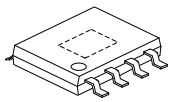
1.5A ULTRA LOW DROPOUT LINEAR REGULATOR WITH PROGRAMMABLE SOFT-START



HSOP-8

DFN3030-10

■ DESCRIPTION

The UTC **LR1815** 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 **LR1815** 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

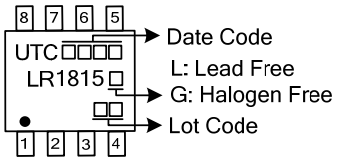
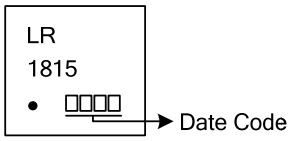
* Low V_{IN} and wide V_{IN} range: 1.0V~5.5V
* Bias voltage (V_{VCC}) range: 2.7V~5.5V
* Low V_{OUT} range: 0.8V~3.3V
* 150mV dropout @1.5A, V_{VCC}=5V
* 2% output Voltage
* Power-Good (PG) output
* Programmable soft-start provides linear voltage startup
* Stable with any output capacitor≥2.2μF

■ ORDERING INFORMATION

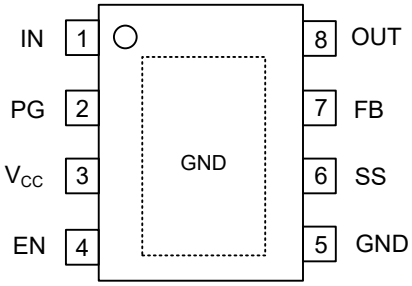
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR1815L-SH2-R	LR1815G-SH2-R	HSOP-8	Tape Reel
LR1815L-K10-3030-R	LR1815G-K10-3030-R	DFN3030-10	Tape Reel

LR1815G-SH2-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) SH2: HSOP-8, K10-3030: DFN3030-10 (3) G: Halogen Free and Lead Free, L: Lead Free

