



**DT8211 Inverter Driver IC
(Application Note)**

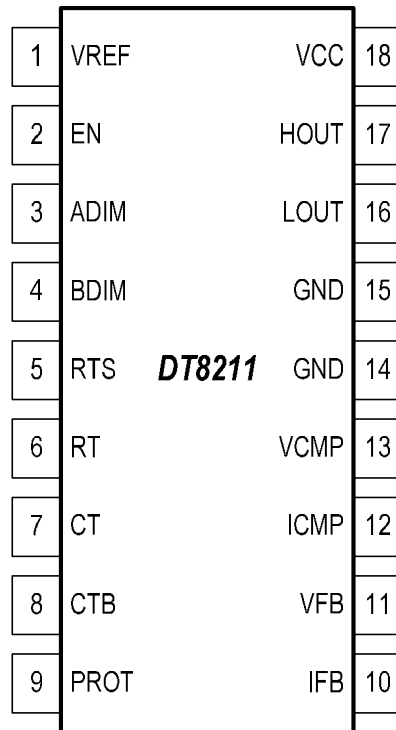
2008.7.11

DMB Technology Inc.,



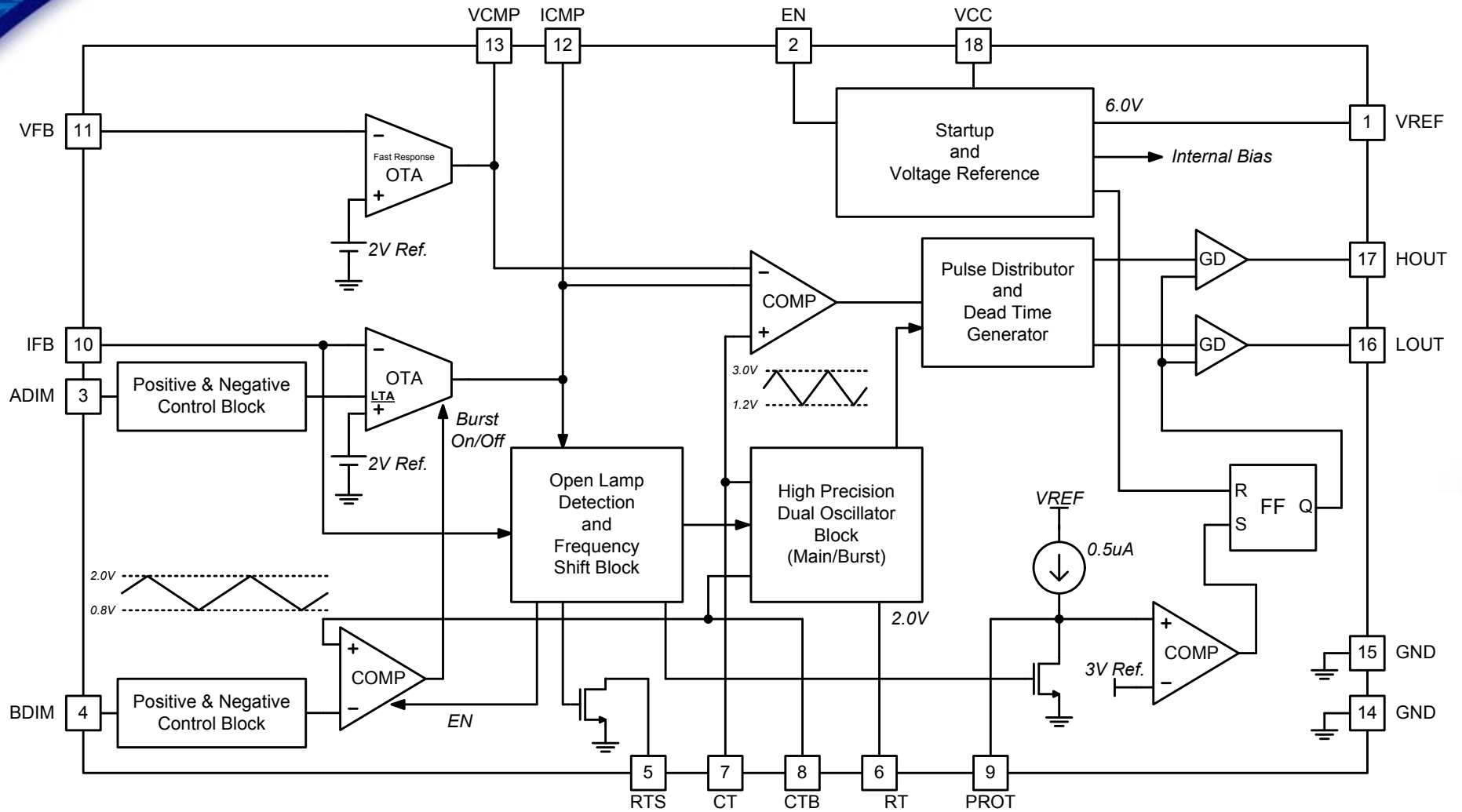
Pinning information

Top View

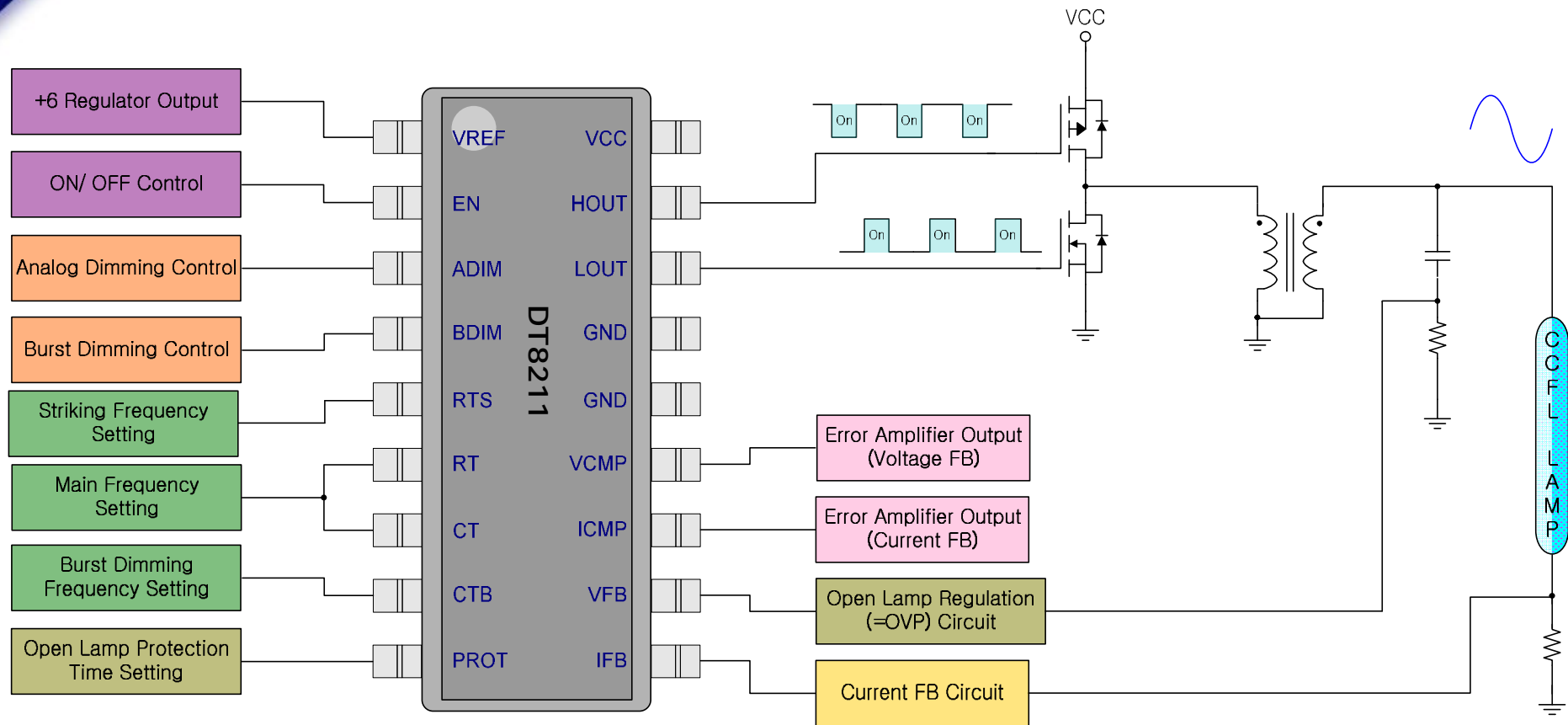


PIN	Symbol	I/O	Description
1	VREF	O	Reference Voltage (VREF) = 6V
2	EN	I	ON/OFF Control Pin
3	ADIM	I	Analog Dimming Pin (Positive and Negative Mode)
