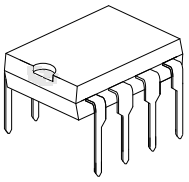
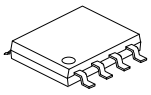
L8561

LINEAR INTEGRATED CIRCUIT

POWER FACTOR CORRECTOR



DIP-8



SOP-8

■ DESCRIPTION

The UTC **L8561** is a Power Factor Corrector, which can work in wide input voltage range applications (from 85V ~ 265V) with an excellent THD. It has very low start up current (about 20 uA) and a disable function on the ZCD pin, which is designed to keep lower current consumption in stand by mode.

The device is operating in transition mode, and is able to drive a Power MOS or IGBT with a ± 400mA current for sourcing and sinking.

■ FEATURES

* 1% Precision (@ T_J = 25℃) Internal Reference Voltage
* Output Overvoltage Protection
* Very Low Power Start-Up Current
* Current Sense Filter On Chip
* Disable Function (with ZCD pin)
* Transition Mode Operation
* Gate Driving Current: ± 400mA
* 15V Gate clamped

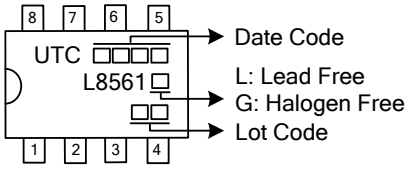
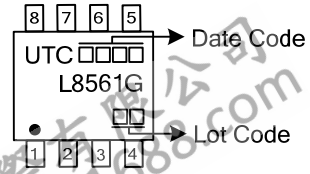
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
L8561L-D08-T	L8561G-D08-T	DIP-8	Tube
-	L8561G-S08-R	SOP-8	Tape Reel

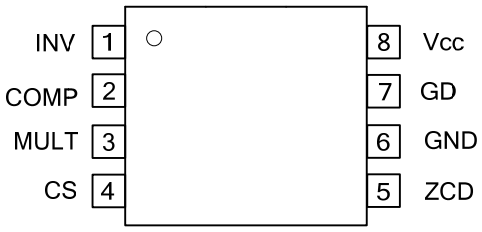
L8561L-D08-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) D08: DIP-8, S08: SOP-8
(3) G: Halogen Free and Lead Free

■ MARKING

DIP-8	SOP-8
	

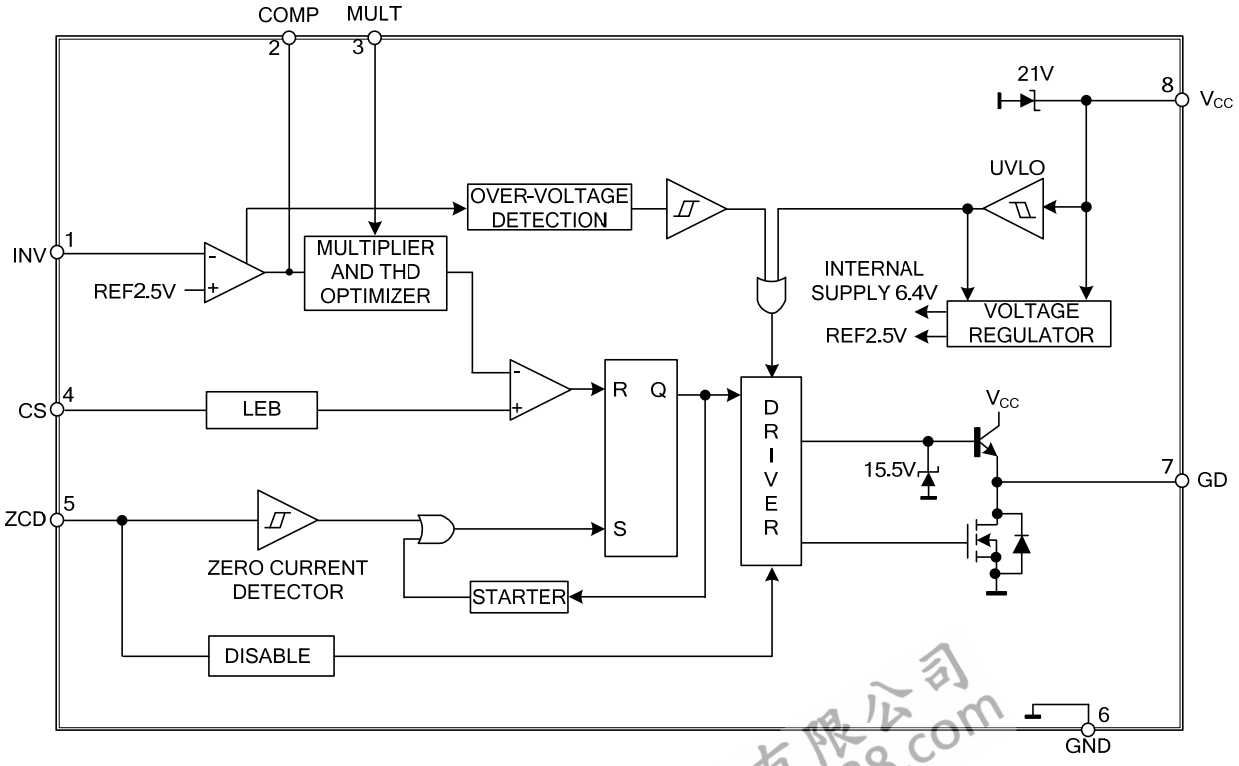
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	INV	Inverting input of the error amplifier.
2	COMP	Output of the error amplifier.
3	MULT	Input of the multiplier stage.
4	CS	Input of the current sense stage.
5	ZCD	Input of the zero current detection .
6	GND	Ground.
7	GD	Gate driver output.
8	V_{CC}	Voltage supply.

