



P1986

LINEAR INTEGRATED CIRCUIT

PWM CONTROL 3A STEP-DOWN CONVERTER

DESCRIPTION

The UTC **P1986** consists of 3A step-down switching regulator with PWM control which includes a reference voltage source, oscillation circuit, error amplifier, internal PMOS and etc.

The UTC **P1986** can provide low-ripple power, high efficiency, and perfect transient characteristics. The duty ratio varies linearly from 0% to 100% in the PWM control. The error amplifier circuit and soft-start circuit included in this device can prevent overshoot at startup. Internally, the build-in compensation block can reduce external component count. An enable function, an over current protect (OCP) function and short circuit protect (SCP) are also build inside, and when OCP happens, the operation frequency will be reduced.

In application, the UTC **P1986** is suitable for portable devices when it works as an ideal power supply in SOP-8L package. There is an internal P-channel power MOS, a coil, capacitors inside and a diode connected externally that makes these ICs step-down switching regulators.

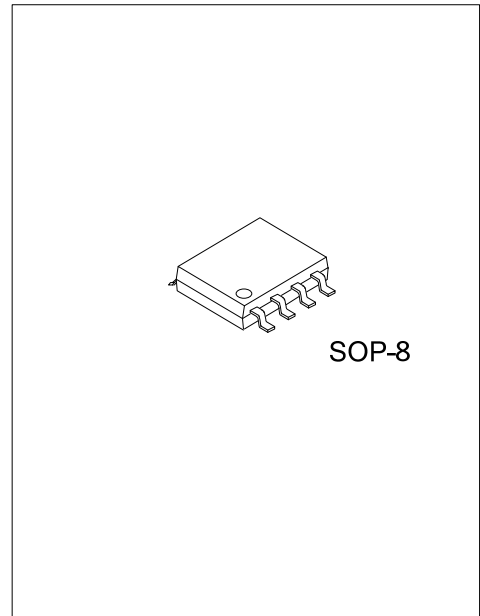
FEATURES

- * Input voltage varies from 3.6V to 28V
- * Output voltage varies from 0.8V to V_{CC}
- * Duty ratio varies from 0% to 100% PWM control
- * With 330kHz typical oscillation frequency
- * Thermal shutdown and SCP function and soft-start, current limit, enable function
- * Low ESR output capacitor(Multi-layer chip capacitor) application
- * Built-in switch P-channel power MOS
- * Halogen Free

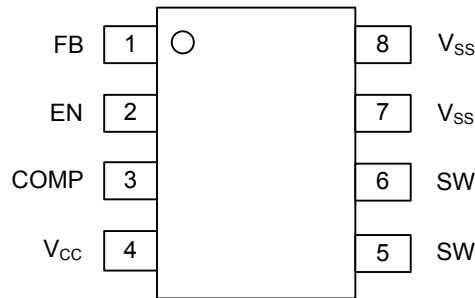
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
P1986L-S08-R	P1986G-S08-R	SOP-8	Tape Reel

