Aug. 07, 2006

AVERD Semiconductor

AV110
Ballast Control IC

General Description

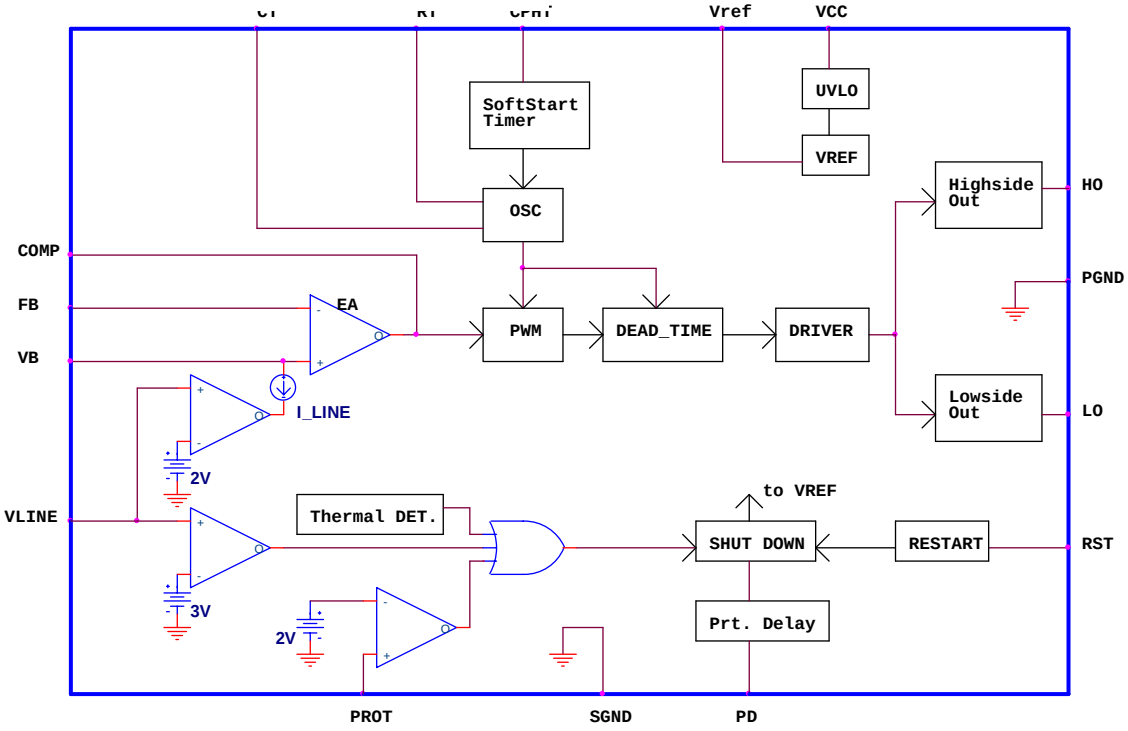
AV110 is an ASIC intended to drive two power MOSFET or IGBT in half bridge topology, ensuring all the features needed to drive and control properly a fluorescent lamp.
Moreover, by varying the switching frequency and pulse width it is possible to modulate the current in the lamp, therefore the output power control for dimming.
Externally programmable features such as preheat time, ignition lamp characteristics, and running mode operating frequency provide a high degree of flexibility for the ballast design engineer.
Comprehensive protection features such as protection from failure of a lamp to strike, filament failure, or lamp failure during normal operation, as well as an automatic restart function, have been included in the design.
The key function of this ASIC is a PWM oscillator with variable frequency.
The device is available in SOIC16 package.

General Feature

- Sweep mode preheating
- Built-in preheating timer
- Voltage dimming
- Dimming Input : DC.
- Protection from out of normal operation and Restart.
- Protection circuitry :
  - No/Open lamp, Abnormal
- Low start up current

Application

- Electronic Ballast
- Lighting Control System
- Half Bridge Drive Control System
- SOIC16 package



< AV110 BLOCK DIAGRAM >

Absolute Maximum Rating (Note 2)

Supply Voltage	18V
Peak Drive Output Current	600mA
Package dissipation	1W
Storage Temperature	-65 ~ 150℃
Operating Temperature	-25 ~ 85℃
Junction Temperature	150℃