■ BLOCK DIAGRAM



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

PARAMETER		SYMBOL	RATINGS	UNIT
Analog Inputs & Outputs		INV, COMP MULT	-0.3 ~ 7	V
Current Sense Input		CS	-0.3 ~ 7	V
Iq+Iz (I_{GD} = 0)		IV_{CC}	30	mA
Output Totem Pole Peak Current (2ms)		I_{GD}	±700	mA
Zero Current Detector		ZCD	50 (source)	mA
			-10 (sink)	
Power Dissipation @ T_A=50℃	SOP-8	P_D	1	W
	DIP-8		0.65	W
Junction Temperature		T_J	125	°C
Operating Temperature		T_{OPR}	-20 ~ +85	°C
Storage Temperature		T_{STG}	-40 ~ +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.

■ ELECTRICAL CHARACTERISTICS (T_A=-25°C ~ 125°C,V_{CC}=14.5V, unless otherwise specified)

PARAMETER	PIN	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY VOLTAGE SECTION							
Operating Range	8	V_{CC}	after turn-on	11		18	V
Turn-on Threshold	8	$V_{CC\ ON}$		14	15.3	16.5	V
Turn-off Threshold	8	$V_{CC\ OFF}$		7.2	7.9	8.7	V
Hysteresis	8	Hys		6.5		8.3	V
SUPPLY CURRENT SECTION							
Start-up Current	8	$I_{START-U}$	V_{CCON}-1V		30	50	μA
Quiescent Current	8	Iq			6	9	mA
Operating Supply Current	8	I_{CC}	C_L=1nF @ 70KHz		10	15	mA
			In OVP condition V_{pin1}=2.7V			6.8	mA
Quiescent Current	8	Iq	V_{PIN5}≤150mV, V_{CC}>$V_{CC\ off}$			6	mA
	8		V_{PIN5}≤150mV, V_{CC}<V_{CC} off	4	7	10	μA
Zener Voltage	8	V_Z	I_{CC}=20mA	18	21	24	V
ERROR AMPLIFIER SECTION							
Voltage Feedback Input Threshold	1	V_{INV}	T_A=25℃	2.465	2.5	2.535	V
			10.3V<V_{CC}<18V	2.44		2.56	V
Line Regulation			V_{CC}=10.3 ~ 18V		3	5	mV
Input Bias Current	1	I_{INV}			-100	-1000	uA
Voltage Gain		G_V	Open loop	60	80		dB
Gain Bandwidth		G_B			0.8		MHz
Source Current	2	I_{COMP}	V_{COMP}=4V, V_{INV}=2.4V	-2	-4	-8	mA
Sink Current			V_{COMP}=4V, V_{INV}=2.6V	2.5	4.5		mA
Upper Clamp Voltage	2	V_{COMP}	I_{SOURCE}=0.5mA	4.5	5	5.5	V
Lower Clamp Voltage			I_{SINK}=0.5mA	2.25	2.4	2.55	V
MULTIPLIER SECTION							
Linear Operating Voltage	3	V_{MULT}		0~2.5	0 ~ 3.5		V
Output Max. Slope		$\frac{\triangle V_{CS}}{\triangle V_{MULT}}$	V_{MULT}=from 0V ~ 0.5V V_{COMP}=Upper ClamVoltage	1.65	1.9		
Gain		K	V_{MULT}=1V, V_{COMP}=4V	0.5	0.7	0.9	1/V