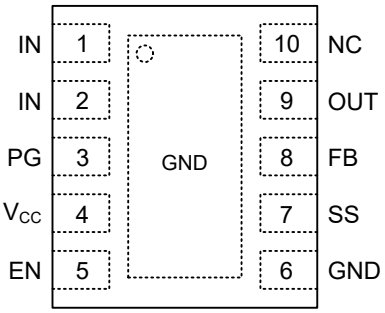
■ MARKING

HSOP-8	DFN3030-10
	

■ PIN CONFIGURATION



HSOP-8

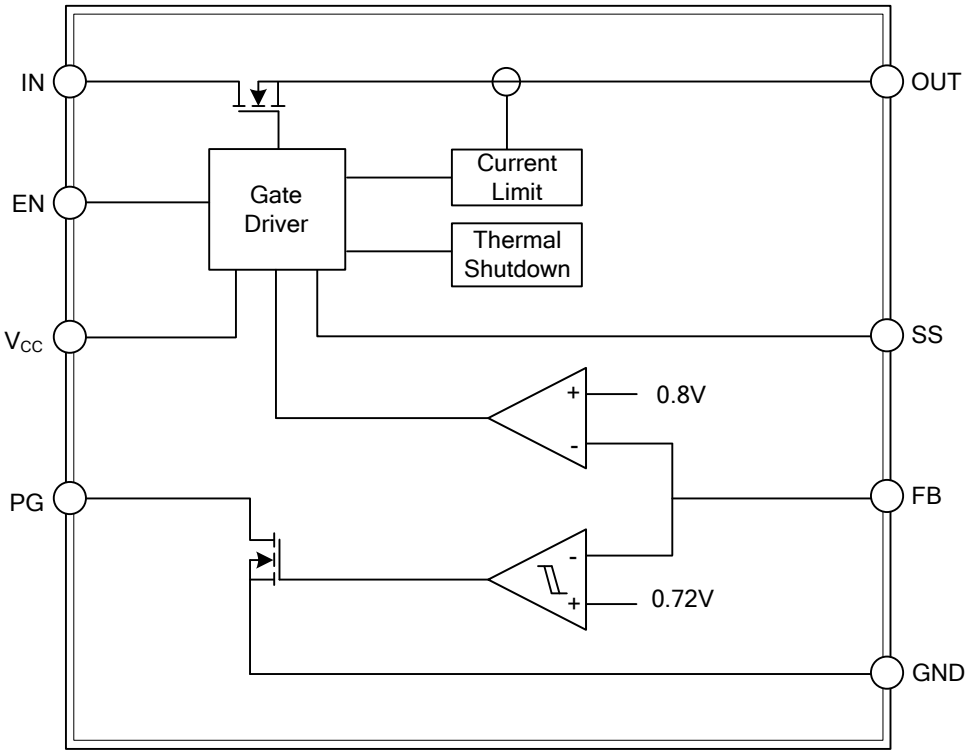


(Top View)
DFN3030-10

■ 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.
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 DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	HSOP-8	θ_{JA}	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}=0.1uF, C_{IN}=C_{OUT}=10uF, I_{OUT}=50mA, V_{VCC}=5.0V, and T_A=-40°C~+85°C, unless otherwise noted. Typical values are at T_A=+25°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°C	0.788	0.8	0.812	V
Output Voltage Range	V_{OUT}	V_{IN}=5V, I_{OUT}=1.5A	0.8		3.3	V
Accuracy (Note 2)		3V≤V_{VCC}≤5.5V, 50mA≤I_{OUT}≤1.5A	-2	±0.5	2	%
Line Regulation	ΔV_{OUT} / ΔV_{IN} / V_{OUT}	$V_{OUT\ (NOM)}$+0.5≤V_{IN}, 5.5V		0.02		%/V
Load Regulation	ΔV_{OUT} / V_{OUT} / ΔI_{OUT}	50mA≤I_{OUT}≤1.5A		0.08		%/V
Dropout Voltage (Note 3)	V_{DO}	I_{OUT}=1.5A, V_{VCC}-$V_{OUT(NOM)}$≥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%x$V_{OUT\ (NOM)}$	1.8	3	4	A
Short-Circuit Current	I_{SHORT}	V_{OUT}<0.2V	0.5	1.1		A
Bias Pin Current	I_{VCC}			1	2	mA
Shutdown Supply Current (I_{GND})	I_{SHDN}	V_{EN}≤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}~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}~V_{OUT})	PSRR	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}, H_I		1.1		5.5	V
Enable Input Low Level	V_{EN}, L_O		0		0.4	V
Enable Pin Hysteresis	V_{EN}, H_{YS}			50		mV
Enable Pin Current	I_{EN}	V_{EN}=5V		0.1	1	μA
PG Trip Threshold	V_{PG}, T_H	V_{OUT} Decreasing		93		%V_{OUT}
PG Trip Hysteresis	V_{PG}, H_{YS}			7		%V_{OUT}
PG Output Low Voltage	V_{PG}, L_O	I_{PG}=1mA (Sinking), V_{OUT}<V_{PG}, T_H			0.3	V
PG Leakage Current	I_{PG}, L_{KG}	VPG=5.25V, V_{OUT}>V_{PG}, T_H		0.1	1	μA
Thermal Shutdown Temperature	T_{SD}	Shutdown, Temperature Increasing		+150		°C
		Reset, Temperature Decreasing		+130		°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

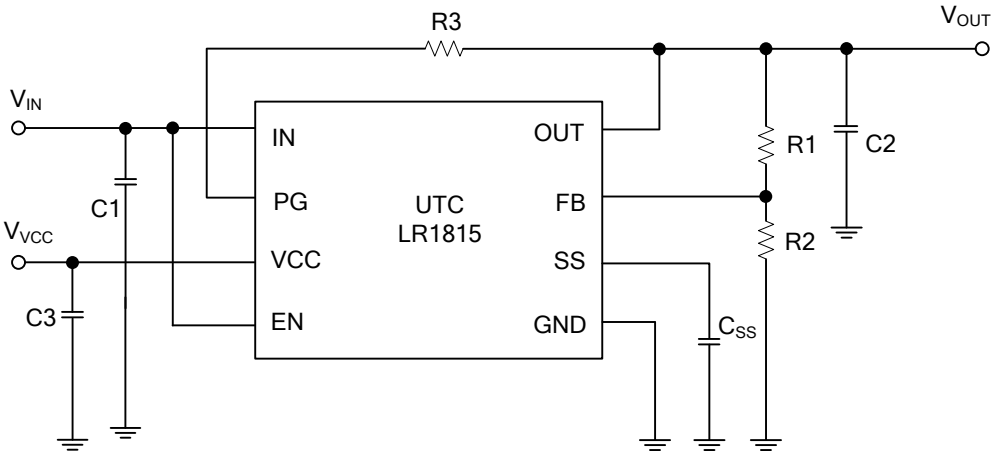


Table 1. Capacitor Values for Programming the Soft-Start Time (Note)

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

Note: t_{SS} (s) = 0.8 x C_{SS} (F) / ($4.4x10^{-7}$)