

VERY LOW DROP VOLTAGE REGULATORS WITH INHIBIT

- ULTRA LOW DROPOUT VOLTAGE (0.12V TYP. AT 50mA LOAD)
- VERY LOW QUIESCENT CURRENT (MAX 1 μ A IN OFF MODE; TYP. 375 μ A AT 50mA LOAD)
- OUTPUT CURRENT UP TO 50 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 $\pm 0.5\%$ TOLERANCE (AT 25 $^{\circ}$ C, A VERSION)
- SUPPLY VOLTAGE REJECTION: 63dB (TYP)
- ONLY 1 μ F FOR STABILITY
- TEMPERATURE RANGE: -40 TO 125 $^{\circ}$ C
- SMALLEST PACKAGE SOT23-5L
- FAST DYNAMIC RESPONSE TO LINE AND LOAD CHANGES



SOT23-5L

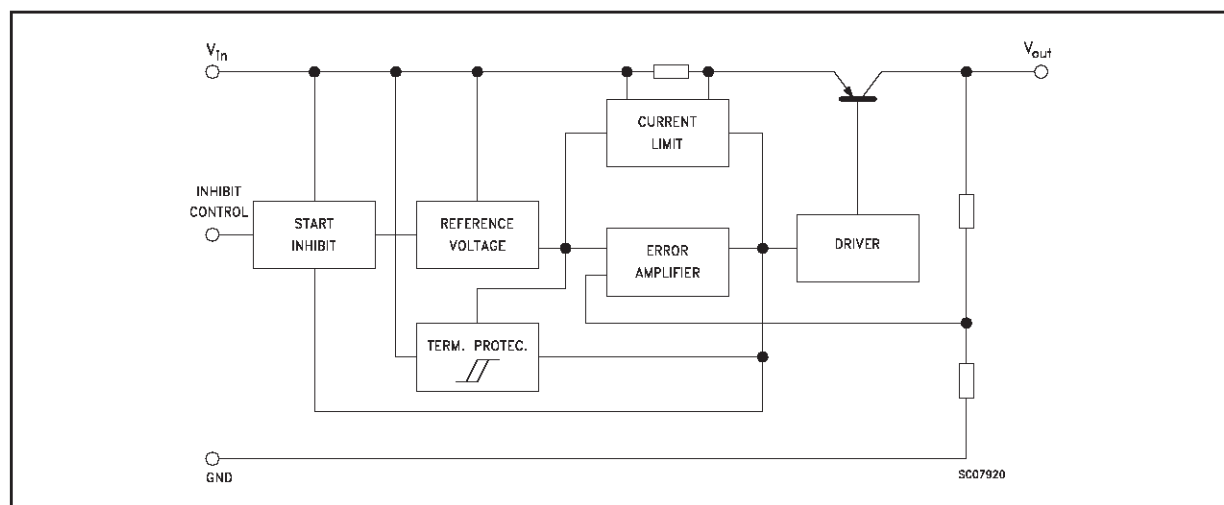
DESCRIPTION

The LD2980 series are very Low Drop regulators available in SOT23-5L package. The ultra low drop-voltage and the very low quiescent current make them particularly suitable for low noise, low

power applications and in battery powered systems.

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.

SCHEMATIC DIAGRAM



LD2980

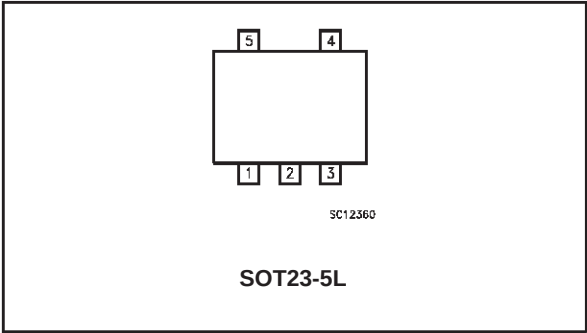
ABSOLUTE MAXIMUM RATING

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)



