

600kHz, 1A Switch PWM DC/DC Converter

FEATURES

- **1A, 0.5Ω, 30V Internal Switch**
- Operates with V_{IN} as Low as 1.5V
- 600kHz Fixed Frequency Operation
- Low-Battery Detector Stays Active in Shutdown
- Low V_{CESAT} Switch: 410mV at 800mA
- Pin-for-Pin Compatible with the LT1317B
- Small 8-Lead MSOP and SO Packages

APPLICATIONS

- LCD Bias Supplies
- GPS Receivers
- Battery Backup
- Portable Electronic Equipment
- Diagnostic Medical Instrumentation

DESCRIPTION

The LT[®]1949 is a fixed frequency step-up DC/DC converter with a 1A, 0.5Ω internal switch. Capable of generating 10V at 175mA from a 3.3V input, the LT1949 is ideal for generating bias voltages for large screen LCD panels. Constant frequency 600kHz operation results in a low noise output that is easy to filter and the 30V switch rating allows output voltage up to 28V using a single inductor. An external compensation pin gives the user flexibility in optimizing loop compensation, allowing small low ESR ceramic capacitors to be used at the output. The 8-lead MSOP and SO packages ensure a low profile overall solution.

The LT1949 includes a low-battery detector that stays alive when the device goes into shutdown. Quiescent current in shutdown is 25μA, while operating current is 4.5mA.

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TYPICAL APPLICATION

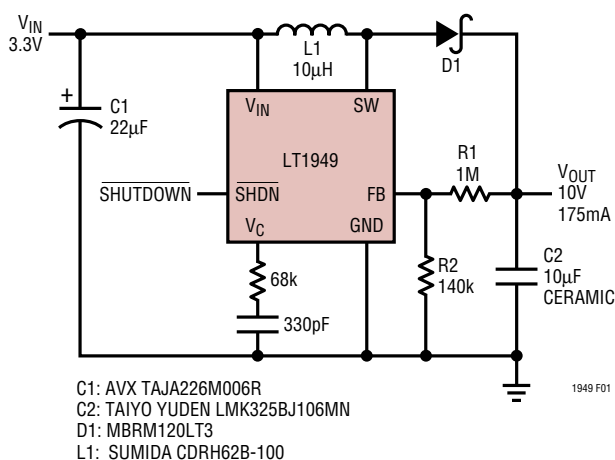


Figure 1. 3.3V to 10V/175mA DC/DC Converter

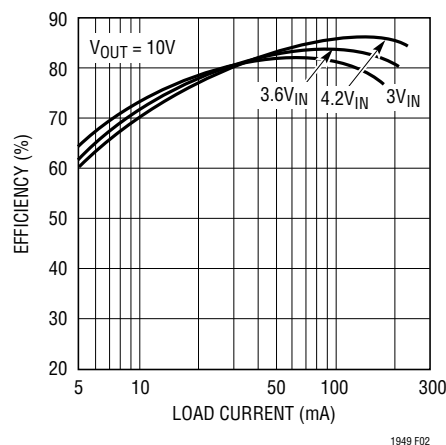


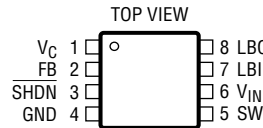
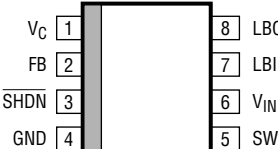
Figure 2. 3.3V to 10V Converter Efficiency

LT1949

ABSOLUTE MAXIMUM RATINGS (Note 1)

V_{IN} , LBO Voltage	12V	Junction Temperature	125°C
SW Voltage	-0.4V to 30V	Operating Temperature Range (Note 2)	
FB Voltage	$V_{IN} + 0.3V$	LT1949EMS8	-40°C to 85°C
V_C Voltage	2V	LT1949ES8/LT1949IS8	-40°C to 85°C
LBI Voltage	$0V \leq V_{LBI} \leq 1V$	Storage Temperature	-65°C to 150°C
SHDN Voltage	6V	Lead Temperature (Soldering, 10sec)	300°C