4	BDIM	I	Burst Dimming Pin (Positive and Negative Mode)
5	RTS	O	Frequency Setting Resistor for Striking PWM Frequency
6	RT	O	Frequency Setting Resistor for Main PWM Frequency
7	CT	O	Frequency Setting Capacitor for Main PWM Frequency
8	CTB	O	Frequency Setting Capacitor for Burst Dimming Frequency
9	PROT	I	Protection Pin
10	IFB	I	Feedback Input for Current Regulation
11	VFB	I	Feedback Input for Voltage Regulation
12	ICMP	O	Error Amplifier Output for Current Regulation
13	VCMP	O	Error Amplifier Output for Voltage Regulation
14,15	GND	I	Ground
16	LOUT	O	Low Side Gate Driver Output
17	HOUT	O	High Side Gate Driver Output
18	VCC	I	Supply Voltage

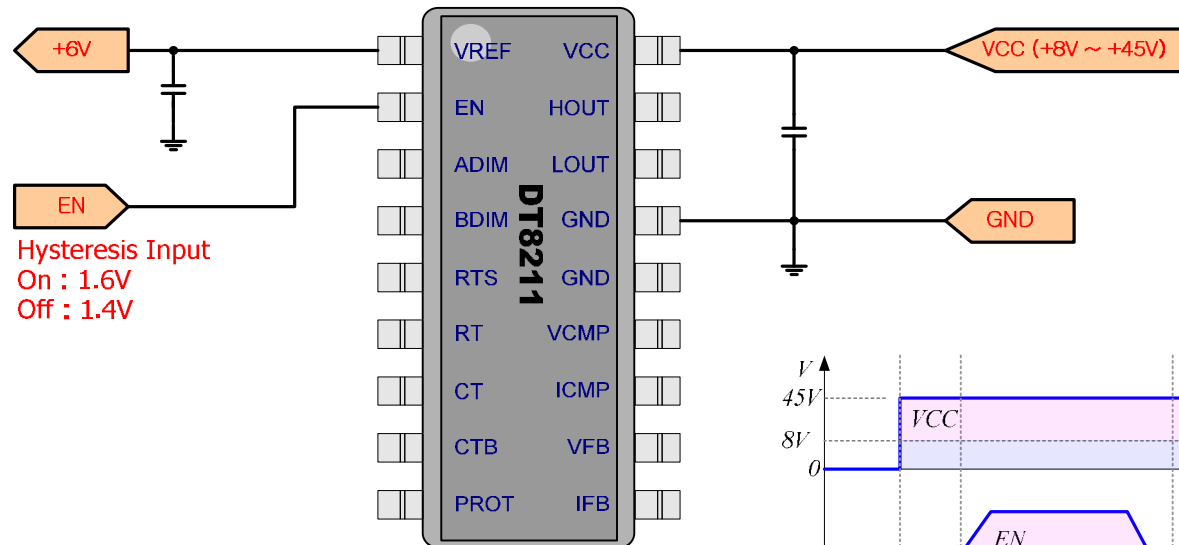
DT8211 (Block Diagram)



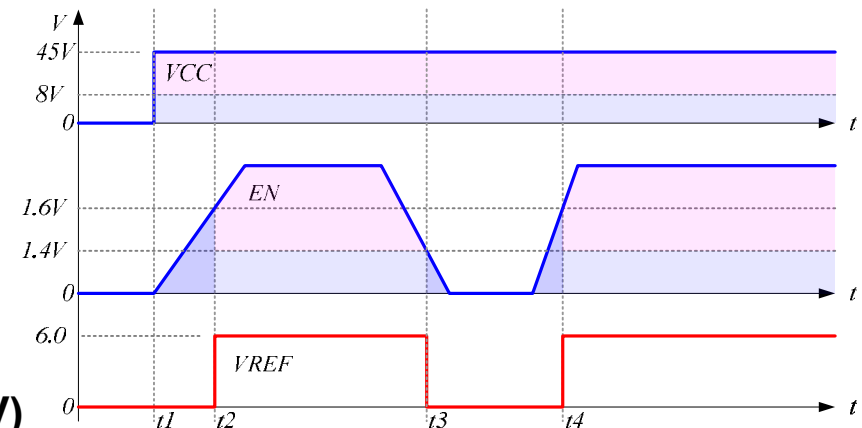
Inverter Part (Block Diagram)