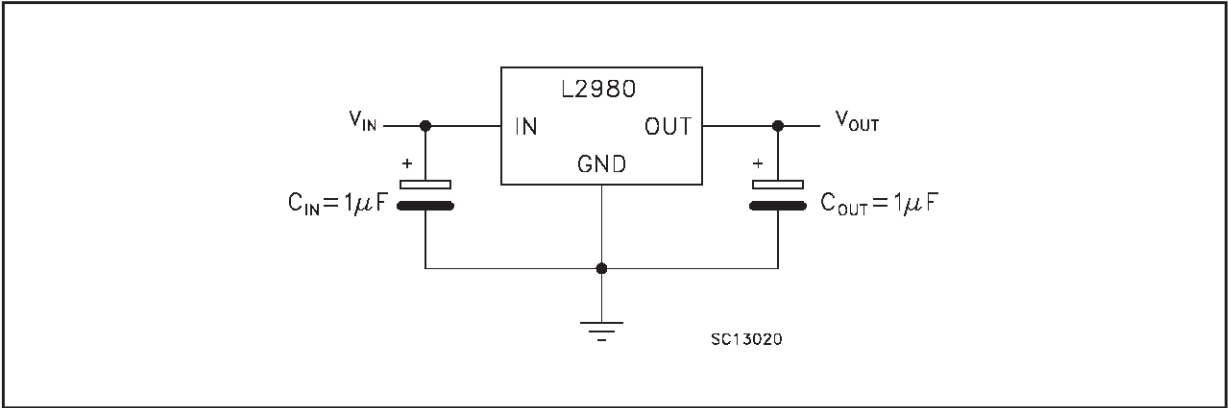
SYMBOL	NAME AND FUNCTION	PIN NUMBER
V_{IN}	Input Voltage	1
GND	Ground	2
INHIBIT	Control Switch ON/OFF(*)	3
NC	Not to be connected	4
V_{OUT}	Output Voltage	5

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

ORDERING NUMBERS

AB VERSION	C VERSION	Output Voltage
LD2980ABM28TR	LD2980CM28TR	2.85 V
LD2980ABM30TR	LD2980CM30TR	3.0 V
LD2980ABM32TR	LD2980CM32TR	3.2 V
LD2980ABM33TR	LD2980CM33TR	3.3 V
LD2980ABM38TR	LD2980CM38TR	3.8 V
LD2980ABM48TR	LD2980CM48TR	4.85 V
LD2980ABM50TR	LD2980CM50TR	5.0 V

APPLICATION CIRCUIT



ELECTRICAL CHARACTERISTICS FOR LD2980AB (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)

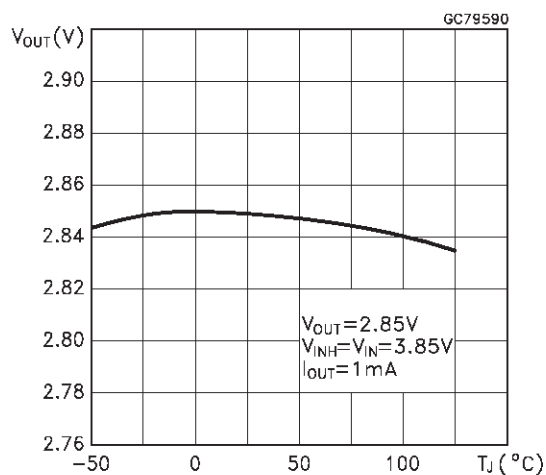
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$V_{IN} = 3.85\text{ V}$	2.835	2.85	2.865	V
		$1 < I_O < 50\text{ mA}$	2.828		2.872	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	2.778		2.922	V
V_O	Output Voltage	$V_{IN} = 4\text{ V}$	2.985	3	3.015	V
		$1 < I_O < 50\text{ mA}$	2.977		3.023	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	2.925		3.075	V
V_O	Output Voltage	$V_{IN} = 4.2\text{ V}$	3.184	3.2	3.216	V
		$1 < I_O < 50\text{ mA}$	3.175		3.225	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.12		3.28	V
V_O	Output Voltage	$V_{IN} = 4.3\text{ V}$	3.283	3.3	3.317	V
		$1 < I_O < 50\text{ mA}$	3.275		3.325	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.217		3.383	V
V_O	Output Voltage	$V_{IN} = 4.8\text{ V}$	3.781	3.8	3.819	V
		$1 < I_O < 50\text{ mA}$	3.771		3.829	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.705		3.895	V
V_O	Output Voltage	$V_{IN} = 5.85\text{ V}$	4.825	4.85	4.875	V
		$1 < I_O < 50\text{ mA}$	4.813		4.887	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	4.729		4.971	V
V_O	Output Voltage	$V_{IN} = 6\text{ V}$	4.975	5	5.025	V
		$1 < I_O < 50\text{ mA}$	4.962		5.038	V
		$1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	4.875		5.125	V
I_{out}	Output Current Limit	$R_L = 0$	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				
		$I_O = 0\text{ mA}$		65	95	μA
		$I_O = 0\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			125	μA
		$I_O = 1\text{ mA}$		80	110	μA
		$I_O = 1\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			170	μA
		$I_O = 10\text{ mA}$		140	220	μA
		$I_O = 10\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			460	μA
		$I_O = 50\text{ mA}$		375	600	μA
		$I_O = 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			1200	μA
		OFF MODE				
		$V_{INH} < 0.18\text{ V}$		0		μA
		$V_{INH} < 0.18\text{ V}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			1	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
		$I_O = 10\text{ mA}$		40	60	mV
		$I_O = 10\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			90	mV
		$I_O = 50\text{ mA}$		120	150	mV
		$I_O = 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$			225	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	$V_{INH} = 0\text{ V}$		0	-1	μA
		$V_{INH} = 5\text{ V}, -40 < T_J < 125\text{ }^{\circ}\text{C}$		5	15	μA
eN	Output Noise Voltage (RMS)	$BW = 300\text{ Hz to } 50\text{ KHz}, C_{out} = 10\text{ }\mu\text{F}$		160		μV

