



L1803

Preliminary

LINEAR INTEGRATED CIRCUIT

1.5A ULTRA LOW DROPOUT LINEAR REGULATOR WITH PROGRAMMABLE SOFT-START

DESCRIPTION

The UTC **L1803** is a typical LDO that features a user-programmable soft-start, very low dropout voltage as low as 0.15V at output current 1.5A, an enable input and a power-good output.

The soft-start reduces inrush current of the load capacitors and minimizes stress on the input power source during start-up. An enable pin to further reduce power dissipation while shutdown. And power-good output indicates the output voltage status.

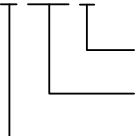
The UTC **L1803** is stable with any type of output capacitor of 2.2 μ F or more. A precision reference and feedback control deliver 2% accuracy over load, line, and operating temperature ranges.

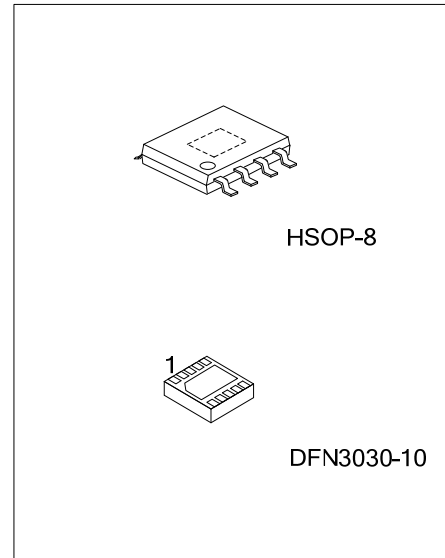
FEATURES

- * Low V_{IN} and wide V_{IN} range: 1.0V~5.5V
- * Bias voltage (V_{VCC}) range: 2.7V~5.5V
- * Low V_{OUT} range: 0.8V~3.3V
- * 150mV dropout @1.5A, V_{VCC} =5V
- * 2% output Voltage
- * Power-Good (PG) output
- * Programmable soft-start provides linear voltage startup
- * Stable with any output capacitor $\geq$ 2.2 μ F

ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
L1803L-SH2-R	L1803G-SH2-R	HSOP-8	Tape Reel
L1803L-K10-3030-R	L1803G-K10-3030-R	DFN3030-10	Tape Reel

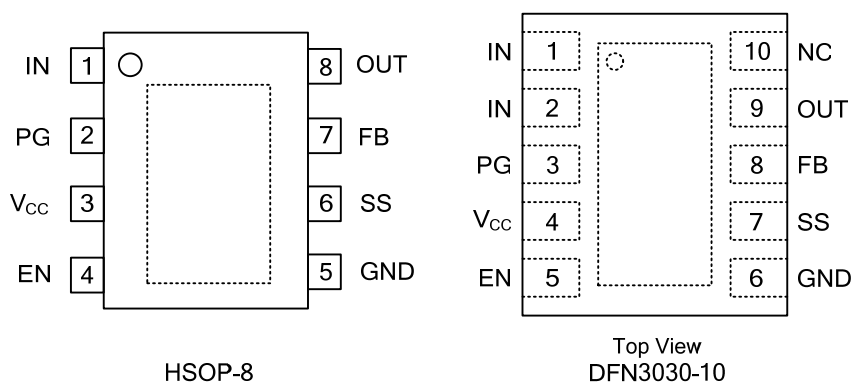
L1803G-SH2-R  (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) SH2: HSOP-8, K10-3030: DFN-10(3$\times$3) (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

HSOP-8	DFN3030-10
8 7 6 5 UTC □ □ □ □ → Date Code L1803 □ L: Lead Free G: Halogen Free □ □ → Lot Code 1 2 3 4	L 1803 • □ □ □ → Date Code