Electrical Characteristics (Note 1,2,)

Unless otherwise specified, Vcc=12V, T_A = 25℃

Under Voltage Lockout Section

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Start Threshold Voltage	UVon	Vcc Increasing	10.2	10.8	11.4	V
UVLO Hysteresis	HY(st)	-	1.8	2.2	2.4	V
Voltage Reference	Vref	I5=0mA	4.9	5.1	5.3	V
Maximum Load Current	Ire(max)	-	-	-	25	mA

Supply Current Section

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Start Up Current	Ist	Vcc=9.7V		0.15	0.3	mA
Quiescent Current	Iccq	Output not switching	-	6	10	mA
Operating Current	Icc	Fosc=45KHz, Cl=1nF	-	9	20	mA
Shut Down Mode Current	Iprot	Shut Down Mode		0.2	0.4	mA

Error Amplifier Section (EA(+) = 2V)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Output Voltage High	Vcomp(H)	EA(-) =0V	4.0	4.3	4.5	V
Output Voltage Low	Vcomp(L)	EA(-) =4V	0.5	0.7	0.9	V
Unit Gain Bandwidth	GB	-		1		MHz

Vline Section

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
High Line Protection	LI_H		3.0	3.1	3.2	V
Low Line start	LI_L		2.0	2.1	2.2	V
Low Line Output Current	I_LINE	-		60		uA

Electrical Characteristics (Continue)

Unless otherwise specified, Vcc=12V, T_A = 25℃

Oscillator Section(CT=220pF)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Preheat & Sweep time	Tpht	CPHF=330nF	0.7	1	1.3	Sec
Minimum Frequency	Fmin	RT=56Kohms, Vcomp(H)	42	46	50	KHz
Preheat Frequency	Fpht	-	80	88	96	KHz
OSC top Voltage	V4top	-	3.7	4	4.2	Vp
OSC valley Voltage	V4valley	-	0.7	1.0	1.3	Vp
Duty Ratio		-		50		%
Dead Time	DT	-	1.2	1.6	2.0	uS

Output 1/2 Section

Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Rising Time	tr	Vcc=12V, Cl=1nF	-	100	200	ns
Falling Time	tf	Vcc=12V, Cl=1nF	-	100	200	ns
Output Voltage with UVLO Activated	Vomin(0)	Vcc=12V, Io=100uA	-	-	0.9	V

Protection Section

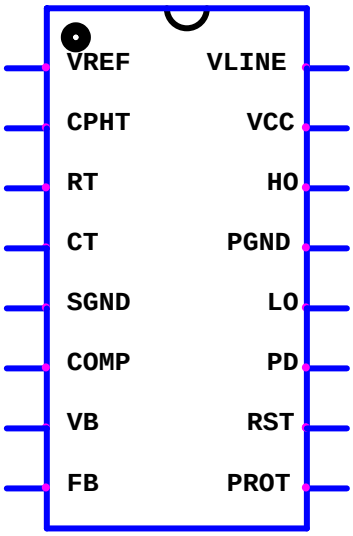
Characteristics	Symbol	Test Condition	Min	Typ	Max	Units
Restart Voltage threshold	Vrst	at Protection mode	0.6	0.7	1.0	V
PROT Voltage threshold	Vprt	-	1.7	2.1	2.5	V
		-				
		-				

Note 1: All voltages are measured with respect to the ground pin, unless otherwise specified.