ELECTRICAL CHARACTERISTICS FOR LD2980C (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)

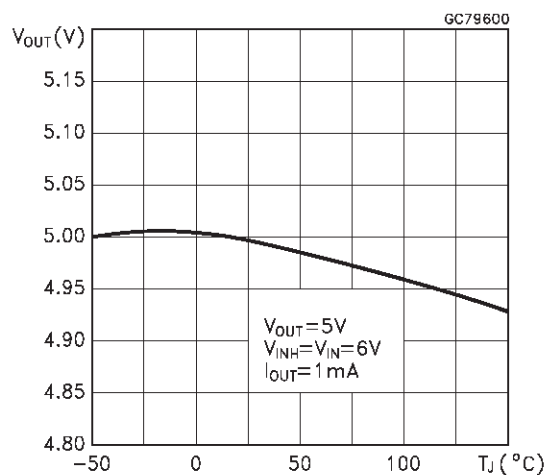
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$V_{IN} = 3.85\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	2.821 2.807 2.750	2.85	2.879 2.893 2.950	V V V
V_O	Output Voltage	$V_{IN} = 4\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	2.970 2.955 2.895	3	3.030 3.045 3.105	V V V
V_O	Output Voltage	$V_{IN} = 4.2\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.168 3.152 3.088	3.2	3.232 3.248 3.312	V V V
V_O	Output Voltage	$V_{IN} = 4.3\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.267 3.250 3.184	3.3	3.333 3.350 3.416	V V V
V_O	Output Voltage	$V_{IN} = 4.8\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	3.762 3.743 3.667	3.8	3.838 3.857 3.933	V V V
V_O	Output Voltage	$V_{IN} = 5.85\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	4.800 4.777 4.680	4.85	4.900 4.923 5.020	V V V
V_O	Output Voltage	$V_{IN} = 6\text{ V}$ $1 < I_O < 50\text{ mA}$ $1 < I_O < 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$	4.950 4.925 4.825	5	5.050 5.075 5.175	V V V
I_{out}	Output Current Limit	$R_L = 0$	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 $I_O = 0\text{ mA}$ $I_O = 0\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 1\text{ mA}$ $I_O = 1\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 10\text{ mA}$ $I_O = 10\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 50\text{ mA}$ $I_O = 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ OFF MODE $V_{INH} < 0.18\text{ V}$ $V_{INH} < 0.18\text{ V}, -40 < T_J < 125\text{ }^{\circ}\text{C}$		65 80 140 375 0	95 125 110 170 220 460 600 1200 1	μA μA μA μA μA μA μA μA μA μA
SVR	Supply Voltage Rejection	$f = 1\text{ KHz}$, $C_{out} = 10\text{ }\mu\text{F}$		63		dB
V_d	Dropout Voltage	$I_O = 0\text{ mA}$ $I_O = 0\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 1\text{ mA}$ $I_O = 1\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 10\text{ mA}$ $I_O = 10\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$ $I_O = 50\text{ mA}$ $I_O = 50\text{ mA}, -40 < T_J < 125\text{ }^{\circ}\text{C}$		1 7 40 120	3 5 10 15 60 90 150 225	mV mV mV mV mV mV mV 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	$V_{INH} = 0\text{ V}$ $V_{INH} = 5\text{ V}, -40 < T_J < 125\text{ }^{\circ}\text{C}$		0 5	-1 15	μA μA
eN	Output Noise Voltage (RMS)	$BW = 300\text{ Hz to }50\text{ KHz}$, $C_{out} = 10\text{ }\mu\text{F}$		160		μV

