



## LR1965

Preliminary

CMOS IC

### 1.5A, LOW DROPOUT REGULATOR WITH POWER GOOD

#### ■ DESCRIPTION

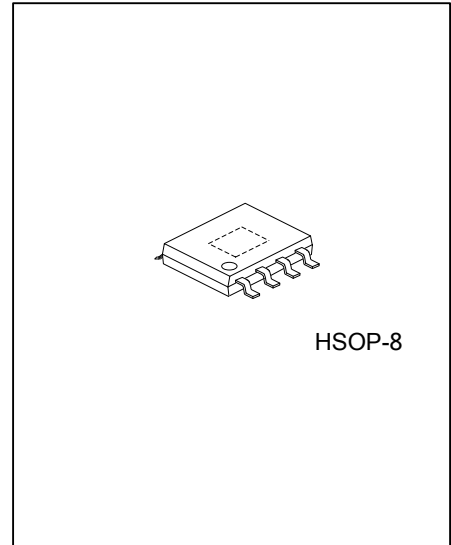
The **UTC LR1965** is CMOS-based positive voltage and a very low dropout regulator IC that minimum input voltage is 2.5V and is capable of delivering the continuous output load current up to 1.5A.

It has features of low dropout (maximum 300mV at 1A), a very low quiescent current (typically 300uA at 0.1A) and very high PSRR up to 86dB at 1A load current.

The output voltage can be set from 0.5V to (VIN - VDRP) with an external resistor divider and it has  $\pm 2\%$  accuracy through all temperature ranges include the line as well as load variations. It is allowed to use a small 4.7 $\mu$ F MLCC input and output capacitor to deliver the current with the stable operation.

Built-in Soft-Start function reduces the inrush current and the other features are include over current protection (OCP), short-circuit protection (SCP), and thermal shut down protection (TSD).

The **UTC LR1965** is available in 8-SOP-EP package with exposed pad for optimal power dissipation and 8-TDFN (3x3mm).



#### ■ FEATURES

- \* Input Voltage Range: 2.5V~6.0V
- \* Supply Current : Typ. 300uA
- \* Current limit : Min. 1.8A
- \* Adjustable Output from 0.8V
- \* LR1965: Typ 0.4V Dropout @ I<sub>OUT</sub>=1.5A
- \* Compatible with MLCC Capacitors
- \* Built-in Soft-Start Limits Inrush Current
- \* Built-in Thermal Shutdown Protection
- \* Built-in Over Current & Short Circuit Protection

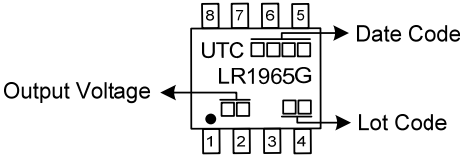
#### ■ ORDERING INFORMATION

Ordering Number	Package	Packing
LR1965G-xx-SH2-R	HSOP-8	Tape Reel

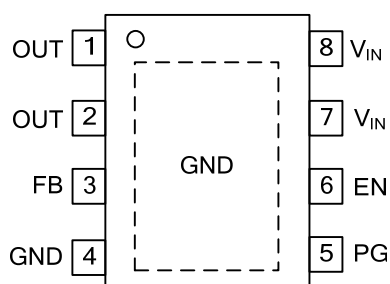
Note: xx: Output Voltage, refer to Marking Information.

LR1965G-xx-SH2-R	(1) Packing Type (2) Package Type (3) Output Voltage Code (4) Green Package	(1) R: Tape Reel (2) SH2: HSOP-8 (3) xx: refer to Marking Information (4) G: Halogen Free and Lead Free
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## MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
HSOP-8	AD: ADJ	

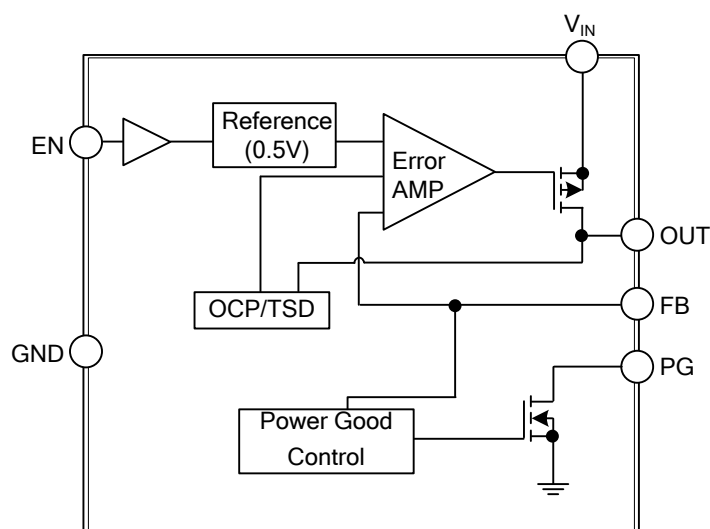
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1, 2	OUT	Voltage Regulator Output Pin
3	FB	Feedback Pin. Connect to output through a voltage-divider to set the output. Recommended that the tolerance of feedback resistors is below 1%.
4	GND	Ground Pin
5	PG	Open Drain Power-Good (PG) Output.
6	EN	Chip Enable Pin
7, 8	V <sub>IN</sub>	Input Supply Voltage Pin.

## BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ( $T_A=25^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	-0.3~7	V
Output Voltage	OUT	-0.3~ $V_{IN}+0.3$	V
Junction to Ambient	$\theta_{JA}$	50	$^{\circ}\text{C/W}$
Junction to Case	$\theta_{JC}$	10	$^{\circ}\text{C/W}$
Junction Temperature	$T_J$	150	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-65~150	$^{\circ}\text{C}$

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	RATINGS	UNIT
Input Voltage Range	$V_{IN}$	2.5~6.0	V
Ambient Temperature Range	$T_A$	-40~85	$^{\circ}\text{C}$

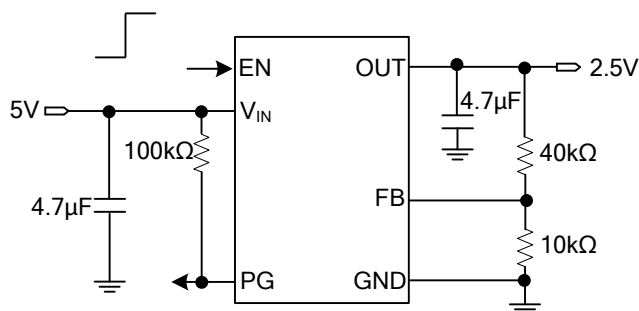
■ ELECTRICAL CHARACTERISTICS

All parameters are guaranteed over the operational supply voltage and temperature range. Operating conditions unless otherwise noted are:  $V_{IN}=5\text{V}$ ,  $\text{OUT}=2.5\text{V}$  and  $T_A=25^{\circ}\text{C}$ . Typical values are for information only.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>Supply Voltage</b>						
Quiescent Current	$I_Q$	$I_{OUT}=100\text{mA}$		300		$\mu\text{A}$
Shutdown Current	$I_{STD}$	$V_{IN}=6\text{V}$ , $V_{EN}=\text{GND}$		0.2	2	$\mu\text{A}$
<b>Feedback (FB)</b>						
Feedback Voltage Accuracy	$V_F$	$I_{OUT}=10\text{mA}$ , $T_A=25^{\circ}\text{C}$	784	800	816	mV
Input Bias Current	$I_F$	$V_{FB}=0.8\text{V}$ , $V_{IN}=6\text{V}$		0.001	0.1	$\mu\text{A}$
<b>Output (OUT)</b>						
Output Accuracy	$V_{OUT}$		-2		2	%
Load Regulation	$R_{LO}$	$I_{OUT}=1\text{mA}$ to 1.5A		0.1	2	%/A
Line Regulation	$R_{LN}$	$V_{IN}=2.2\sim 6\text{V}$ , $V_{OUT}=1.225\text{V}$ , $I_{OUT}=1\text{mA}$	-0.2		0.2	%/V
Dropout Voltage	$V_{DRP}$	$I_{OUT}=1.5\text{A}$ , $V_{FB}=768\text{mV}$		400		mV
		$I_{OUT}=1\text{A}$ , $V_{FB}=768\text{mV}$		140	280	
		$I_{OUT}=0.5\text{A}$ , $V_{FB}=768\text{mV}$			200	
Current Limit	$I_C$		1.8			A
Load transient (Note 1)	$L_{OT}$	$I_{OUT}=20\text{mA}$ to 1.5A,		3		%
Line Transient (Note 1)	$R_{NT}$	$\Delta V_{IN}=0.5\text{V}$		3		%
<b>Enable (EN)</b>						
Input Threshold	$V_{ENH}$	EN rising, $V_{IN}=\text{OUT}+1\text{V}\sim 6\text{V}$	1.2			V
	$V_{ENL}$	EN falling, $V_{IN}=\text{OUT}+1\text{V}\sim 6\text{V}$			0.4	
Input Bias Current	$I_{EN}$	EN=0 or 6V	-1	0	1	$\mu\text{A}$
<b>Power Good (PG)</b>						
Threshold Voltage	$P_{V1}$	FB high, $V_{HYS}=10\text{mV}$ , $V_{IN}=\text{OUT}+1\text{V}\sim 6\text{V}$	835	880	924	mV
	$P_{V2}$	FB low, $V_{HYS}=10\text{mV}$ , $V_{IN}=\text{OUT}+1\text{V}\sim 6\text{V}$	652	688	760	mV
Output Voltage Low	$P_{CL}$	FB=0.6V or 1.0V, $I_{PG}=1\text{mA}$		25	200	mV
Output Current High	$P_{CH}$	$P_{WRGD}=6\text{V}$		0.001	0.1	$\mu\text{A}$
Rising Delay Time	$P_{RDT}$	From FB*90% to PG		150		$\mu\text{s}$
Falling Delay Time 1	$P_{FDT1}$	$V_{IN}=2.5\text{V}$ , From FB to PG	20	70	120	$\mu\text{s}$
Falling Delay Time 2	$P_{FDT2}$	$V_{IN}=6\text{V}$ , From FB to PG	60	180	300	$\mu\text{s}$
<b>Thermal Shutdown (TSD) (Note 1)</b>						
TSD Threshold	$T_{SDON}$	TSD On		165		$^{\circ}\text{C}$
	$T_{SDOFF}$	TSD Off		145		$^{\circ}\text{C}$

Note: Guaranteed by design but not production tested.

## ■ TYPICAL APPLICATION CIRCUIT



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