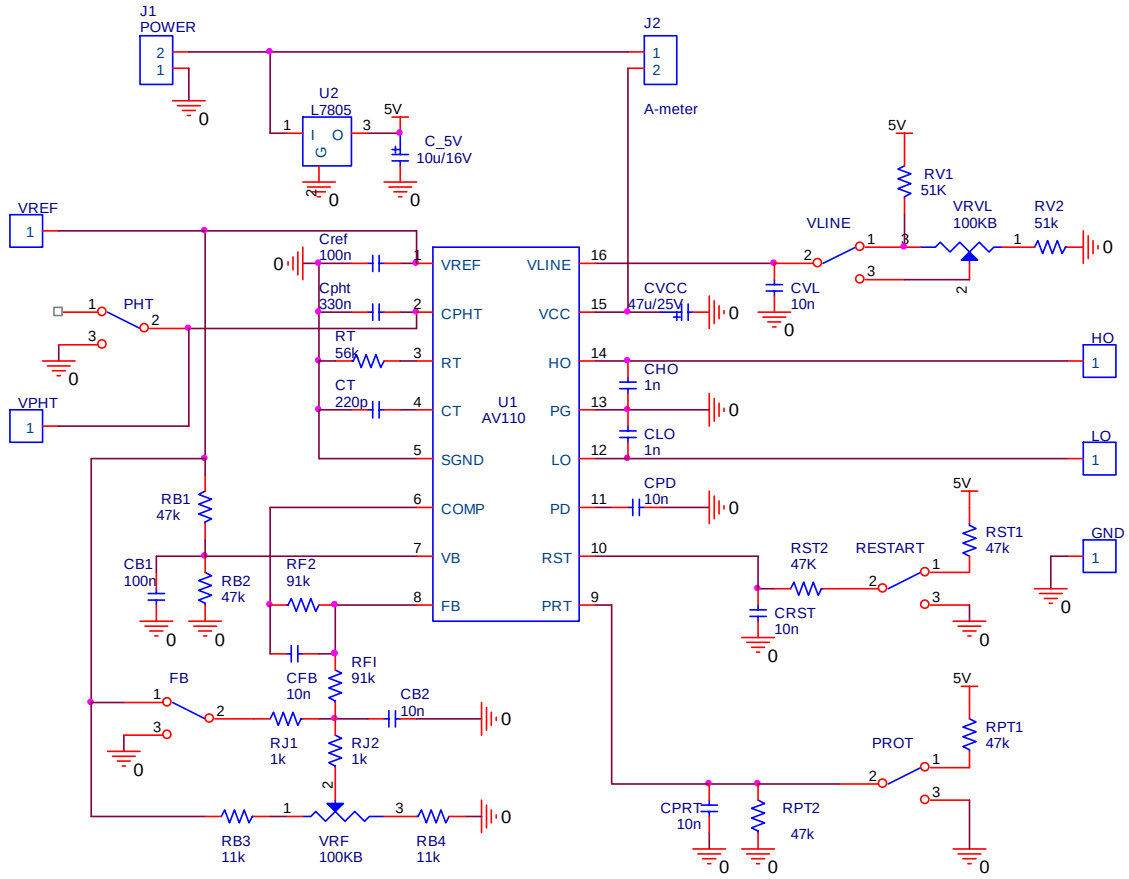
Note 2: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. Electrical Characteristics state DC and AC electrical specifications under particular test conditions which guarantee specific performance limits. This assumes that the device is within the Operating Ratings. Specifications are not guaranteed for parameters where no limit is given, however, the typical value is a good indication of device performance

Pin Description

Number	Name	I/O	Description
1	VREF	Output	Reference Voltage
2	CPHT		Preheat & Sweep timing Cap.
3	RT		Minimum frequency setting
4	CT		Oscillator Cap.
5	SGND		Signal Ground
6	COMP	Output	Compensation output
7	VB	Input/Output	Non-inverting Input
8	FB	Input	Inverting Input
9	PROT	Input	Latched shutdown input
10	RST	Input	Restart Input
11	PD	Output	Protection Delay timing Cap.
12	LO	Output	Low side output
13	PGND		Power GND
14	HO	Output	High side output
15	VCC		VCC
16	VLINE	Input	Line Voltage Detection Input

