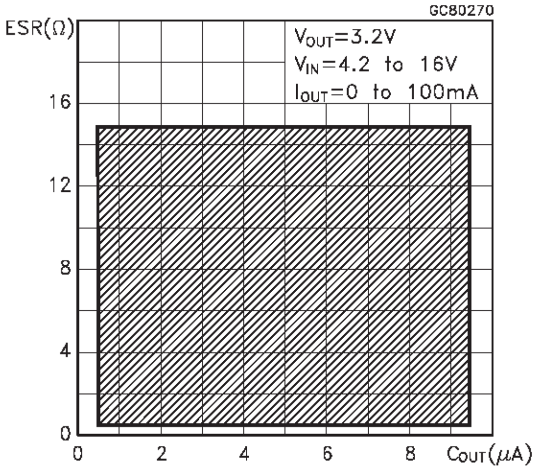
S.V.R. vs Temperature



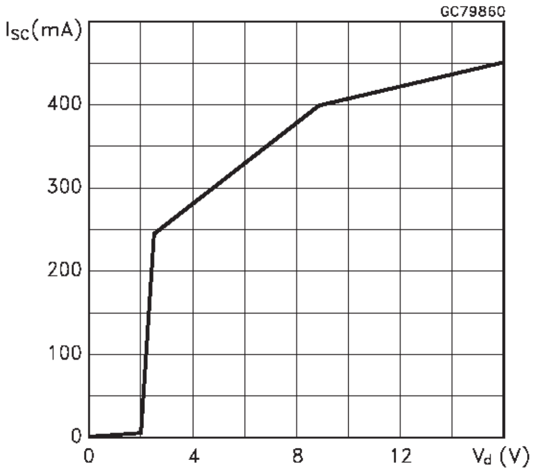
S.V.R. vs Output Current



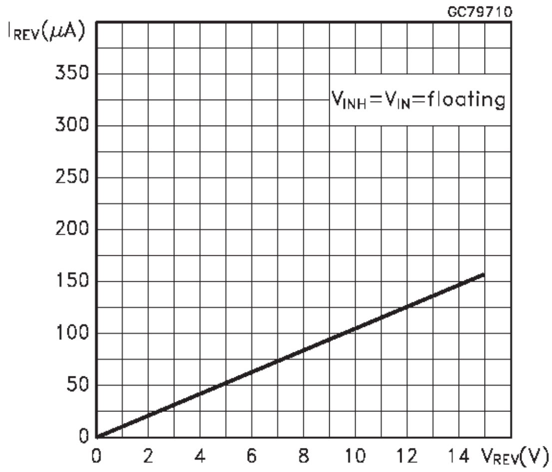
Stability



Short Circuit Current vs Droput Voltage

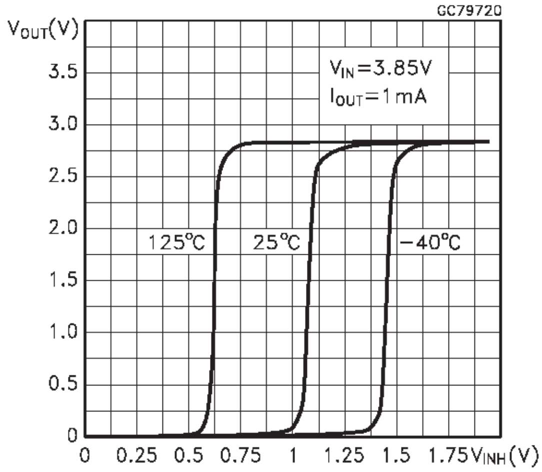


Reverse Current vs Reverse Voltage

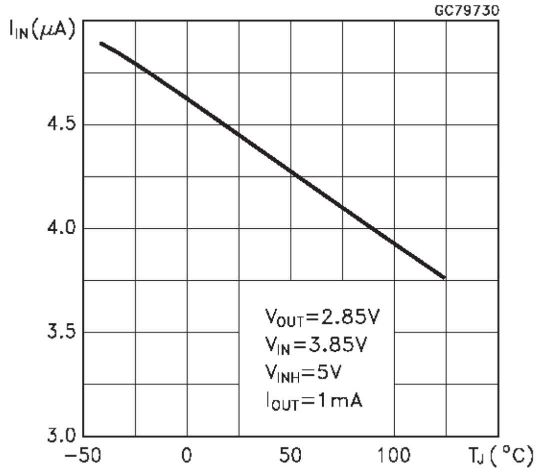


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

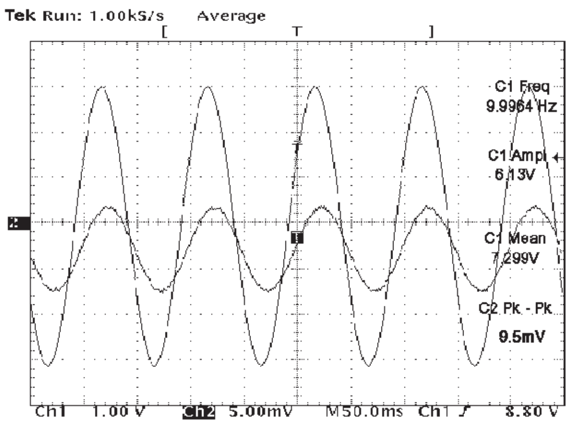
