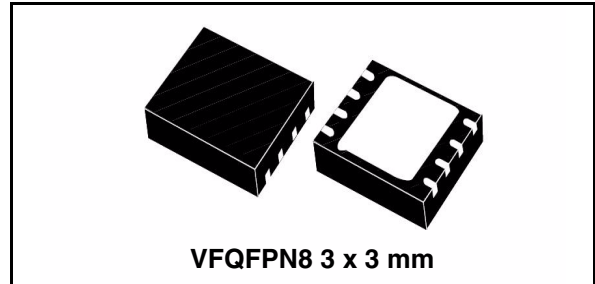


0.7 A step-down switching regulator

Features

- 0.7 A DC output current
- 2.9 V to 18 V input voltage
- Output voltage adjustable from 0.6 V
- 250 kHz switching frequency, programmable up to 1 MHz
- Internal soft-start and inhibit
- Low dropout operation: 100 % duty cycle
- Voltage feed-forward
- Zero load current operation
- Over current and thermal protection
- VFQFPN8 3 x 3 mm package



Description

The L5980 is step down switching regulator with 1 A (min.) current limited embedded power MOSFET, so it is able to deliver in excess of 0.7 A DC current to the load depending on the application condition.

The input voltage can range from 2.9 V to 18 V, while the output voltage can be set starting from 0.6 V to V_{IN} . Having a minimum input voltage of 2.9 V, the device is suitable also for 3.3 V bus.

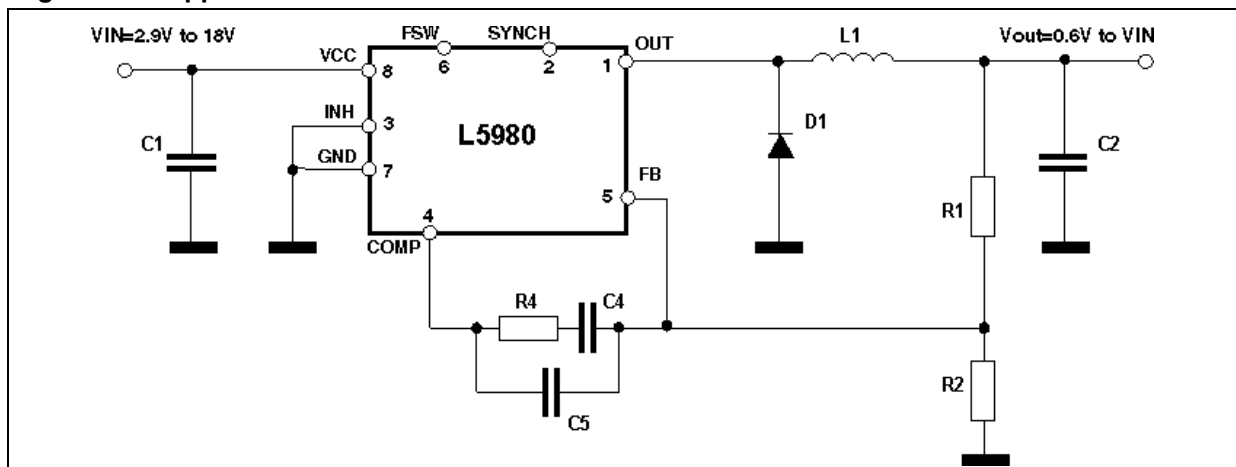
Requiring a minimum set of external components, the device includes an internal 250 kHz switching frequency oscillator that can be externally adjusted up to 1 MHz.

The FVQFPN package with exposed pad allows reducing the R_{thJA} down to approximately 60 °C/W.

Applications

- Consumer: STB, DVD, DVD recorder, car audio, LCD TV and monitors
- Industrial: Chargers, PLD, PLA, FPGA
- Networking: XDSL, modems, DC-DC modules
- Computer: Optical storage, hard disk drive, printers, audio/graphic cards
- LED driving

Figure 1. Application circuit



2 Maximum ratings

2.1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CC}	Input voltage	20	V
OUT	Output DC voltage	-0.3 to V _{CC}	
F _{SW} , COMP, SYNCH	Analog pin	-0.3 to 4	
INH	Inhibit pin	-0.3 to V _{CC}	
FB	Feedback voltage	-0.3 to 1.5	
P _{TOT}	Power dissipation at T _A < 60 °C	1.5.	W
T _J	Junction temperature range	-40 to 150	°C
T _{stg}	Storage temperature range	-55 to 150	°C

2.2 Thermal data

Table 3. Thermal data

Symbol	Parameter		Value	Unit
R _{thJA}	Maximum thermal resistance junction-ambient ⁽¹⁾	VFQFPN	60	°C/W

1. Package mounted on demonstration board.

3 Electrical characteristics

$T_J = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 12\text{ V}$, unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min	Typ	Max	
V_{CC}	Operating input voltage range	(1)	2.9		18	V
V_{CCON}	Turn on V_{CC} threshold	(1)			2.9	
V_{CCOFF}	Turn off V_{CC} threshold	(1)	2.4			
$R_{DS(on)}$	MOSFET on resistance			140	170	m Ω
		(1)		140	220	
I_{LIM}	Maximum limiting current		1.0	1.3	1.6	A
Oscillator						
F_{SW}	Switching frequency		225	250	275	kHz
		(1)	220		275	
V_{FSW}	FSW pin voltage			1.254		V
D	Duty cycle		0		100	%
F_{ADJ}	Adjustable switching frequency	$R_{FSW} = 33\text{ k}\Omega$		1000		kHz
Dynamic characteristics						
V_{FB}	Feedback voltage	$2.9\text{ V} < V_{CC} < 18\text{ V}$ (1)	0.593	0.6	0.607	V
DC characteristics						
I_Q	Quiescent current	Duty cycle = 0, $V_{FB} = 0.8\text{ V}$			2.4	mA
I_{QST-BY}	Total stand-by quiescent current			20	30	μA
Inhibit						
	INH threshold voltage	Device ON level			0.6	V
		Device OFF level	1.9			
	INH current	INH = 0		7.5	10	μA
Soft-start						
T_{SS}	Soft-start duration	FSW pin floating	7.4	8.2	9.1	ms
		$F_{SW} = 1\text{ MHz}$, $R_{FSW} = 33\text{ k}\Omega$		2		