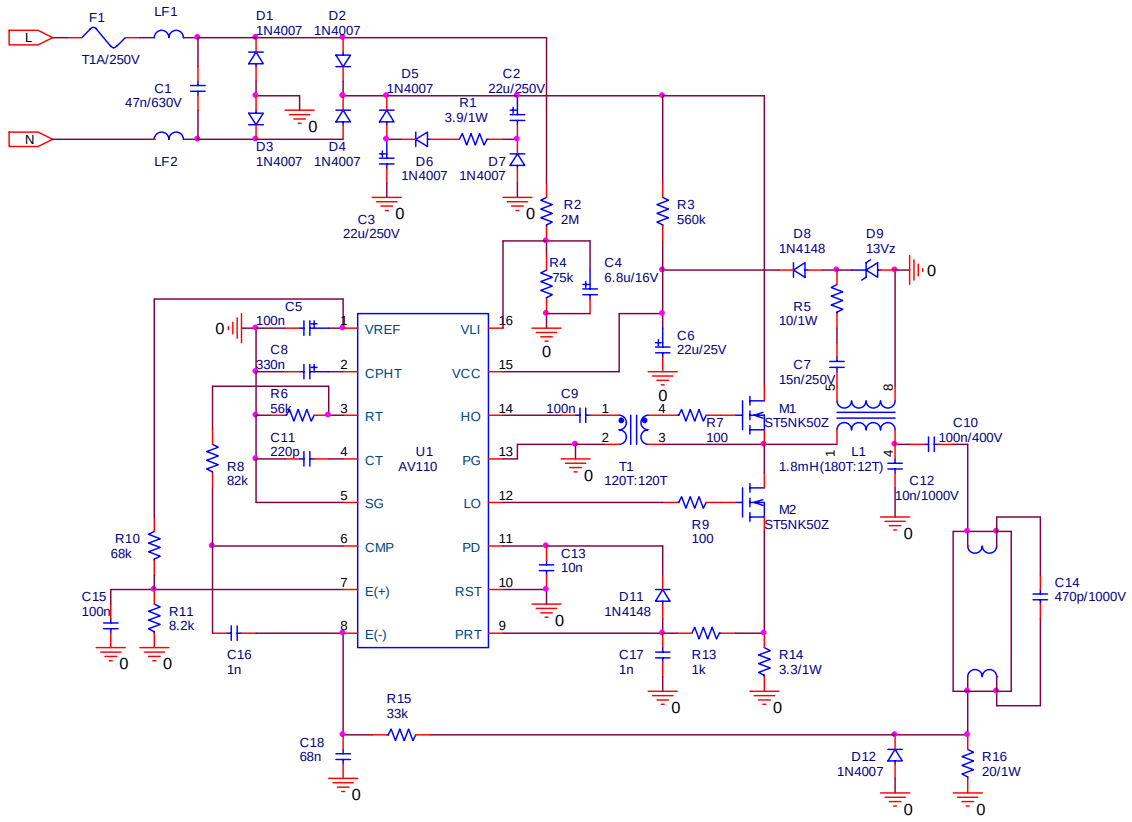


AV110 Test Circuit



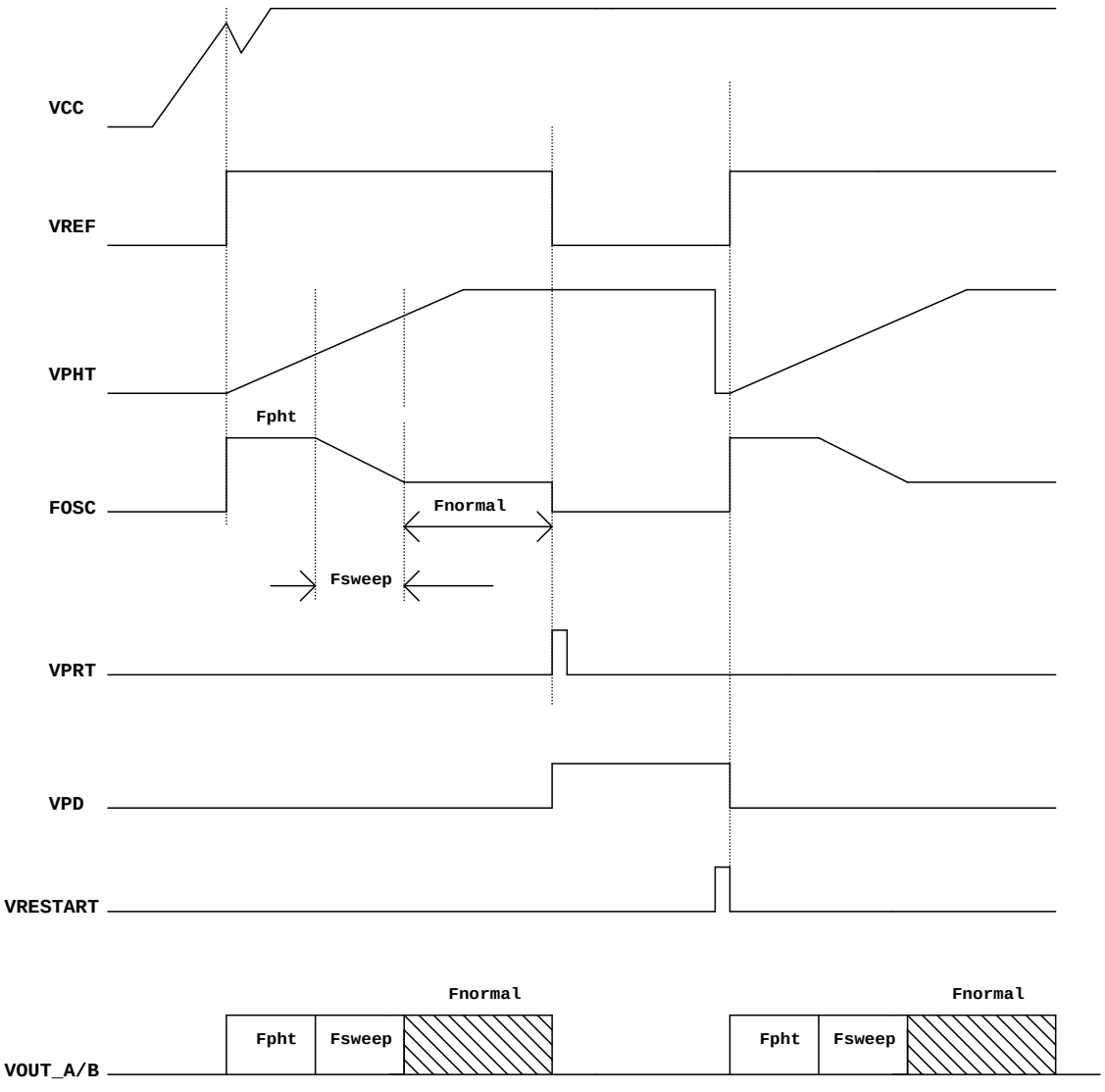
Application Circuit

