



L8561

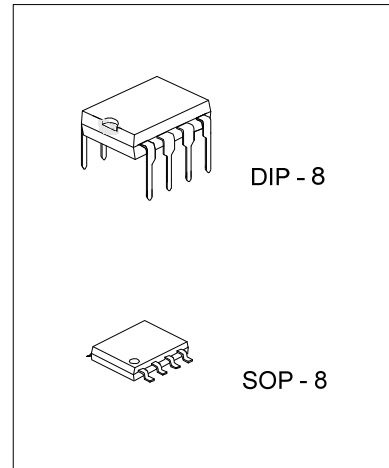
LINEAR INTEGRATED CIRCUIT

POWER FACTOR CORRECTOR

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 $\pm 400\text{mA}$ current for sourcing and sinking.



FEATURES

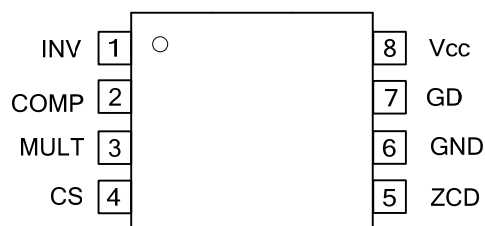
- * 1% Precision (@ $T_J = 25^\circ\text{C}$) Internal Reference Voltage
- * Output Overvoltage Protection
- * Very Low Power Start-Up Current
- * Current Sense Filter On Chip
- * Disable Function (with ZCD pin)
- * Transition Mode Operation
- * Gate Driving Current: $\pm 400\text{mA}$
- * 15V Gate clamped

ORDERING INFORMATION

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

L8561L-D08-T (1)Packing Type (2)Package Type (3)Lead Free		(1) R: Tape Reel, T: Tube (2) S08: SOP-8, D08: DIP-8 (3) G: Halogen Free, L: Lead Free
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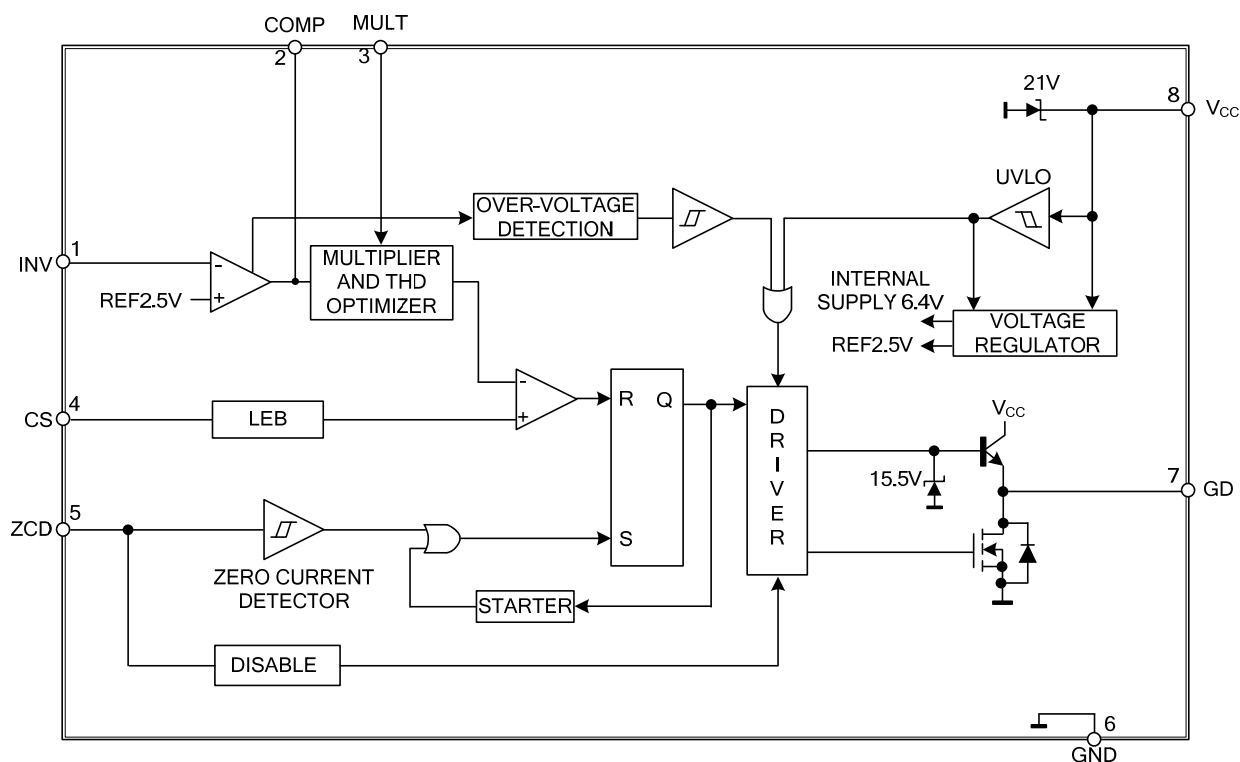
PIN CONFIGURATION