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

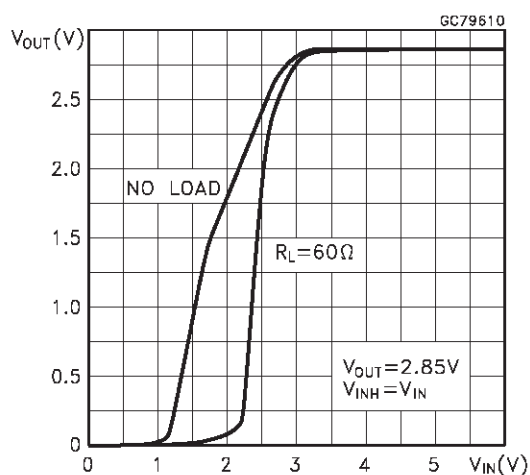
Output Voltage vs Temperature



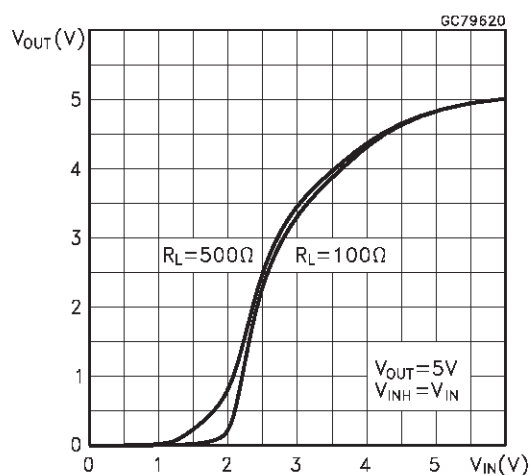
Output Voltage vs Temperature



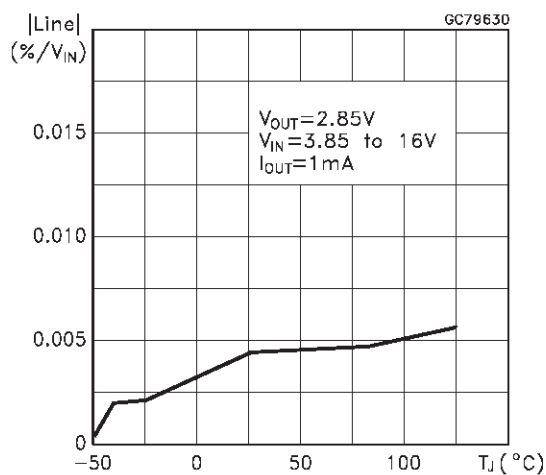
Output Voltage vs Input Voltage



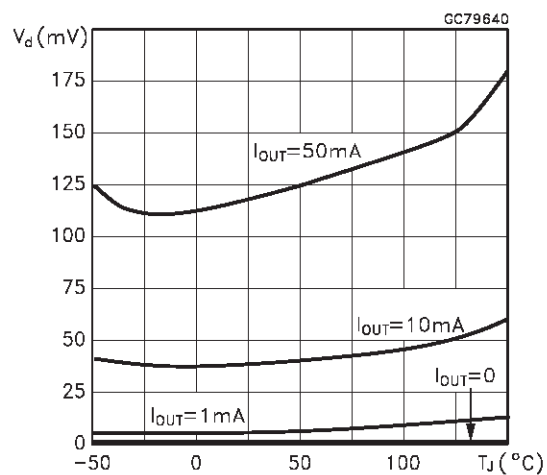
Output Voltage vs Input Voltage



Line Regulation vs Temperature