COMPACT 4U 20W DIMMING CIRCUIT

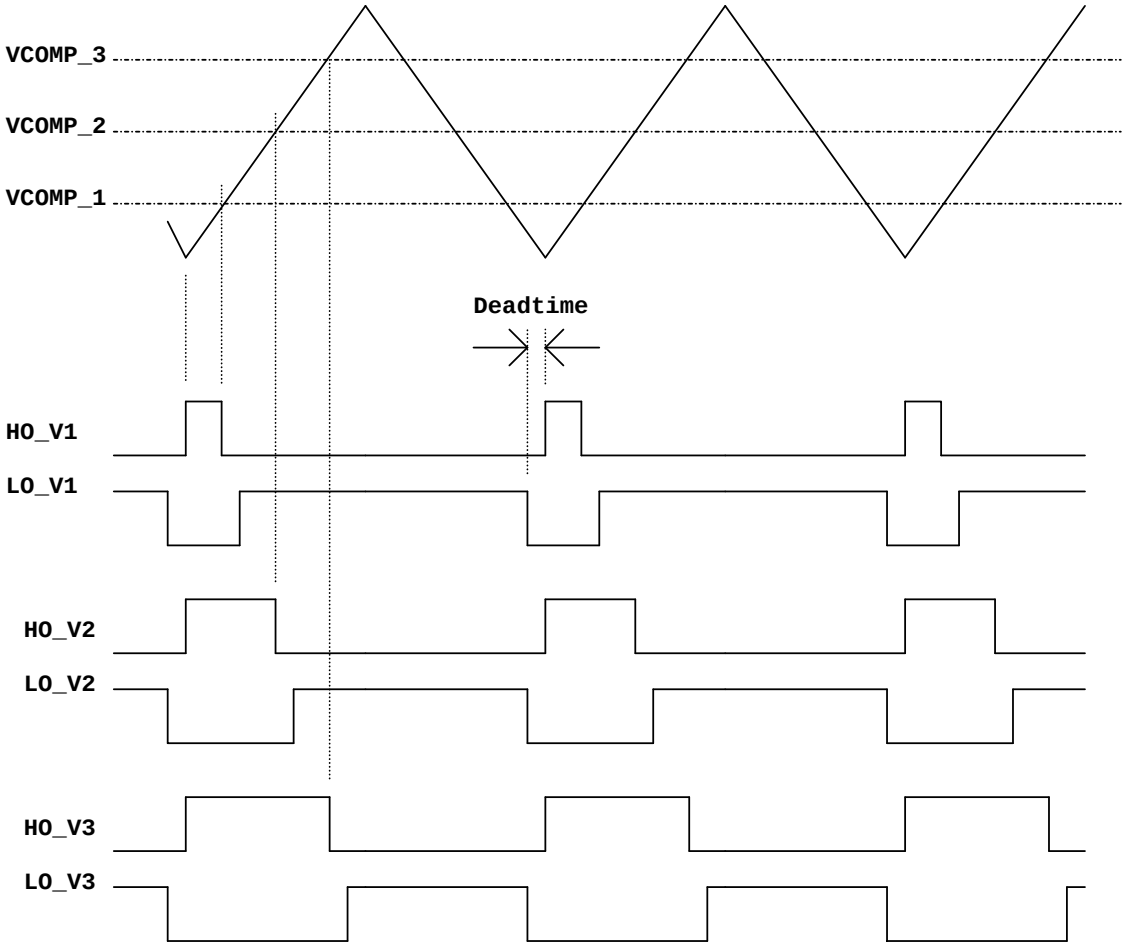


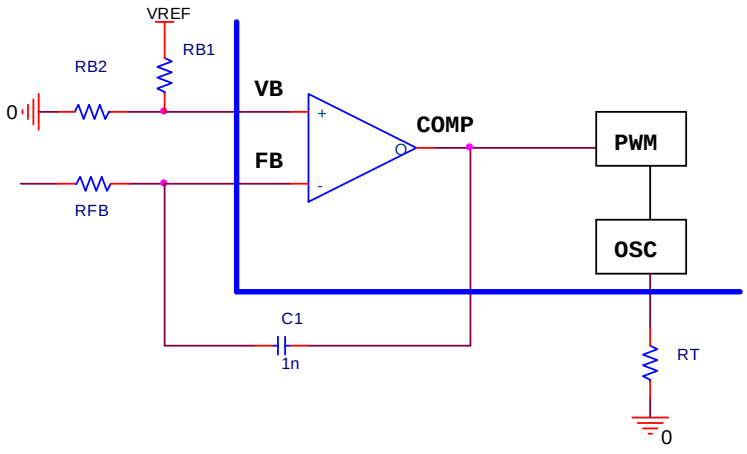