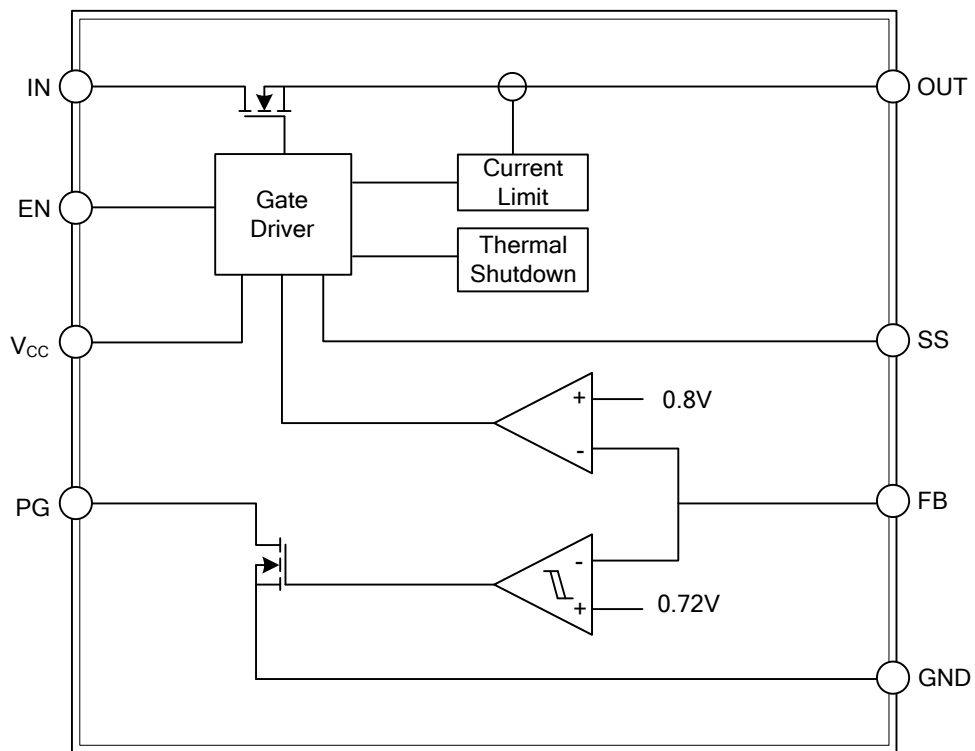
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
HSOP-8	DFN3030-10		
1	1, 2	IN	The main power Input pin.
2	3	PG	Power-good pin, open-drain output.
3	4	V _{CC}	Bias input pin of the control circuitry
4	5	EN	Enable pin.
5	6	GND	Ground.
6	7	SS	Soft-start pin.
7	8	FB	Feedback pin.
8	9	OUT	Regulated output pin.
-	10	NC	NO Connection.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage Range	V_{IN}, V_{VCC}	-0.3~+6	V
Enable Voltage Range	V_{EN}	-0.3~+6	V
Power-Good Voltage Range	V_{PG}	-0.3~+6	V
Soft-Start Voltage Range	V_{SS}	-0.3~+6	V
Feedback Voltage Range	V_{FB}	-0.3~+6	V
Output Voltage Range	V_{OUT}	-0.3~ $V_{IN}+0.3$	V
Maximum Output Current	I_{OUT}	Internally Limited	
Junction Temperature	T_J	-40~+150	°C
Storage Temperature	T_{STG}	-65~+150	°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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Voltage (Note)	V_{IN}	1.0		5.5	V
Bias Voltage	V_{VCC}	2.7		5.5	V
Output Current	I_{OUT}	0		1.5	A
Operating Ambient Temperature	T_A	-40		85	°C

Note: At $V_{IN}=1V$, the maximum load currents may be lower than 1.5A.

■ THERMAL RESISTANCES CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	HSOP-8	150	°C/W
	DFN3030-10	72 (Note)	°C/W

Note: The PCB area is 4 times larger than that of IC's

■ ELECTRICAL CHARACTERISTICS

At $V_{EN}=1.1V$, $V_{IN}=V_{OUT}+0.5V$, $C_{VCC}=0.1\mu F$, $C_{IN}=C_{OUT}=10\mu F$, $I_{OUT}=50mA$, $V_{VCC}=5.0V$, and $T_A=-40^{\circ}C\sim+85^{\circ}C$, unless otherwise noted. Typical values are at $T_A=+25^{\circ}C$.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{IN}		$V_{OUT}+V_{DO}$		5.5	V
Bias Pin Voltage Range (Note 2)	V_{VCC}		2.7		5.5	V
Internal Reference (Adj.)	V_{REF}	$T_A=+25^{\circ}C$	0.792	0.8	0.808	V
Output Voltage Range	V_{OUT}	$V_{IN}=5V$, $I_{OUT}=1.5A$	0.8		3.3	V
Accuracy (Note 2)		$3V\leq V_{VCC}\leq 5.5V$, $50mA\leq I_{OUT}\leq 1.5A$	-2	± 0.5	2	%
Line Regulation	$\Delta V_{OUT} / \Delta V_{IN}$ / V_{OUT}	$V_{OUT(NOM)}+0.5\leq V_{IN}$, 5.5V		0.02		%/V
Load Regulation	$\Delta V_{OUT} / V_{OUT}$ / ΔI_{OUT}	$50mA\leq I_{OUT}\leq 1.5A$		0.08		%/V
Dropout Voltage (Note 3)	V_{DO}	$I_{OUT}=1.5A$, $V_{VCC}-V_{OUT(NOM)}\geq 3.25V$		150	270	mV
		$I_{OUT}=1.5A$, $V_{IN}=V_{VCC}$		1.5	1.7	V
Current Limit	I_{CL}	$V_{OUT}=80\%\times V_{OUT(NOM)}$	2	3	4	A
Short-Circuit Current	I_{SHORT}	$V_{OUT}<0.2V$	0.6	1.1		A
Bias Pin Current	I_{VCC}			1	2	mA
Shutdown Supply Current (I_{GND})	I_{SHDN}	$V_{EN}\leq 0.4V$		70	100	μA
Feedback Pin Current	I_{FB}		-1	0.1	1	μA