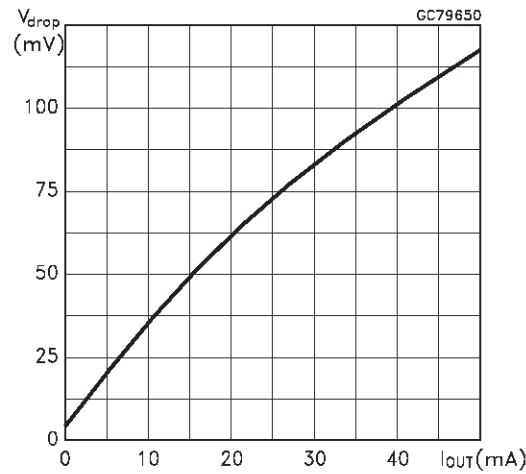


Dropout Voltage vs Temperature

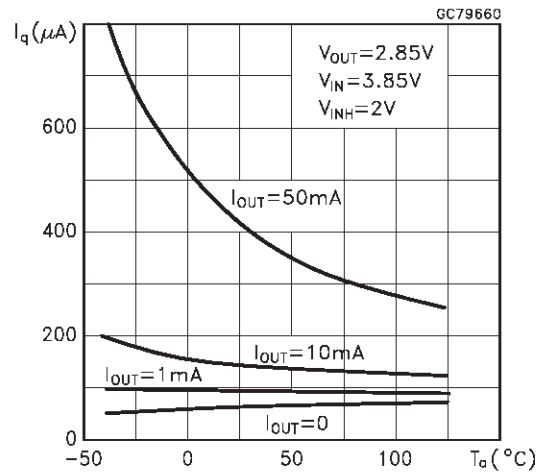


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

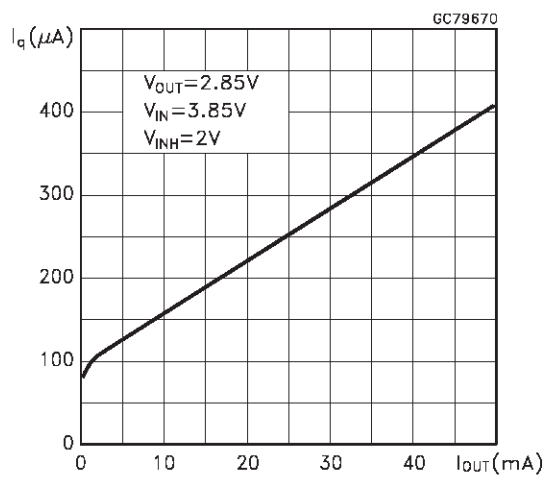
Dropout Voltage vs Output Current



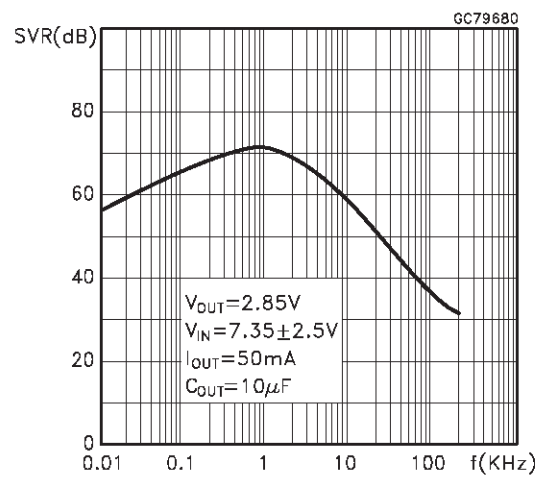
Quiescent Current vs Temperature



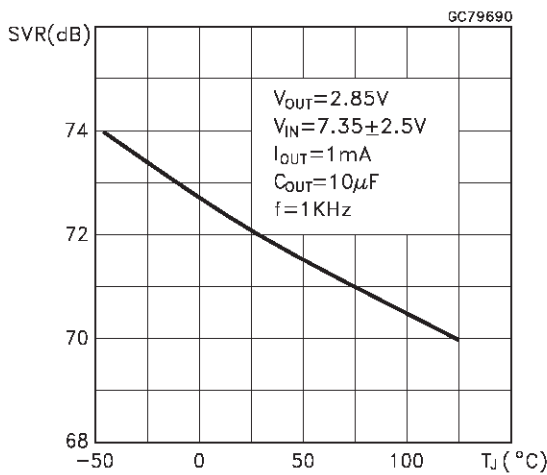
Quiescent Current vs Output Current