Timing Diagram

1. Operating Sequence



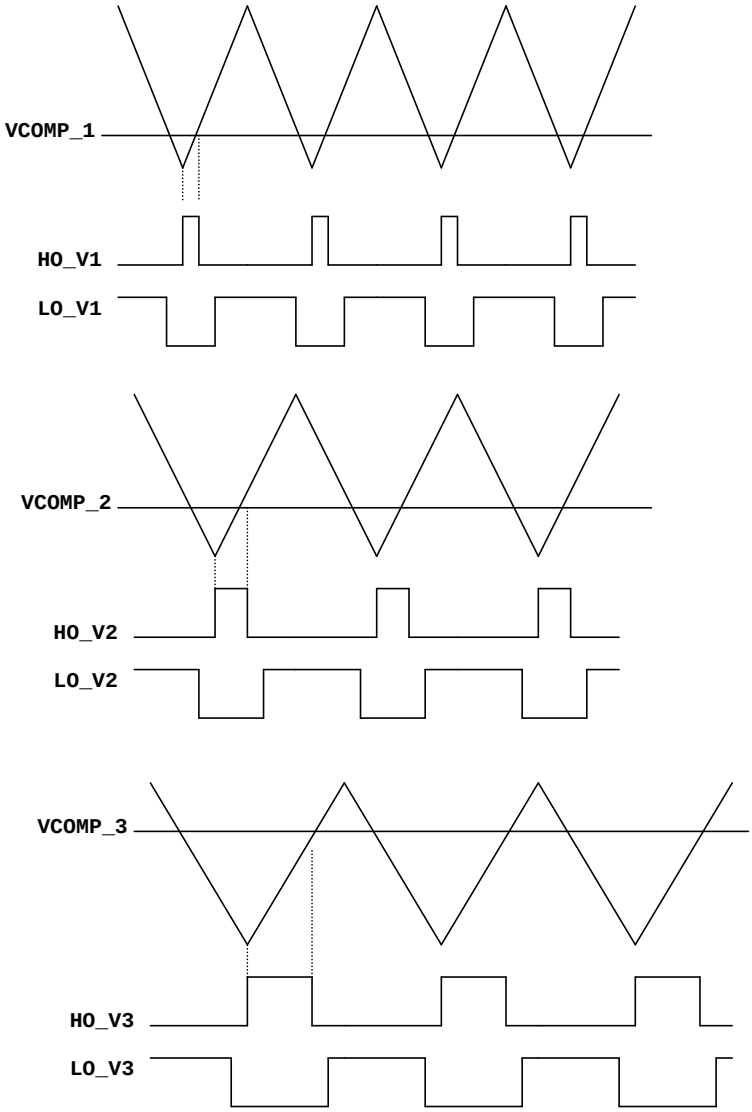
2. VCOMP vs OUTPUT with PWM (fixed frequency)