<p>P1986L-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free, L: Lead Free</p>
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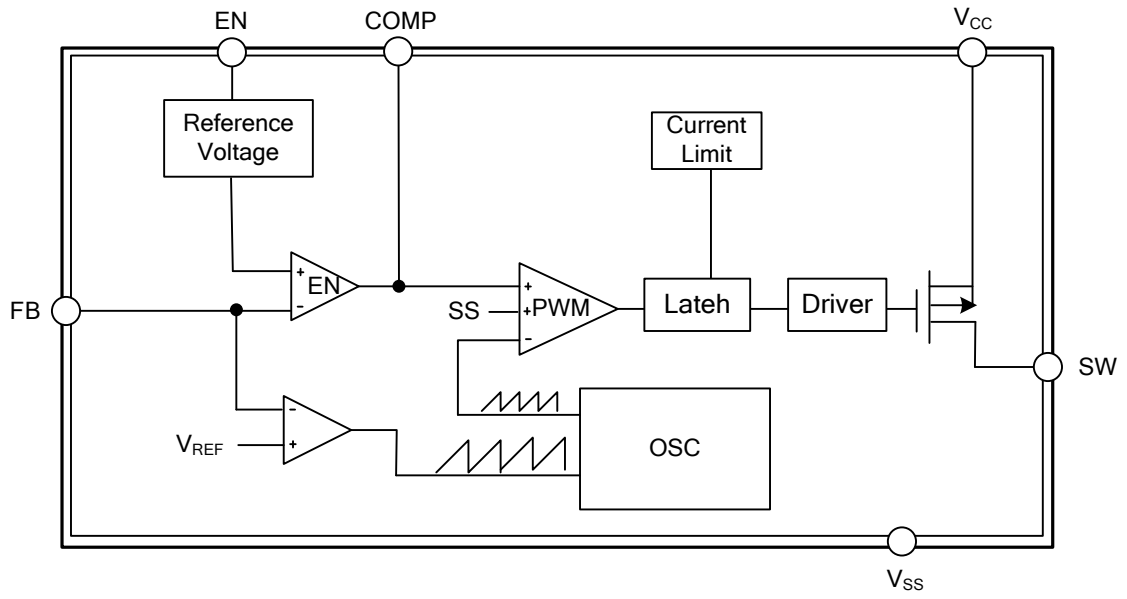
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	FB	Feedback pin
2	EN	Power-off pin H: normal operation (Step-down) L: Step-down operation stopped (All circuits deactivated)
3	COMP	Compensation pin
4	V _{CC}	IC power supply pin
5	SW	Switch pin. Connect external inductor/diode here.
6	SW	Switch pin. Connect external inductor/diode here.
7	V _{SS}	GND pin
8	V _{SS}	GND pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
V _{CC} Pin Voltage	V _{CC}	V _{SS} -0.3 ~V _{SS} +30	V
Feedback Pin Voltage	V _{FB}	V _{SS} -0.3 ~ V _{CC}	V
ON/OFF Pin Voltage	V _{EN}	V _{SS} - 0.3 ~ V _{CC} + 0.3	V
Switch Pin Voltage	V _{SW}	V _{SS} - 0.3 ~ V _{CC} + 0.3	V
Operating Supply Voltage	V _{OP}	+3.6 ~ 28	V
Power Dissipation	P _D	Internally limited	mW
Storage Temperature	T _{STG}	-40 ~ +150	°C
Operating Temperature	T _{OPR}	-20 ~ +125	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ _{JA}	70	°C/W
Junction to Case	θ _{JC}	25	°C/W

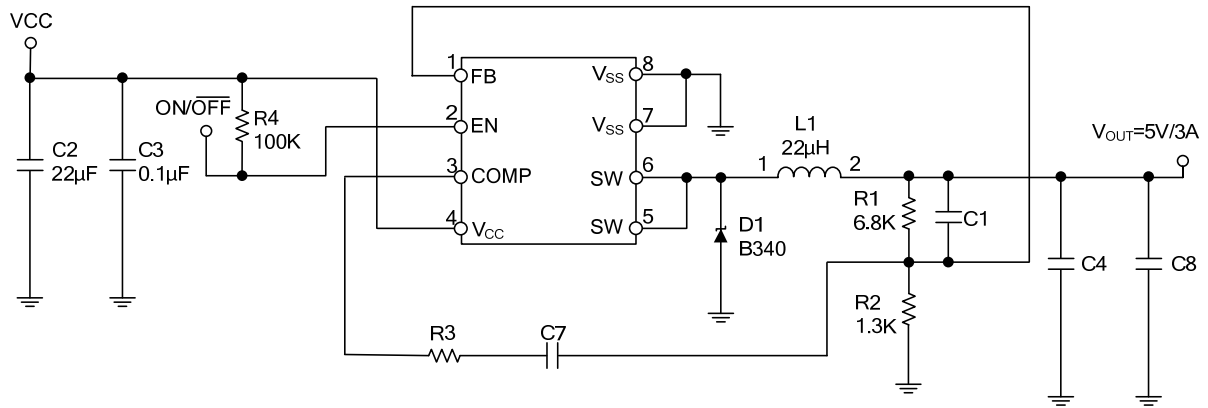
Notes: θ_{JA} is measured with the PCB copper area(need connect to SW pins) of approximately 1 in²(Multi-layer)