Power Supply (VCC, VREF, GND)



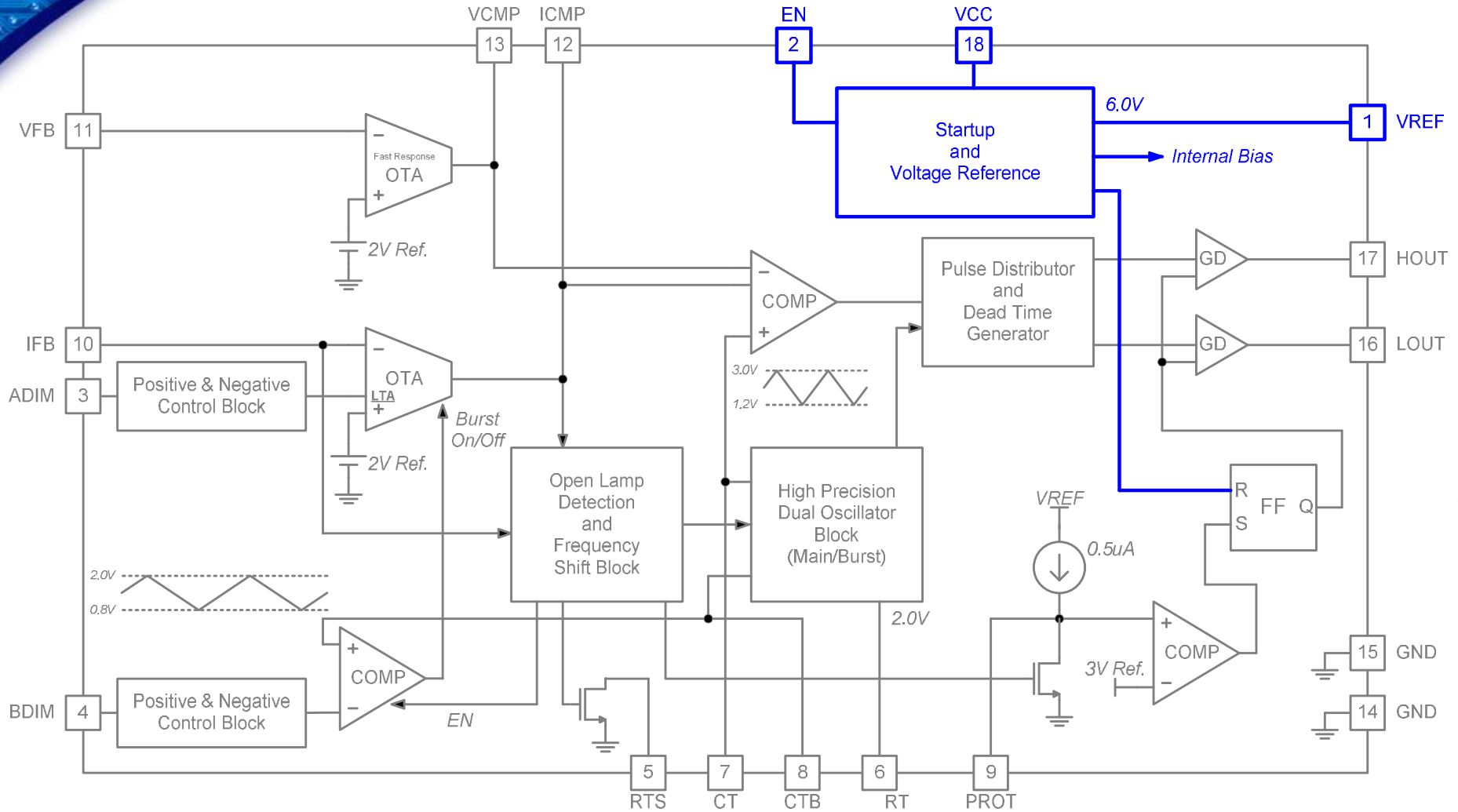
Hysteresis Input
On : 1.6V
Off : 1.4V