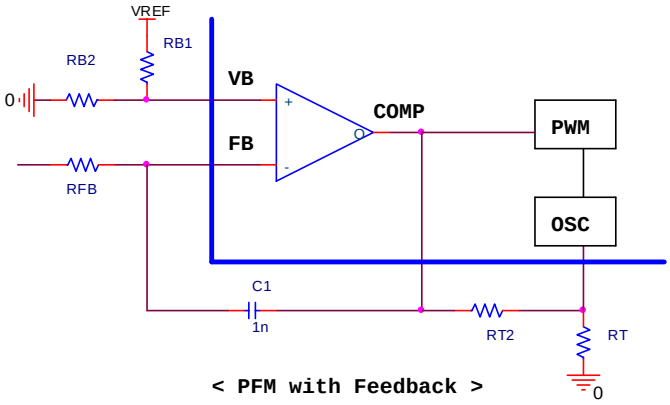




< PWM with Feedback >

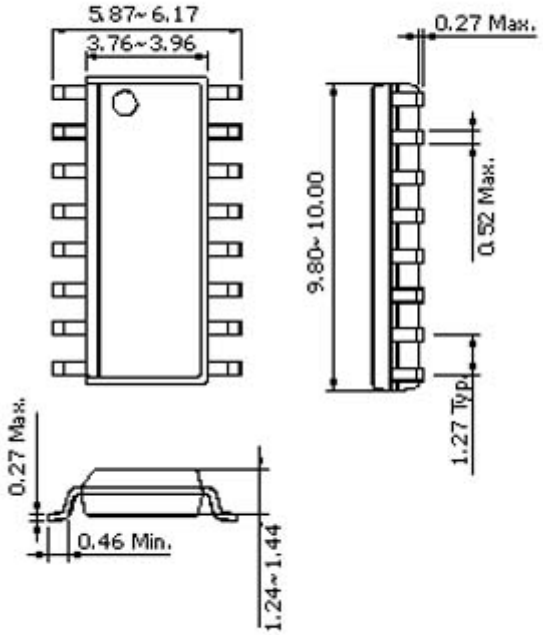
3.VCOMP vs OUTPUT with PFM (variable frequency)





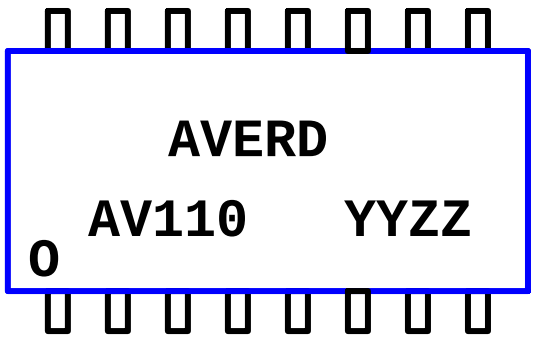
< PFM with Feedback >

Package Dimension (16SOP)



Marking Specification

AV110 16SOP MARKING SPEC.



YY : 제작년도 CODE

ZZ : 제작주차 CODE

NOTE