



## L1803

Preliminary

LINEAR INTEGRATED CIRCUIT

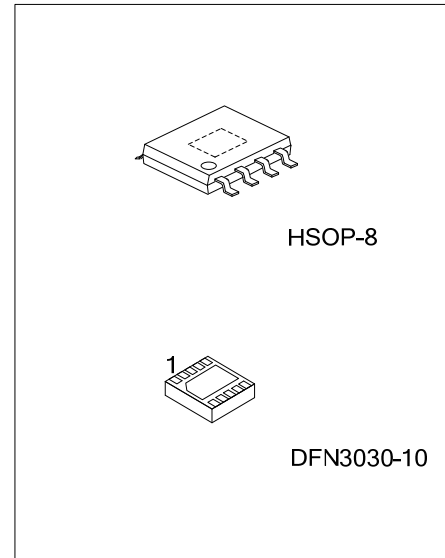
### 1.5A ULTRA LOW DROPOUT LINEAR REGULATOR WITH PROGRAMMABLE SOFT-START

#### 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 2.2μF 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  $\geq 2.2\mu F$

#### ORDERING INFORMATION

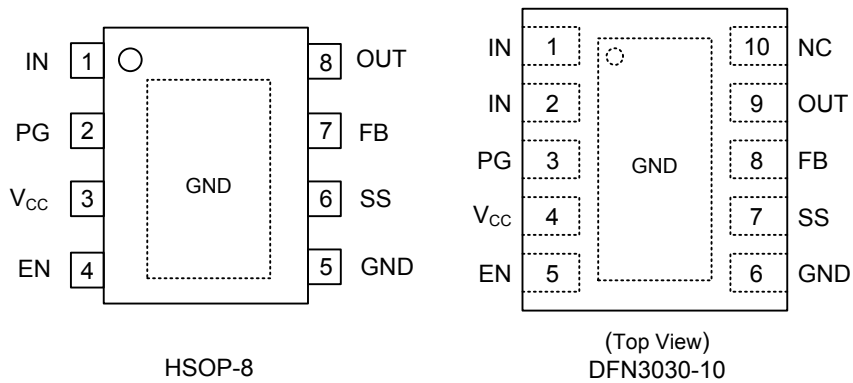
Ordering Number		Package	Packing
Lead Free	Halogen Free		
L1803L-SH2-R	L1803G-SH2-R	HSOP-8	Tape Reel
L1803L-K10-3030-R	L1803G-K10-3030-R	DFN3030-10	Tape Reel

<p>L1803G-SH2-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) SH2: HSOP-8, K10-3030: DFN3030-10</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING

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

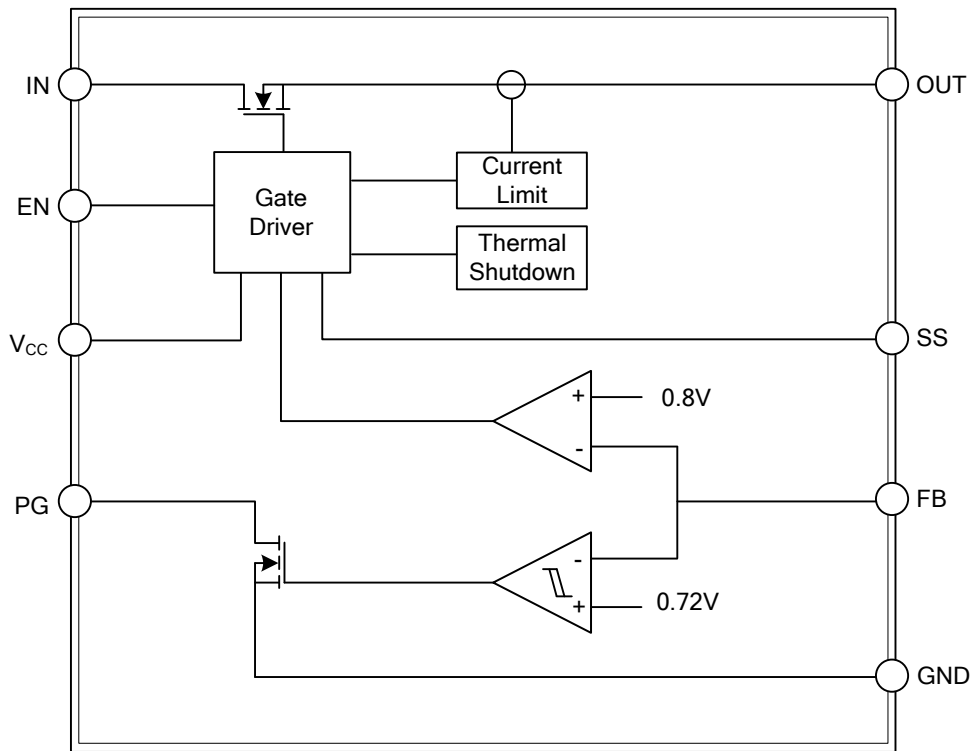
### PIN CONFIGURATION



### 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 <sub>CC</sub>	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.
Exposed Pad	Exposed Pad	GND	Connect exposed pad to GND.

■ 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	$\pm 0.5$	2	%
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}} / \frac{\Delta V_{OUT}}{V_{OUT}}$	$V_{OUT(NOM)}+0.5\leq V_{IN}, 5.5V$		0.02		%/V
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}} / \frac{\Delta I_{OUT}}{I_{OUT}}$	$50mA\leq I_{OUT}\leq 1.5A$		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	$\mu A$
Feedback Pin Current	$I_{FB}$		-1	0.1	1	$\mu A$

■ 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		$\mu S$
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	$\mu A$
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	$\mu A$
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

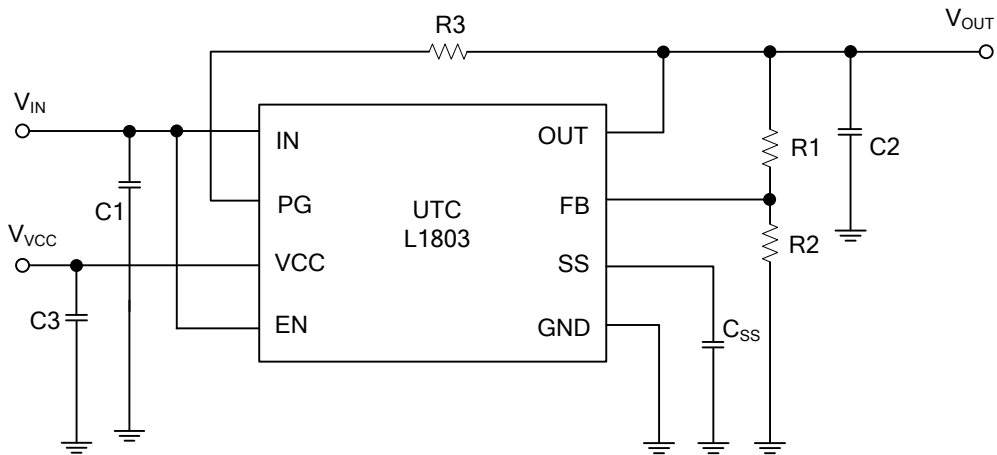


Table 1. Capacitor Values for Programming the Soft-Start Time (Note)

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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