PACKAGE/ORDER INFORMATION

 <p>TOP VIEW</p> <p>V_C 1 □ 8 LBO FB 2 □ 7 LBI SHDN 3 □ 6 V_{IN} GND 4 □ 5 SW</p> <p>MS8 PACKAGE 8-LEAD PLASTIC MSOP $T_{JMAX} = 125^\circ\text{C}$, $\theta_{JA} = 120^\circ\text{C/W}$</p>	ORDER PART NUMBER	 <p>TOP VIEW</p> <p>V_C 1 □ 8 LBO FB 2 □ 7 LBI SHDN 3 □ 6 V_{IN} GND 4 □ 5 SW</p> <p>S8 PACKAGE 8-LEAD PLASTIC SO $T_{JMAX} = 125^\circ\text{C}$, $\theta_{JA} = 120^\circ\text{C/W}$</p>	ORDER PART NUMBER
	LT1949EMS8		LT1949ES8 LT1949IS8
	MS8 PART MARKING		S8 PART MARKING
	LTJC		1949E 1949I

Consult factory for Military grade parts.

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are $T_A = 25^\circ\text{C}$. $V_{IN} = 2V$, $V_{SHDN} = 2V$ unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
I_Q	Quiescent Current	$V_{SHDN} = 0V$	●	4.5	7.5	mA	
			●	25	40	μA	
V_{FB}	Feedback Voltage		●	1.22	1.24	1.26	V
			●	1.20	1.24	1.26	V
I_B	FB Pin Bias Current (Note 3)		●	12	80	nA	
	Input Voltage Range		●	1.7	12	V	
g_m	Error Amp Transconductance	$\Delta I = 5\mu\text{A}$	●	70	140	240	μmhos
A_V	Error Amp Voltage Gain			700		V/V	
	Maximum Duty Cycle		●	80	85	%	
	Switch Current Limit (Note 4)	$V_{IN} = 2.5V$, Duty Cycle = 30%	●	1	1.13	1.5	A
			●	0.95		1.5	A
f_{OSC}	Switching Frequency		●	500	600	750	kHz
	Shutdown Pin Current	$V_{SHDN} = V_{IN}$ $V_{SHDN} = 0V$	●	0.015	0.1	μA	
●			-2.3	-7	μA		
	LBI Threshold Voltage		●	190	200	210	mV
			●	180	200	220	mV
	LBO Output Low	$I_{SINK} = 10\mu\text{A}$	●	0.15	0.25	V	
	LBO Leakage Current	$V_{LBI} = 250\text{mV}$, $V_{LBO} = 5V$	●	0.02	0.1	μA	
	LBI Input Bias Current (Note 5)	$V_{LBI} = 150\text{mV}$	●	5	60	nA	
	Low-Battery Detector Gain	1M Ω Pull-Up		2000		V/V	
	Switch Leakage Current	$V_{SW} = 5V$	●	0.01	3	μA	

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are $T_A = 25^\circ\text{C}$. $V_{IN} = 2\text{V}$, $V_{SHDN} = 2\text{V}$ unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
	Switch V_{CESAT}	$I_{SW} = 800\text{mA}$ $I_{SW} = 500\text{mA}$		410		mV
	Reference Line Regulation	$1.8\text{V} \leq V_{IN} \leq 12\text{V}$	●	0.08	0.15	%/V
	$\overline{\text{SHDN}}$ Input Voltage High		●		6	V
	$\overline{\text{SHDN}}$ Input Voltage Low		●		0.4	V

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: The LT1949E is guaranteed to meet performance specifications from 0°C to 70°C . Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with statistical process controls.

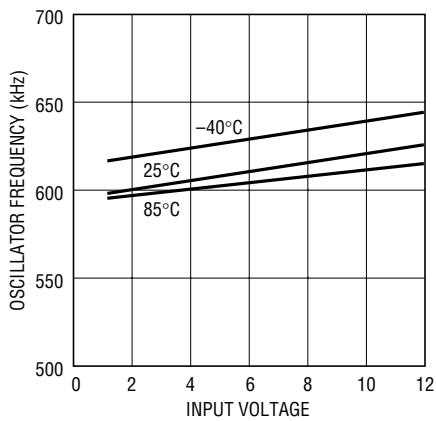
Note 3: Bias current flows into FB pin.