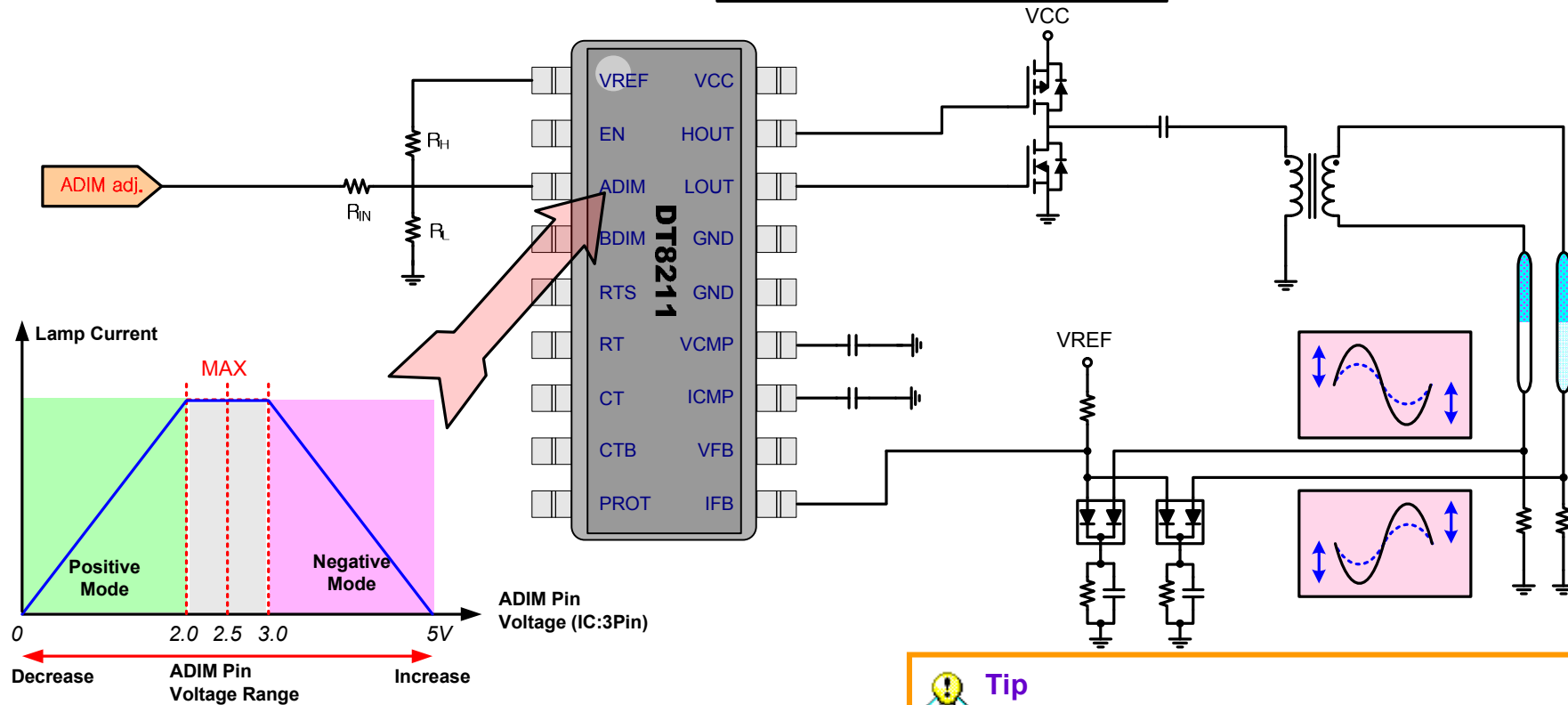
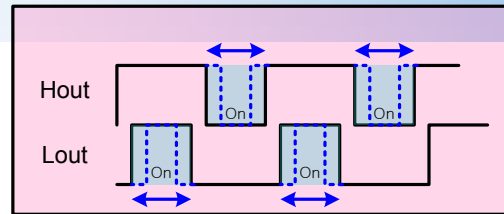
Vcc & EN & VREF Sequence