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power-Supply Rejection ($V_{IN} \sim V_{OUT}$)	PSRR	1KHz, $I_{OUT}=1A$, $V_{IN}=1.8V$, $V_{OUT}=1.5V$		60		dB
		300KHz, $I_{OUT}=1A$, $V_{IN}=1.8V$, $V_{OUT}=1.5V$		30		dB
Power-Supply Rejection ($V_{VCC} \sim V_{OUT}$)		1KHz, $I_{OUT}=1A$, $V_{IN}=1.8V$, $V_{OUT}=1.5V$		50		dB
		300KHz, $I_{OUT}=1A$, $V_{IN}=1.8V$, $V_{OUT}=1.5V$		30		dB
Startup Time	T_{ST}	RLOAD for $I_{OUT}=1.0A$, $C_{SS} = OPEN$		100		μS
Soft-Start Charging Current	I_{SS}	$V_{SS}=0.4V$		440		nA
Enable Input High Level	$V_{EN, HI}$		1.1		5.5	V
Enable Input Low Level	$V_{EN, LO}$		0		0.4	V
Enable Pin Hysteresis	$V_{EN, HYS}$			50		mV
Enable Pin Current	I_{EN}	$V_{EN}=5V$		0.1	1	μA
PG Trip Threshold	$V_{PG, TH}$	V_{OUT} Decreasing	85	90	94	% V_{OUT}
PG Trip Hysteresis	$V_{PG, HYS}$			7		% V_{OUT}
PG Output Low Voltage	$V_{PG, LO}$	$I_{PG}=1mA$ (Sinking), $V_{OUT} < V_{PG, TH}$			0.3	V
PG Leakage Current	$I_{PG, LKG}$	$V_{PG}=5.25V$, $V_{OUT} > V_{PG, TH}$		0.1	1	μA
Thermal Shutdown Temperature	T_{SD}	Shutdown, Temperature Increasing		+150		$^{\circ}C$
		Reset, Temperature Decreasing		+130		$^{\circ}C$

Notes: 1. V_{VCC} should be higher or equal to V_{IN} in this chip.

2. Tested at 0.8V; resistor tolerance is not taken into account.

3. Dropout is defined as the voltage from V_{IN} to V_{OUT} when V_{OUT} is 3% below nominal.

■ TYPICAL APPLICATION CIRCUIT

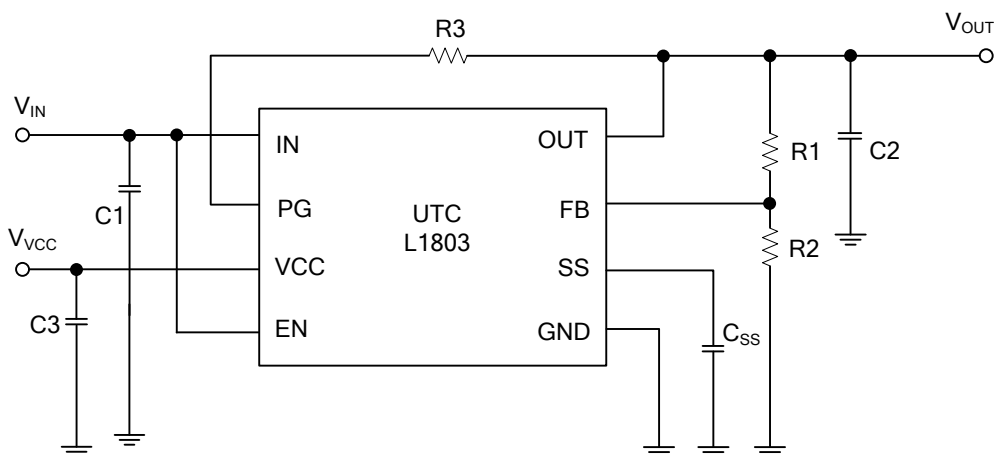


Table 1. Capacitor Values for Programming the Soft-Start Time (Note)

CSS	SOFT-START TIME
Open	0.1ms
270pF	0.5ms
560pF	1ms
2.7nF	5ms
5.6nF	10ms

Note: $t_{ss} (s) = 0.8 \times C_{ss} (F) / (4.4 \times 10^{-7})$

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