Note 4: Switch current limit guaranteed by design and/or correlation to static tests. Duty cycle affects current limit due to ramp generator.

Note 5: Bias current flows out of LBI pin.

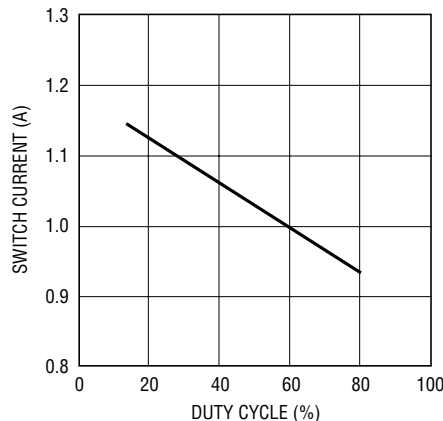
TYPICAL PERFORMANCE CHARACTERISTICS

Oscillator Frequency



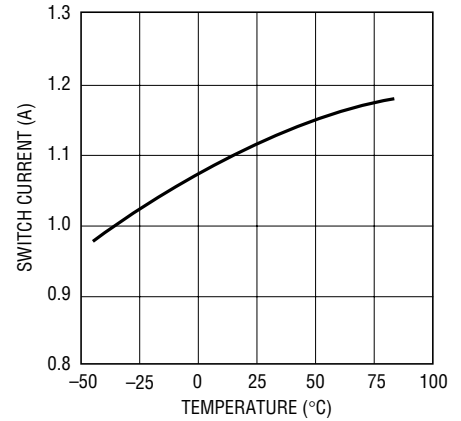
1949 G01

Switch Current Limit



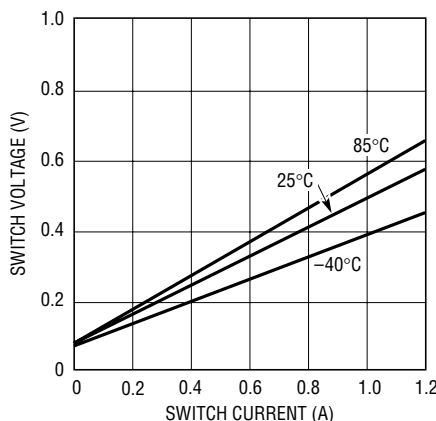
1949 G02

Switch Current Limit, Duty Cycle = 30%



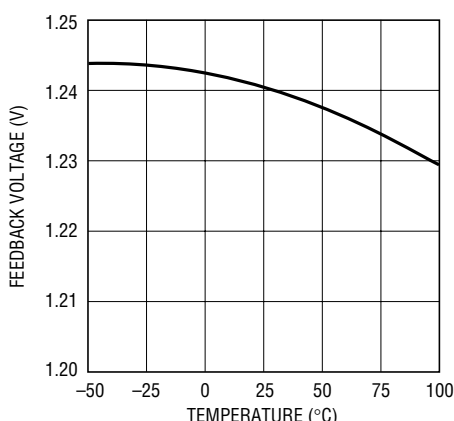
1949 G03

Switch Voltage Drop (V_{CESAT})



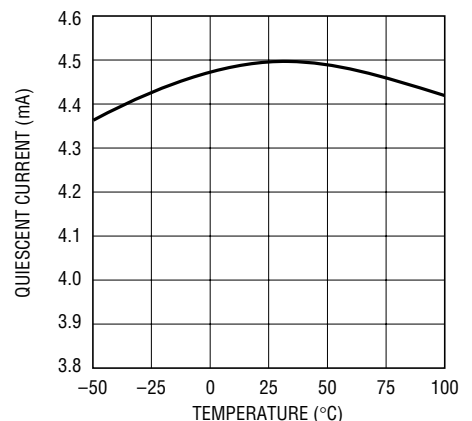
1949 G04

Feedback Voltage



1949 G05

Quiescent Current, $\overline{\text{SHDN}} = 2\text{V}$



1949 G06