- **VCC** : Power Supply Input (+8V~ +45V)
- **VREF** : 6V Regulator Output
- **EN** : ON / OFF Control Pin
- **GND** : Ground

Power Supply (VCC, VREF, GND) Block Diagram



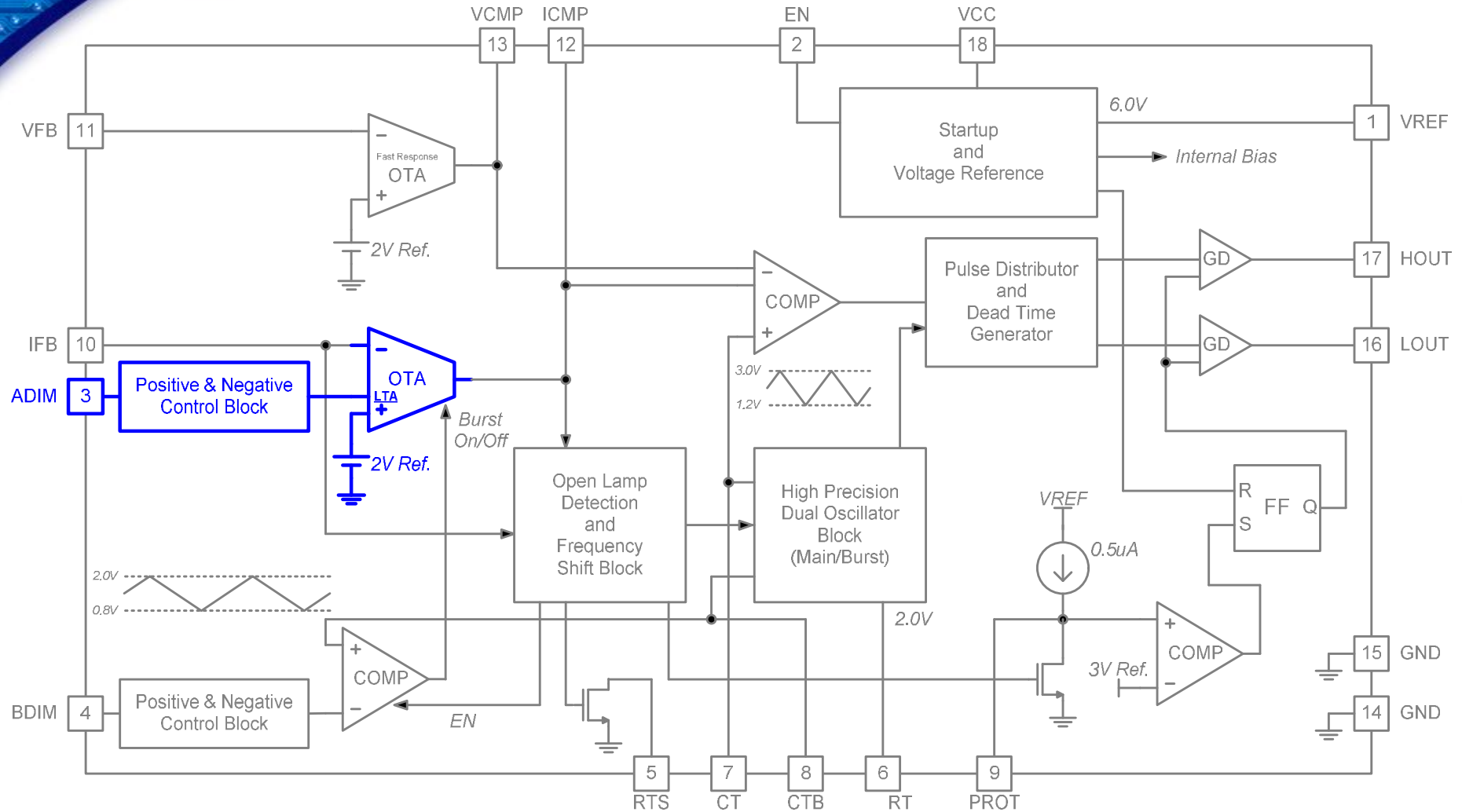
Analog Dimming



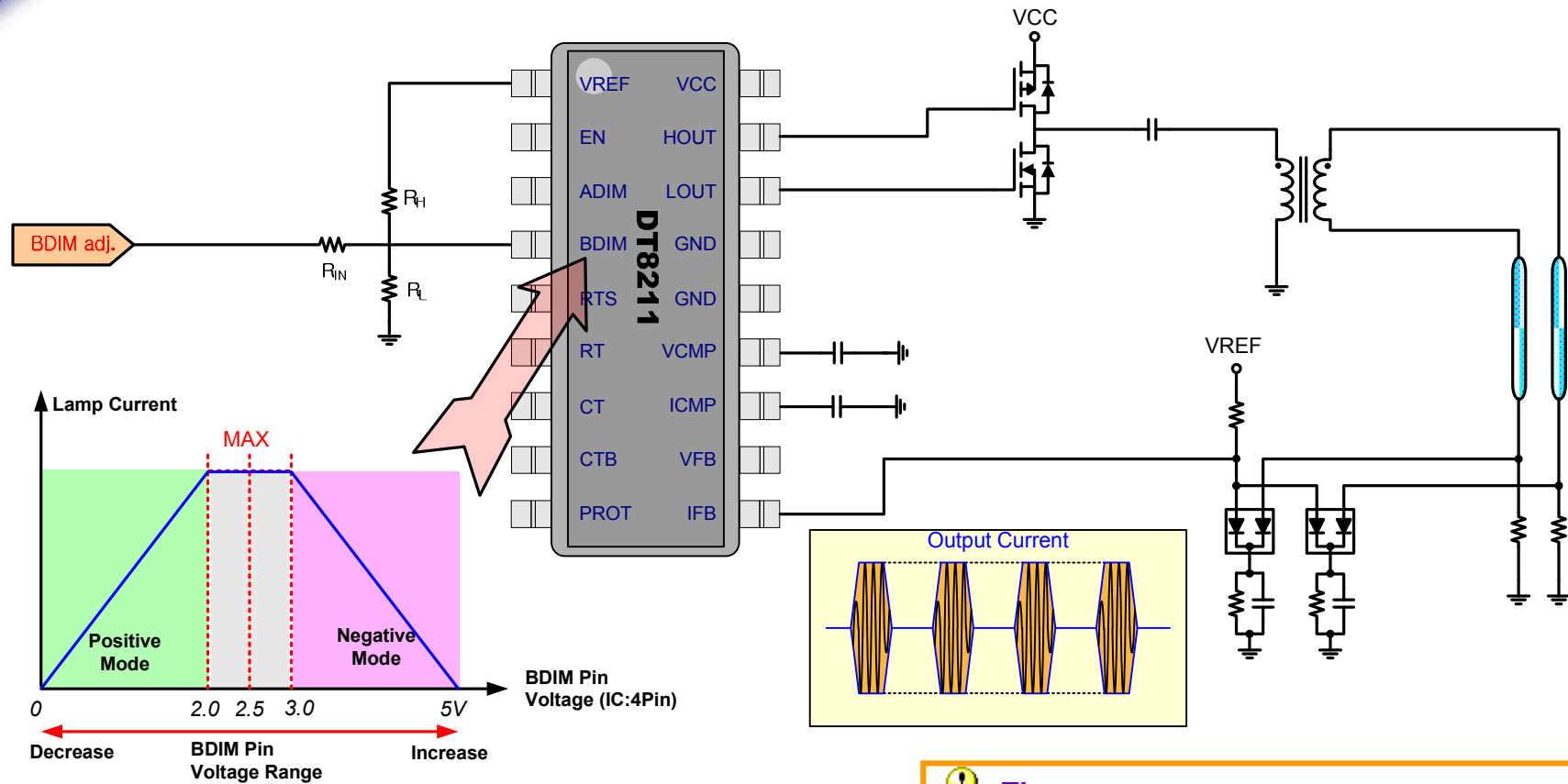
- ADIM : Analog Dimming DC level Input
Positive and Negative Mode Selectable