Output Voltage vs Inhibit Voltage



Inhibit Current vs Temperature

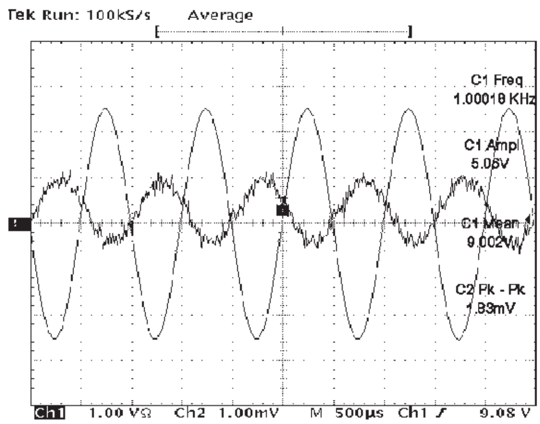


Supply Voltage Rejection at V_{OUT}=2.85V



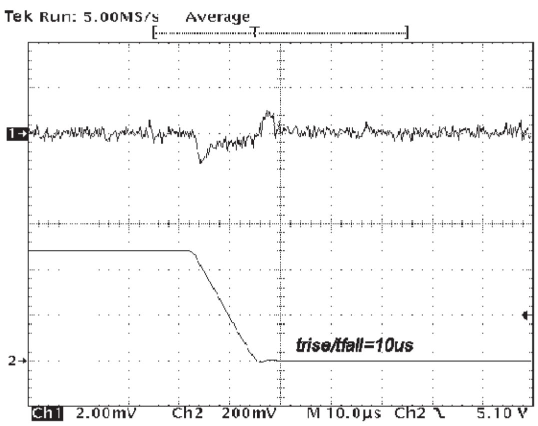
V_{IN} = 7.35 ± 2.5V, I_{OUT} = 0.1A, f = 1KHz

Supply Voltage Rejection at V_{OUT}=5V



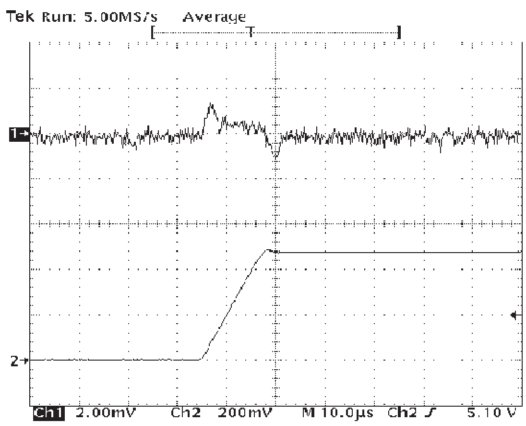
V_{IN} = 9 ± 2.5V, I_{OUT} = 0.1A, f = 1KHz

Line Transient Response



V_{IN} = 4.75 to 5.25V, I_{OUT} = 0.1A,C_O = 10μF (ESR=1Ω at 1KHz)