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 ($T_A=25^{\circ}\text{C}$, 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
$I_q + I_z$ ($I_{GD} = 0$)	I_{VCC}	30	mA
Output Totem Pole Peak Current (2ms)	I_{GD}	± 700	mA
Zero Current Detector	ZCD	50 (source)	mA
		-10 (sink)	
Power Dissipation @ $T_A=50^{\circ}\text{C}$	SOP-8	1	W
	DIP-8	0.65	W
Junction Temperature	T_J	125	$^{\circ}\text{C}$
Operating Temperature	T_{OPR}	-20 ~ +85	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-40 ~ +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.

■ ELECTRICAL CHARACTERISTICS ($T_A=-25^{\circ}\text{C} \sim 125^{\circ}\text{C}$, $V_{CC}=14.5\text{V}$, 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	I _q			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	I _q	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°C	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		$\frac{\Delta V_{CS}}{\Delta V_{MULT}}$	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

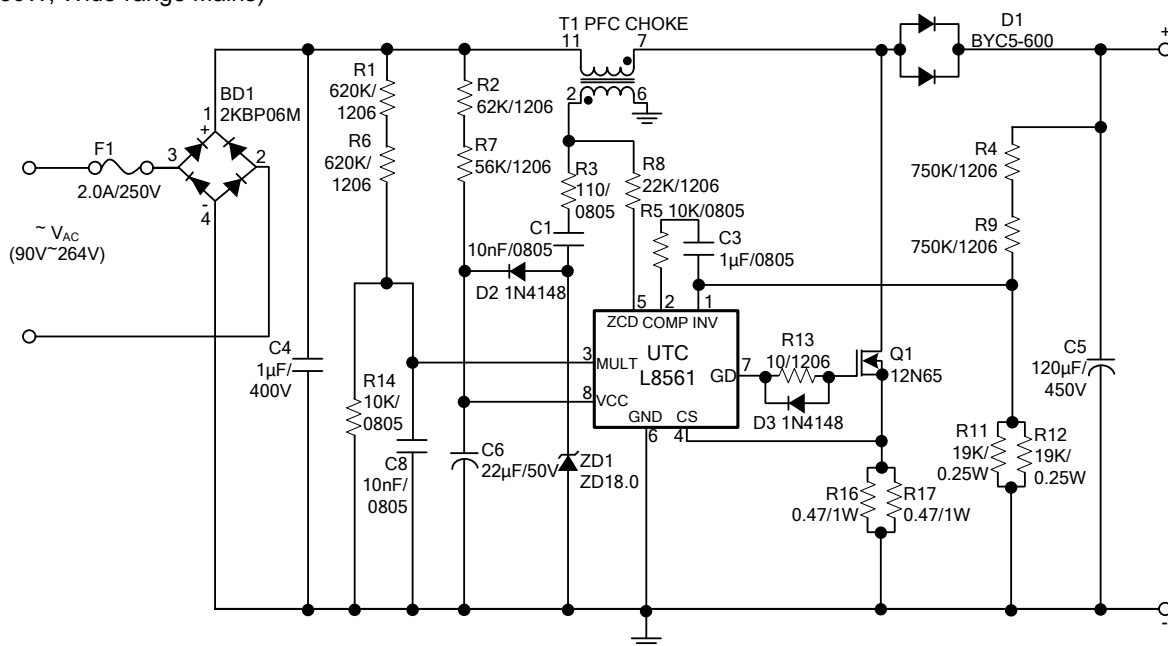
■ ELECTRICAL CHARACTERISTICS(Cont.)