■ ELECTRICAL CHARACTERISTICS (V_{IN} = 12V, Ta= 25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Feedback Voltage	V _{FB}	I _{OUT} =0.2A	0.784	0.80	0.816	V
Feedback Bias Current	I _{FB(BIAS)}	I _{OUT} =0.1A		0.1	0.5	μA
Switch Current	I _{SW}	Pear current, No outside circuit V _{FB} =0V Force driver on		4		A
Standby Current	I _{STN-BY}	V _{EN} =0V No outside circuit V _{FB} =0V Force driver on		2	10	μA
Quiescent Current	I _Q	V _{FB} =1.2V Force driver off		3	5	mA
Oscillation Frequency	f _{OSC}	Measure waveform at SW Pin	260	330	400	KHz
Frequency of Current Limit or Short Circuit Protect	f _{OSC1}	Measure waveform at SW Pin	40			KHz
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	V _{CC} =5V-28V, I _{OUT} =0.2A		0.4		%
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	I _{OUT} =0.2A-3A		0.3		%
EN Pin Input Current	I _{SH}	V _{EN} =2.5V(ON)		5		μA
	I _{SL}	V _{EN} =0.3V(OFF)		0		μA
Soft-Start Time	T _{SS}		0.3	3.5	8	ms
Internal MOSFET R _{DS(ON)}	R _{DS(ON)}	V _{CC} =5V, V _{FB} =0V		130	150	mΩ
		V _{CC} =12V, V _{FB} =0V		80	100	mΩ
EN Pin Logic input threshold voltage	V _{SH}	High(regulator ON)	1.6			V
	V _{SL}	Low(regulator OFF)			0.8	V
Thermal shutdown Temp	TSD			140		°C

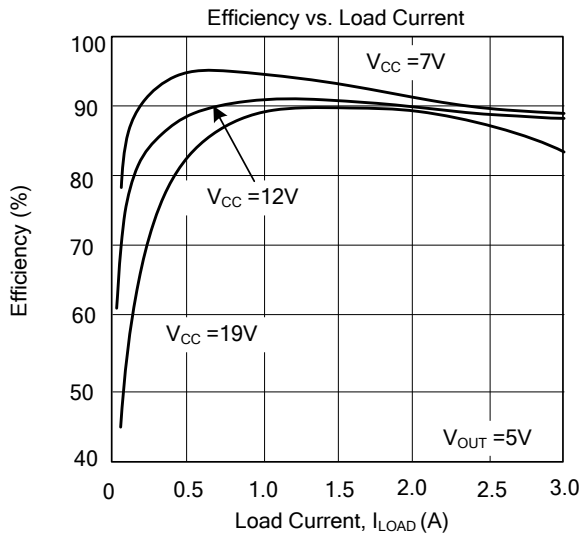
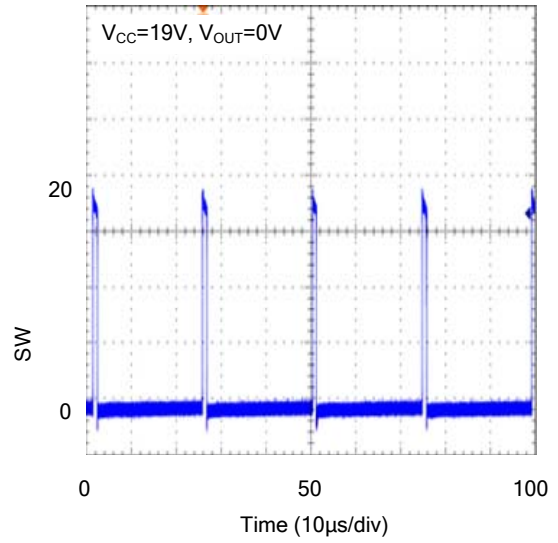
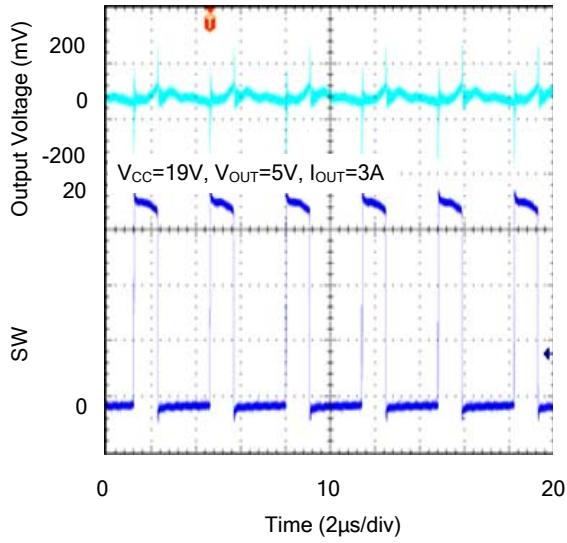
■ TYPICAL APPLICATION CIRCUIT

MLCC



V _{CC} (V)	C1 (nF)	C4 (µF)	C7 (nF)	C8 (µF)	R3 (KΩ)
7	1	33	2.2	0.1	10.3
12	1	33	2.2	0.1	10.96
19	1	33	10	0.1	5.94

■ TYPICAL CHARACTERISTICS



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