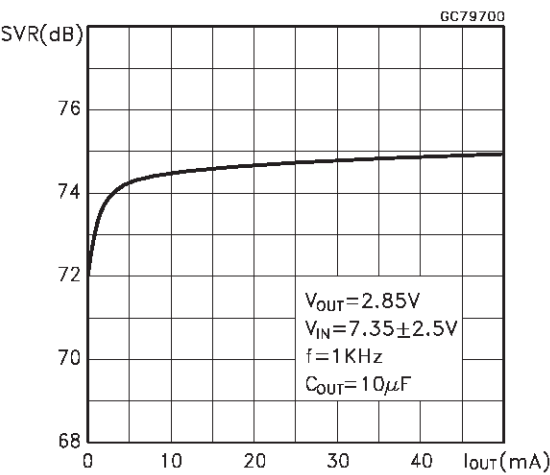
S.V.R. vs Frequency



S.V.R. vs Temperature

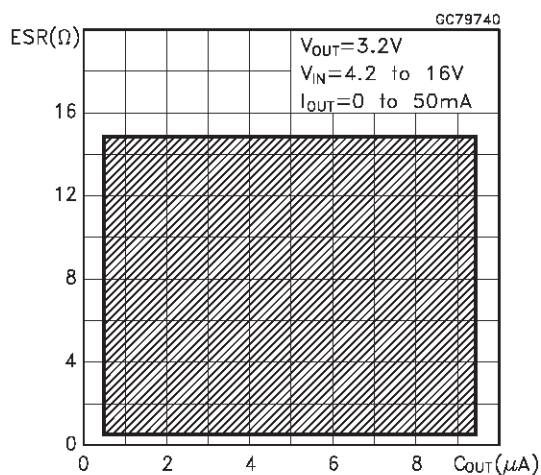


S.V.R. vs Output Current

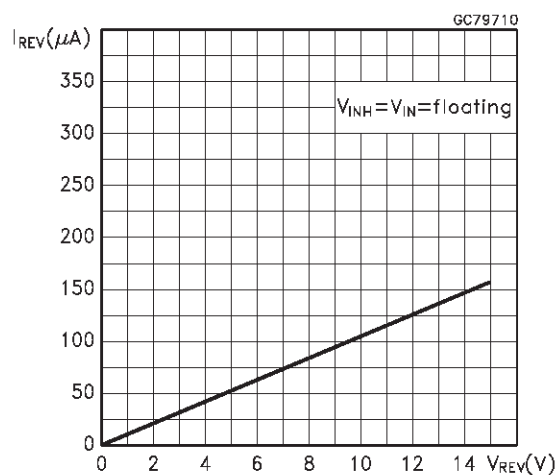


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

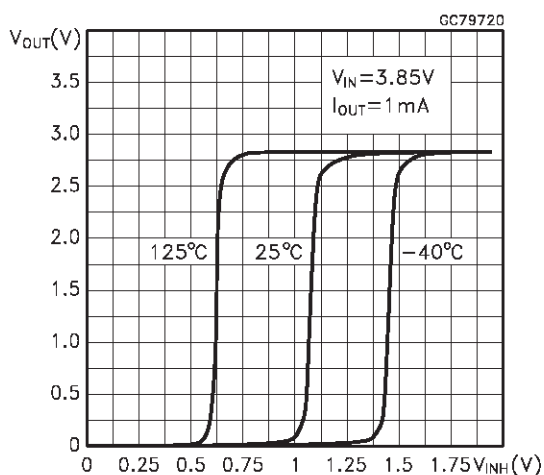
Stability



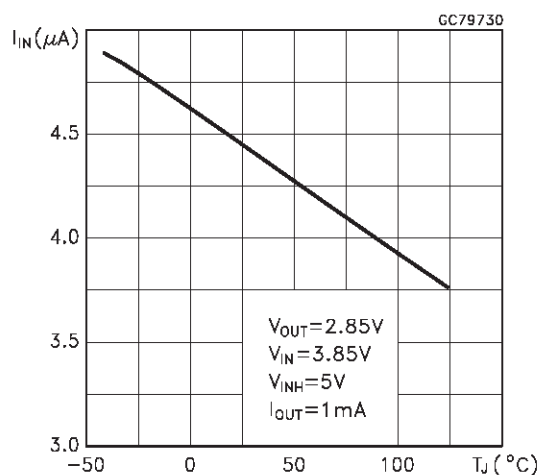
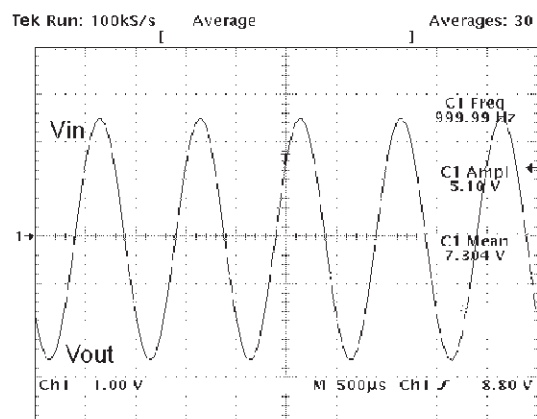
Reverse Current vs Reverse Voltage