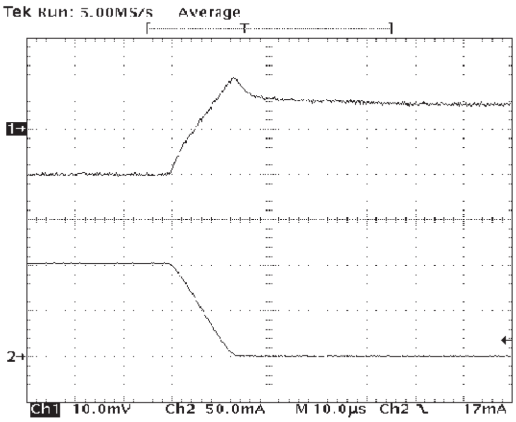
Line Transient Response



V_{IN} = 4.75 to 5.25V, I_{OUT} = 0.1A,C_O = 10μF (ESR=1Ω at 1KHz)

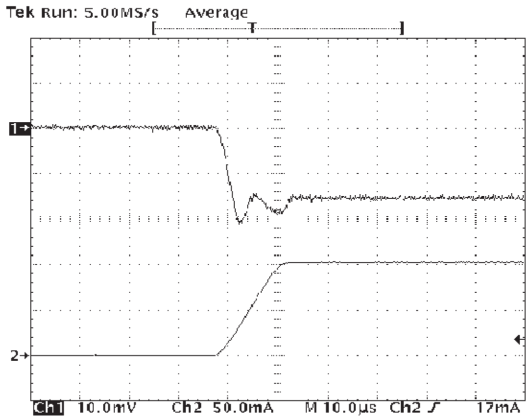
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Load Transient Response



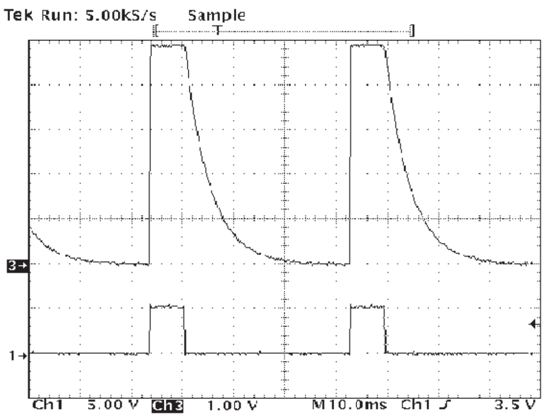
V_{CC} = 5V, I_{OUT} = 1 to 100mA, C_{IN} = 150nF C_{OUT} = 10µF (ESR=1Ω at 1KHz)

Load Transient Response



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

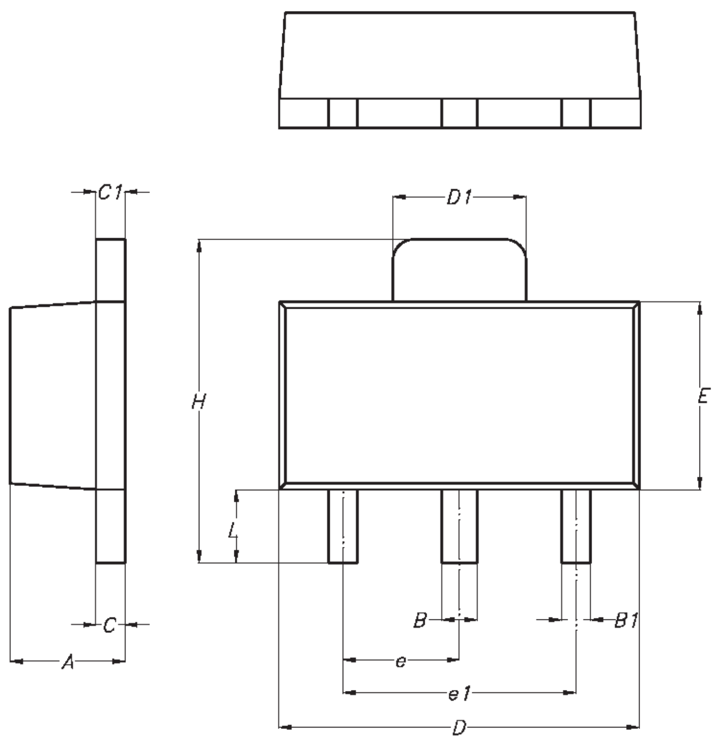
Shutdown Transient Response



V_{OUT} = 5V, V_{IN} = 6V, V_{INH} = 0 to 5V, C_{IN} = C_{OUT} = 1 µF (Tant.)

SOT-89 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



P025H

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