61122 CURRENT-MODE-PWM CONTROLLER WITH OPTOISOLATED VOLTAGE REFERNCE AND ERROR AMPLIFIER

OPTOELECTRONIC PRODUCTS DIVISION

Features:

- Current mode (PWM) operates to 1 Mhz
- 100 µA Maximum start-up current
- 2- A, 30 ns. MOSFET drive output
- -40 °C to 100 °C free air operating temperature

Applications:

- AC to DC Power Supply
- DC/DC Converters
- Off-line power supply

DESCRIPTION

The 61122 consists of an advanced current mode PWM controller, an adjustable precision shunt regulator (TL1431), and an optoisolator in a single package. The controller provides a photo-detector, a MOSFET output, and an LED for isolation. Using the 61122, the controller function of a dc/dc converter or off-line switching power supply with one IC and a few passive components. The 61122 is packaged in a 16 pin ceramic package and operates over the –40 °C to 100 °C temperature range.

ABSOLUTE MAXIMUM RATINGS

LED/Ref Section

Input current range at FB ……-50 µA to 10 mA
LED forward current ……..50 mA
Input LED reverse voltage ……..6 V

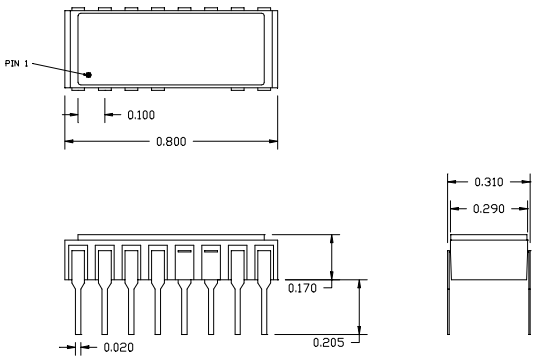
PWM Section

Supply voltage range, Vcc .....-0.3 to 30 V
Input voltage at IS ……-0.3 to 5V
Continuous supply current, Icc ……..15 mA

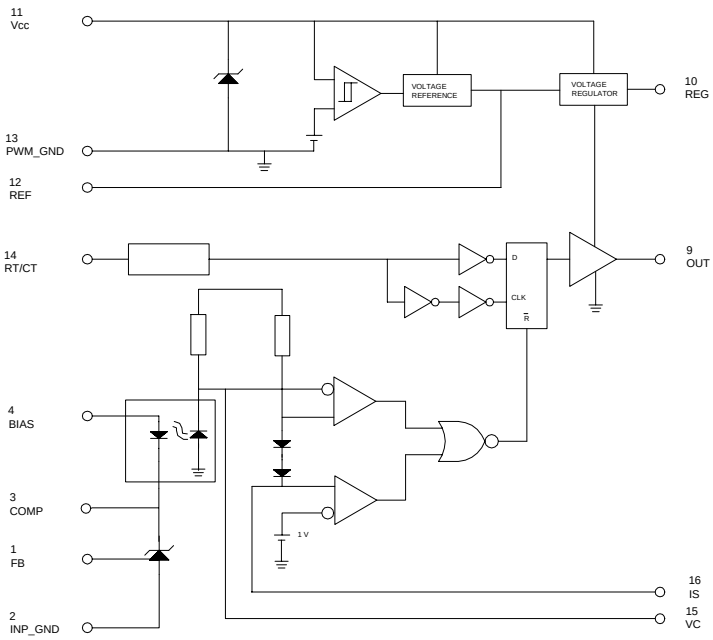
Entire Package

Isolation Voltage ……..1500 VDC
Lead temperature 1.6 mm (1/16) from case for 10 seconds ……..260 °C

Package Dimensions Diagram



Schematic



61122

CURRENT-MODE-PWM CONTROLLER WITH OPTOISOLATED VOLTAGE REFERNCE AND ERROR AMPLIFIER

ELECTRICAL CHARACTERISTICS (T_a = -25°C, V_{cc} = 17 V, Rt = 3.9 K, Ct = 1 nF)

VOLTAGE REFERENCE SECTION

VOLTAGE REFERENCE/ERROR AMPLIFIER

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
V_{ref}	Reference Voltage	Vo (comp) = Vi(FB) II(LED) = 10 mA,	2.48	2.5	2.52	V
$V_{ref(dev)}$	Deviation of reference voltage over temperature	Ta = 25 °C to 100 °C, Vo(comp) = Vi(FB) II(LED) = 10 mA,		25		mV
$\Delta Vref/\Delta V_{I(LED)}$	Ratio of reference voltage change to change in input light emitting diode voltage	$\Delta V_{I(LED)}$ = 4 V to 37 V, $I_{I(LED)}$ = 10 mA		1.1	2	mV/V
$I_{I(FB)}$	Feedback input current	$I_{I(LED)}$ = 10 mA R3 = 10 K		1.5	3	µA
$I_{ref(dev)}$	Deviation of reference input current Over full temperature range	$I_{I(LED)}$ = 10 mA R3 = 10 K Ta = 25 °C to 100 °C		.5		µA
$I_{DRV(min)}$	Minimum drive current	Ta = 25 °C, $Vo_{(comp)} = V_{i(FB)} = 0$		.4	1	mA
$I_{I(off)}$	Off state input light emitting diode current	$V_{I(KED)}$ = 37 V. $V_{I(FB)} = 0$		.18	0.5	µA
Zka	Regulator output impedance	$V_{O(COMP)} = V_{Ii(FB)}$ F</= 1 kHz $I_{O(COMP)}$ = 1 mA to 50 mA		.1		