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 1)		2.1		V
Hysteresis			(Note 1)	0.4	0.6	0.8	V
Upper Clamp Voltage	5	V_{ZCD}	$I_{ZCD}=20\mu A$	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}	$1V \leq V_{ZCD} \leq 4.5V$		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}	$I_{GD(SOURCE)}=200mA$		1.2	2	V
			$I_{GD(SOURCE)}=20mA$		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: 1. Parameter guaranteed by design, not tested in production.

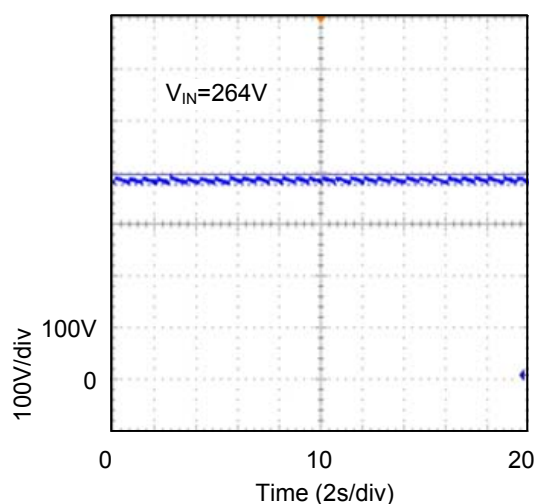
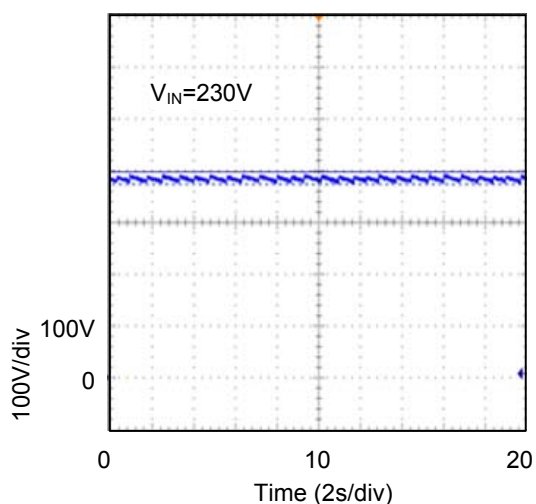
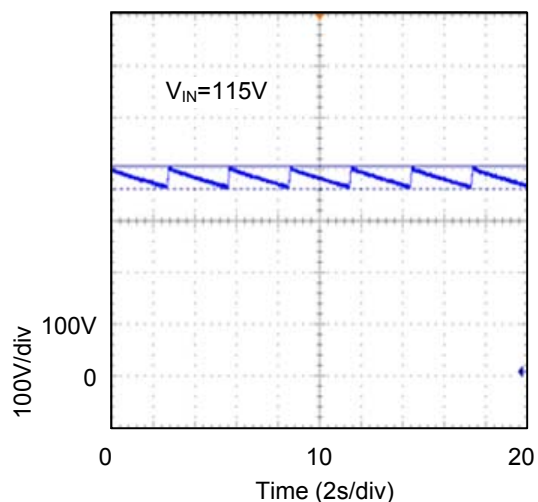
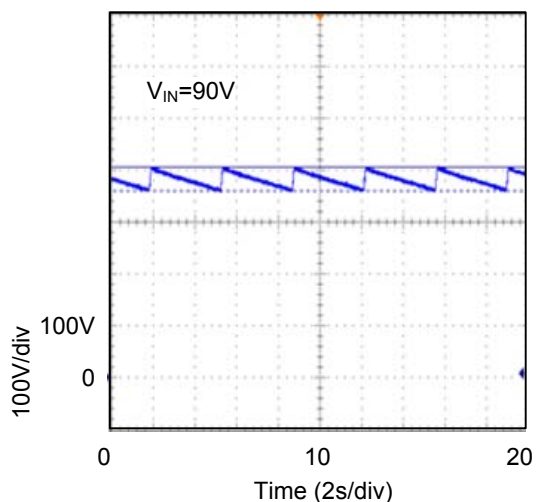
■ TYPICAL APPLICATION CIRCUIT

(150W, Wide-range Mains)



■ TYPICAL CHARACTERISTICS

Output ripple at 0.5W



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