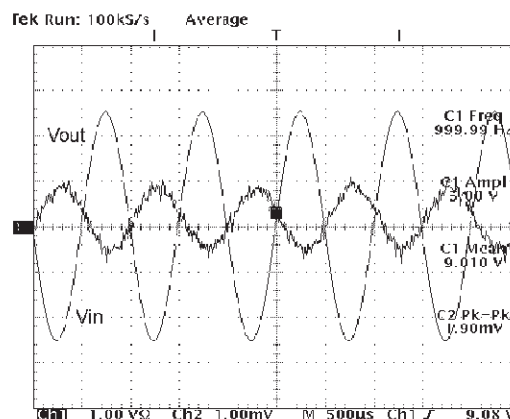
Output Voltage vs Inhibit Voltage



Inhibit Current vs Temperature

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

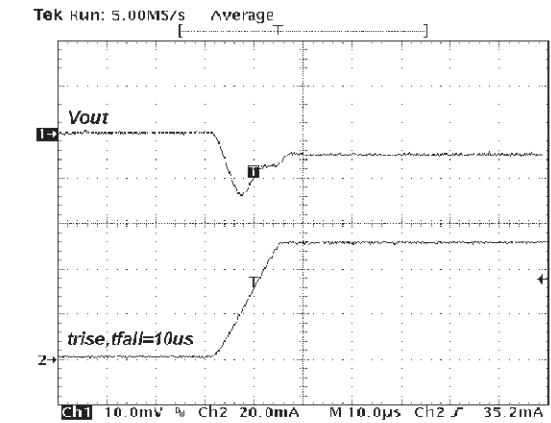
$V_{IN} = 7.35 \pm 2.5V$, $I_{OUT} = 50mA$, $f=1KHz$

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

$V_{IN} = 9 \pm 2.5V$, $I_{OUT} = 50mA$, $f=1KHz$

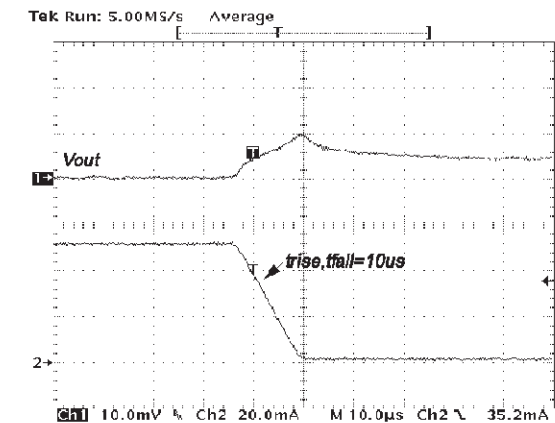
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Line Transient Response



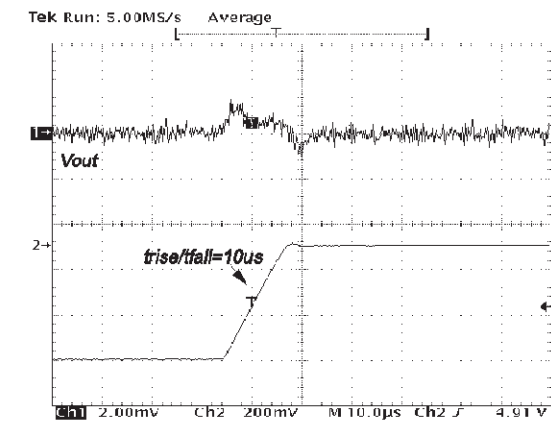
$V_{CC} = 5V$, $I_{OUT} = 1$ to $50mA$, $C_{OUT} = 10\mu F$, $C_{IN} = 150nF$
(ESR=1Ω at 1KHz)

Line Transient Response



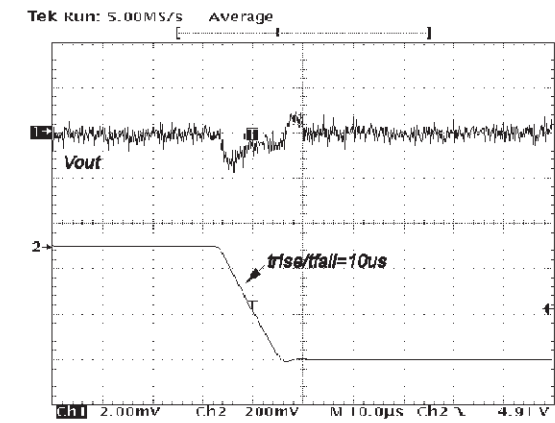
$V_{CC} = 5V$, $I_{OUT} = 50$ to $1mA$, $C_{OUT} = 10\mu F$, $C_{IN} = 150nF$
(ESR=1Ω at 1KHz)