LED

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
V_F	Forward Voltage	Ta = 25 °C,, $V_{O(COMP)} = v_{I(LED)}$ = 10 mA		1.2	1.4	V
I_R	LED reverse current	V_O = 6 V			10	µA

PWM SECTION

VOLTAGE REFERENCE

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
V_{REF}	Reference voltage	Io = 1 mA., Tj = 25 °C	4.95	5	5.5	V
$V_{REF(line\ reg)}$	Reference line regulation	Vcc = 11 V to 30 V			50	mV
$V_{REF(load\ reg)}$	Reference load regulation	Io = 0 mA to 20 mA			25	mV
$V_{REF(temp\ reg)}$	Reference temperature regulation	Ta = 25 °C to 100 °C		-4		mV
		Ta = 25 °C to – 40 °C		-4		

OSCILLATOR

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
f_{osc}	Frequency	R = 3.9 K, C= 1 nF	225	250	275	kHz
$t_{(off)}$	Dead time, (minimum off time)		100	148	200	NS
	Minimum timing ramp voltage			.5		V
	Peak timing ramp voltage			3.2		V

CURRENT SENSE

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
$I_{IB(IS)}$	Input bias current, IS			-4	-10	µA
t_d	Delay time to output			70		nS
$V_{IT(CS)}$	Current sense threshold		.9	1	1.1	V

INTEGRATING CAPACITOR CURRENT

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
$I_{O(cap)}$	Capacitor integrating at VC with LED off	$I_{I(LED)}$ = 0		-5	-10	µA
I_L	Photodiode light current at VC, $I_{(VC)(on)} - I_{(VC(off)}$	$I_{I(LED)}$ = 10 mA, Ta = 25 °C	5	8		µA

PWM (PULSE WIDTH MODULATOR)

PARAMETER	Test Conditons	MIN	TYP	MAX	UNITS
Maximum duty cycle	C_L = 1 nF, C_{REG} = .1 µF		97%		
Minimum duty cycle	C_L = 1 nF, C_{REG} = .1 µF			0	

UVLO (UNDER VOLTAGE LOCKOUT)

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
$V_{IT(H)}$	Start-up threshold voltage		15	16	17	V
$V_{IT(L)}$	Minimum operating voltage after start-up		9	10	11	V

SUPPLY CURRENT

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
$I_{CC(off)}$	Start-up current	Vcc < 15 V		55	100	µA
$t_{(off)}$	Operating supply current	Vcc > 11 V	8	13	16	mA

OUTPUT SECTION

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
V_{OH}	High level output voltage	Io = -20 mA	11	11.7		V
		Io = -200 mA	10.5	11.2		
V_{OL}	Low level output voltage	Io = -20 mA		.78	.9	V
		Io = -200 mA		1.38	2	
t_r	Rise time	Tj = 25 °C, C_L = 1 nF		20	35	nS
t_f	Fall time	Tj = 25 °C, C_L = 1 nF		20	35	nS

REGULATOR

PARAMETER		Test Conditons	MIN	TYP	MAX	UNITS
$V_{O(REG)}$	Regulator output voltage	Vcc = 17 V	12	12.5	13.5	V
$I_{OS(REG)}$	Regulator short-circuit output current	Vo = 0 V	-9	-12.5	-15	mA

TYPICAL CHARACTERISTICS

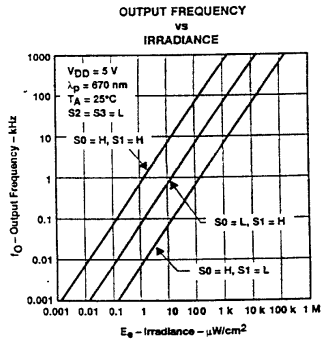


Figure 1

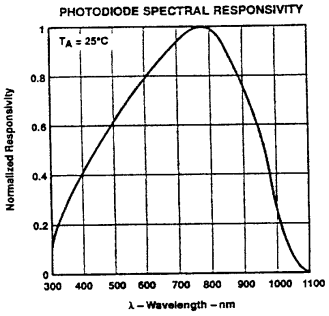


Figure 2

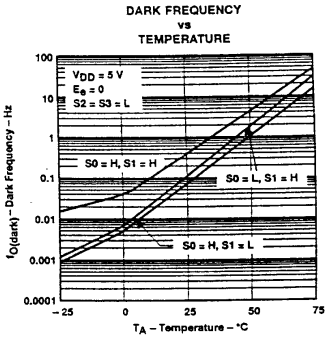


Figure 3

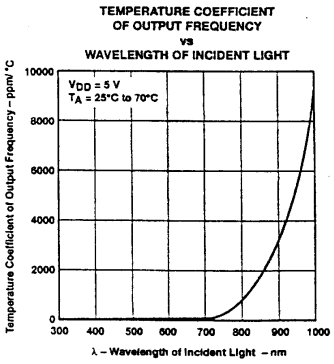


Figure 4

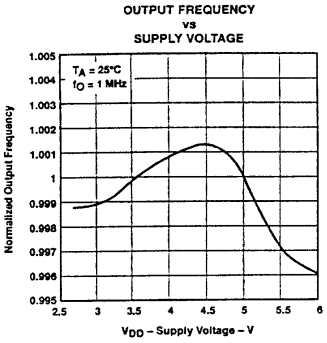


Figure 5