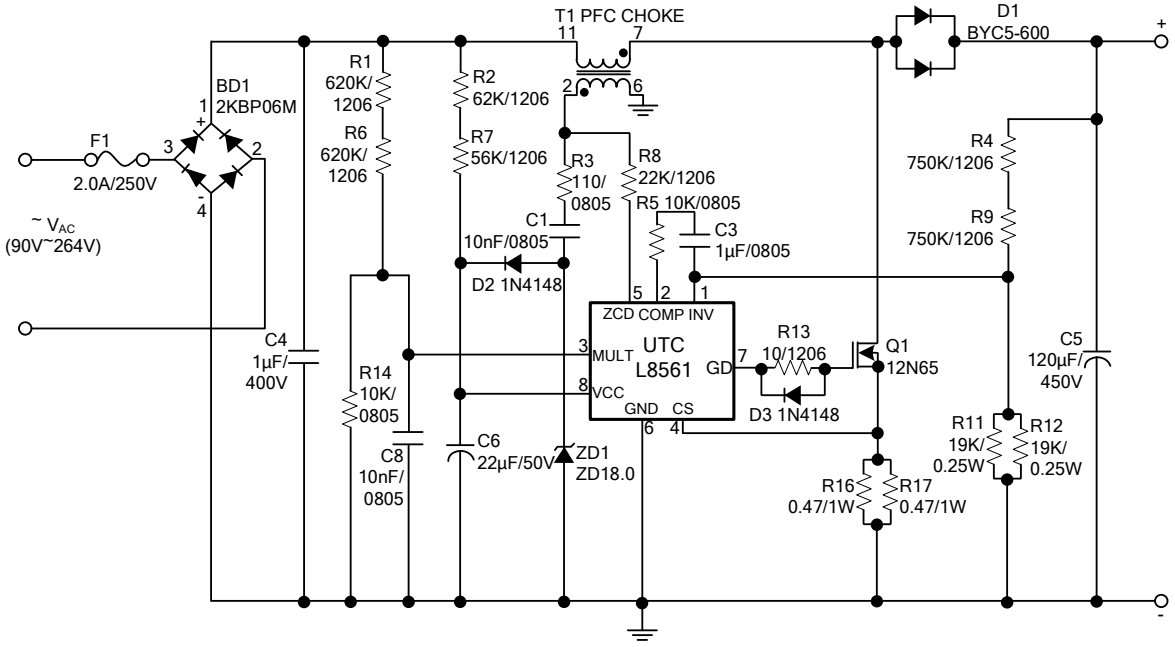
■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	PIN	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
CURRENT SENSE COMPARATOR							
Current Sense Reference Clamp	4	V_{CS}	V_{MULT}=2.5V V_{COMP}=Upper Clamp Voltage	1.6	1.7	1.8	V
Input Bias Current	4	I_{CS}	V_{OS}=0		-0.05	-1	μA
Delay to Output	4	$T_{D(H-L)}$			200	450	ns
ZERO CURRENT DETECTOR							
Input Threshold Voltage Rising Edge	5	V_{ZCD}	(Note)		2.1		V
Hysteresis			(Note)	0.4	0.6	0.8	V
Upper Clamp Voltage	5	V_{ZCD}	I_{ZCD}=20μA	5.9	6.5	7.3	V
Upper Clamp Voltage	5	V_{ZCD}	I_{ZCD}=3mA	6.1	6.6	7.5	V
Lower Clamp Voltage	5	V_{ZCD}	I_{ZCD}=3mA	0.3	0.7	1	V
Sink Bias Current	5	I_{ZCD}	1V≦V_{ZCD}≦4.5V		2		μA
Source Current Capability	5	I_{ZCD}		-3		-10	mA
Sink Current Capability	5	I_{ZCD}		3		10	mA
Disable threshold	5	V_{DIS}		100	200	300	mV
Restart Current After Disable	5	I_{ZCD}	V_{ZCD}<V_{DIS}, V_{CC}>V_{COFF}	-20	-50		μA
OUTPUT SECTION							
Dropout Voltage	7	V_{GD}	$I_{GD(SOURCR)}$=200mA		1.2	2	V
			$I_{GD(SOURCR)}$=20mA		0.8	1.2	V
			$I_{GD(SINK)}$=200mA		1.2	1.9	V
			$I_{GD(SINK)}$=20mA			1.2	V
Output Voltage Rise Time	7	t_R	C_L=1nF		40	100	ns
Output Voltage Fall Time	7	t_F	C_L=1nF		40	100	ns
IGD Sink Current	7	$I_{GD\ (OFF)}$	V_{CC}=3.5V, V_{GD}=1V	10	40		mA
OUTPUT OVERVOLTAGE SECTION							
OVP Triggering Current	2	I_{OVP}		30	40	50	μA
Static OVP Threshold				2.25	2.4	2.55	V
RESTART TIMER							
Start Timer		t_{START}		70	130	300	μs

Note: Parameter guaranteed by design, not tested in production.

■ TYPICAL APPLICATION CIRCUIT

(150W, Wide-range Mains)



■ TYPICAL CHARACTERISTICS

Output ripple at 0.5W