Line Transient Response



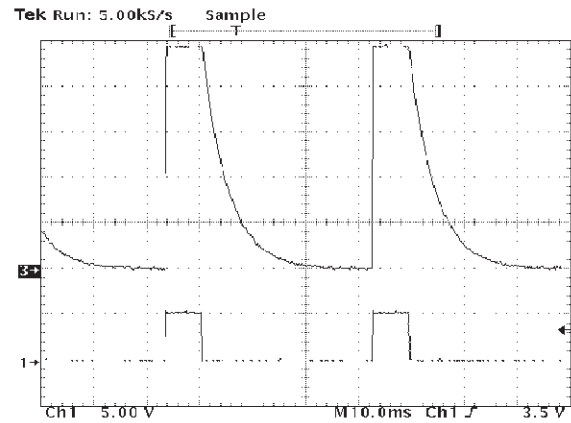
$V_{CC} = 4.75$ to $5.25V$, $I_{OUT} = 0.05A$, $C_{OUT} = 10\mu F$, $C_{IN} = 150nF$
(ESR=1Ω at 1KHz)

Line Transient Response



$V_{CC} = 5.25$ to $6.25V$, $I_{OUT} = 0.05A$, $C_{OUT} = 10\mu F$, $C_{IN} = 150nF$
(ESR=1Ω at 1KHz)

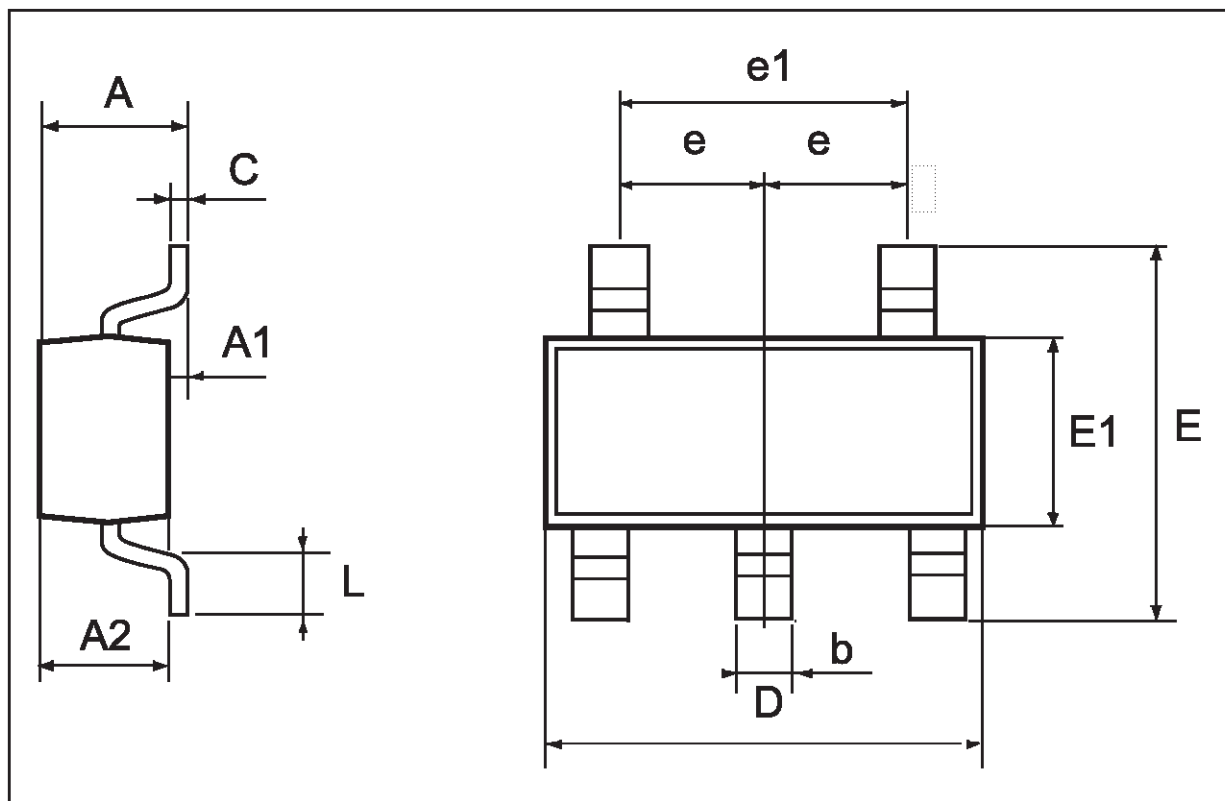
Supply Voltage Rejection



$V_{OUT} = 5V$, $V_{IN} = 6V$, $V_{INH} = 0$ 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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