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test condition	Values			Unit
			Min	Typ	Max	
Error amplifier						
V _{CH}	High level output voltage	V _{FB} < 0.6 V	3			V
V _{CL}	Low level output voltage	V _{FB} > 0.6 V			0.1	
I _{FB}	Bias source current	V _{FB} = 0 V to 0.8 V		1		μA
I _{O SOURCE}	Source COMP pin	V _{FB} = 0.5 V, V _{COMP} = 1 V		17		mA
I _{O SINK}	Sink COMP pin	V _{FB} = 0.7 V, V _{COMP} = 1 V		25		mA
G _V	Open loop voltage gain	(2)		100		dB
Synchronization function						
	High input voltage		2		3.3	V
	Low input voltage				1	
	Slave sink current	V _{SYNCH} = 2.9 V		0.7	0.9	mA
	Master output amplitude	I _{SOURCE} = 200 μA		3.0		V
	Output pulse width	SYNCH floating		110		ns
	Input pulse width		70			
Protection						
I _{FBDISC}	FB disconnection source current			1		μA
T _{SHDN}	Thermal shutdown			150		°C
	Hysteresis			30		

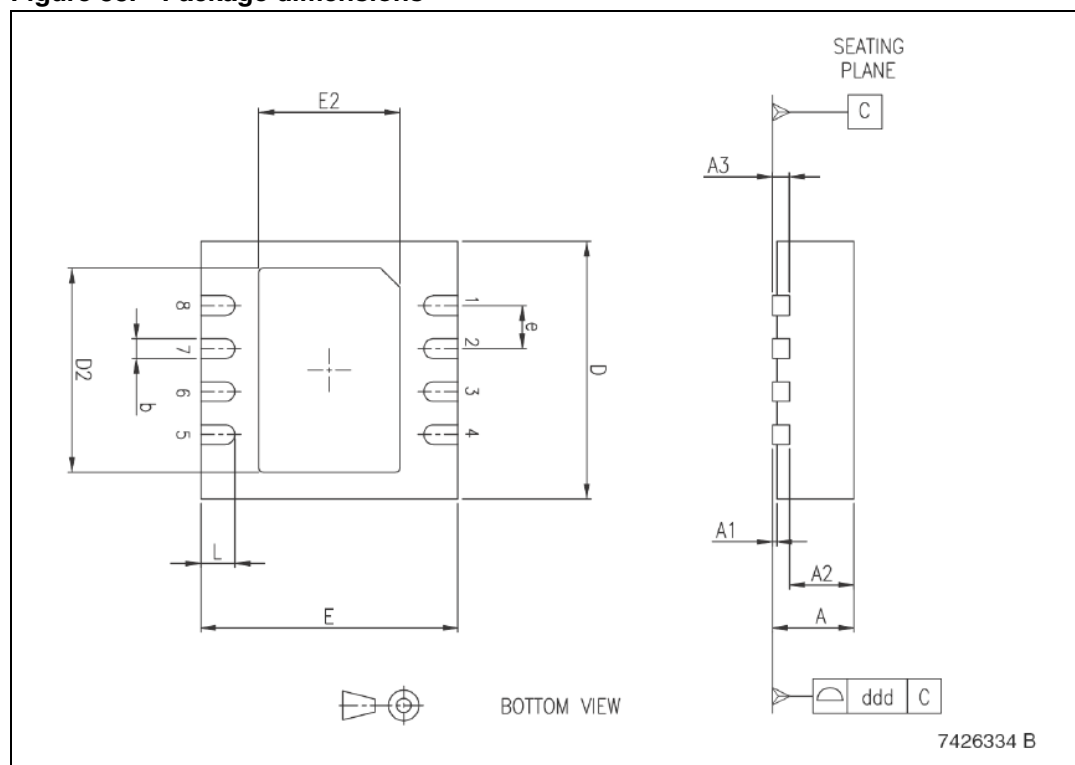
1. Specification referred to T_J from -40 to $+125^{\circ}\text{C}$. Specification in the -40 to $+125^{\circ}\text{C}$ temperature range are assured by design, characterization and statistical correlation.

2. Guaranteed by design.

Table 10. VFQFPN8 (3x3 x 1.08 mm) mechanical data

Dim.	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	0.80	0.90	1.00	0.0315	0.0354	0.0394
A1		0.02	0.05		0.0008	0.0020
A2		0.70			0.0276	
A3		0.20			0.0079	
b	0.18	0.23	0.30	0.0071	0.0091	0.0118
D	2.95	3.00	3.05	0.1161	0.1181	0.1200
D2	2.23	2.38	2.48	0.0878	0.0937	0.0976
E	2.95	3.00	3.05	0.1161	0.1181	0.1200
E2	1.49	1.64	1.74	0.0587	0.0646	0.0685
e		0.50			0.0197	
L	0.30	0.40	0.50	0.0118	0.0157	0.0197
ddd			0.08			0.0031

Figure 33. Package dimensions



7 Order codes

Table 11. Order codes

Order codes	Package	Packaging
L5980	VFQFPN8 (3x3x1.08 mm)	Tube
L5980TR		Tube and reel