Tip
 - Polarity & Dimming Range is selectable by controlling R_{IN} , R_H , R_L value.
 - Non-function Adim : Remove R_{IN} , R_H , R_L ; When Adim Pin is opened, Adim is Max

Analog Dimming Block Diagram



Burst Dimming

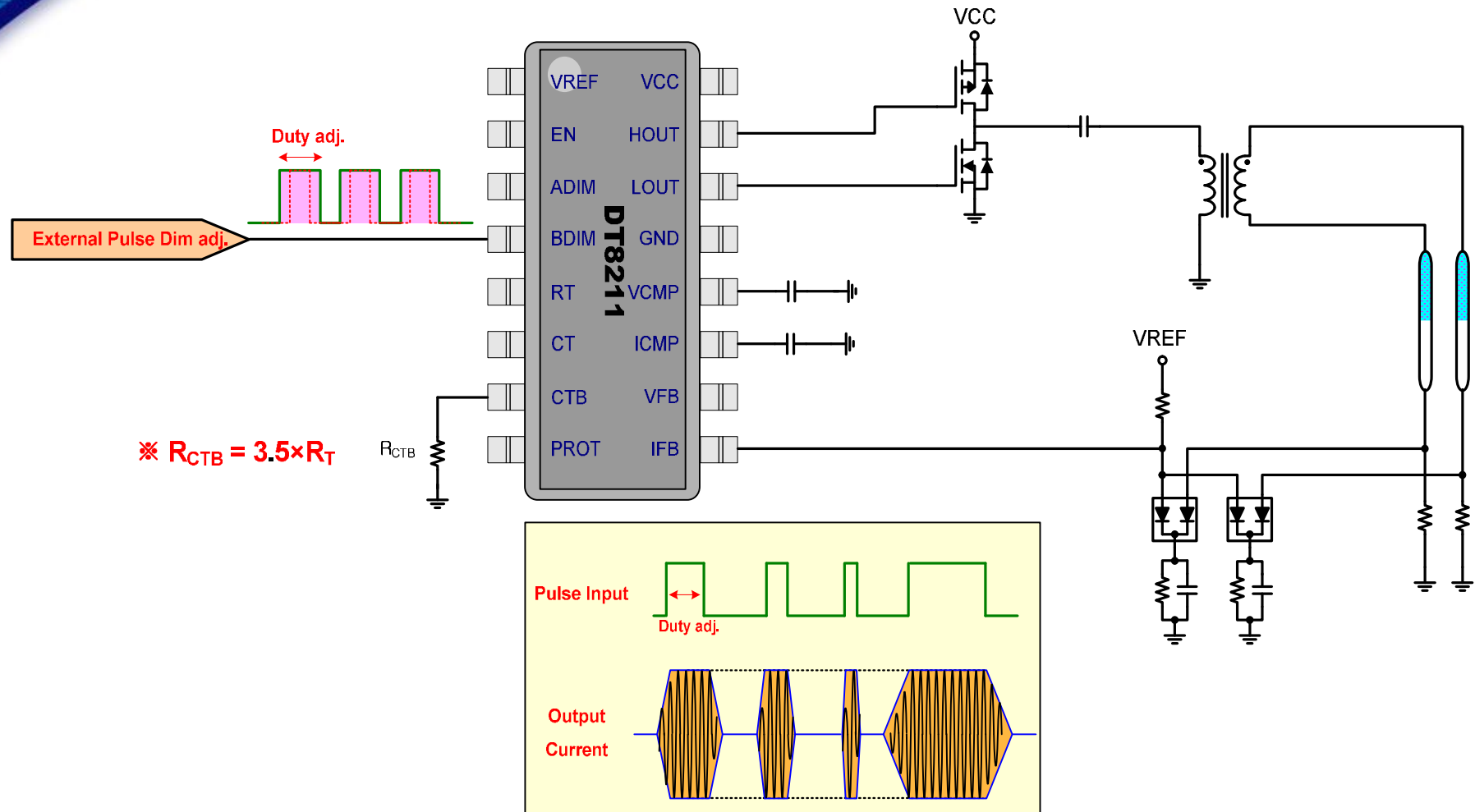


- **BDIM : Burst Dimming DC level Input**
Positive and Negative Mode Selectable

Tip

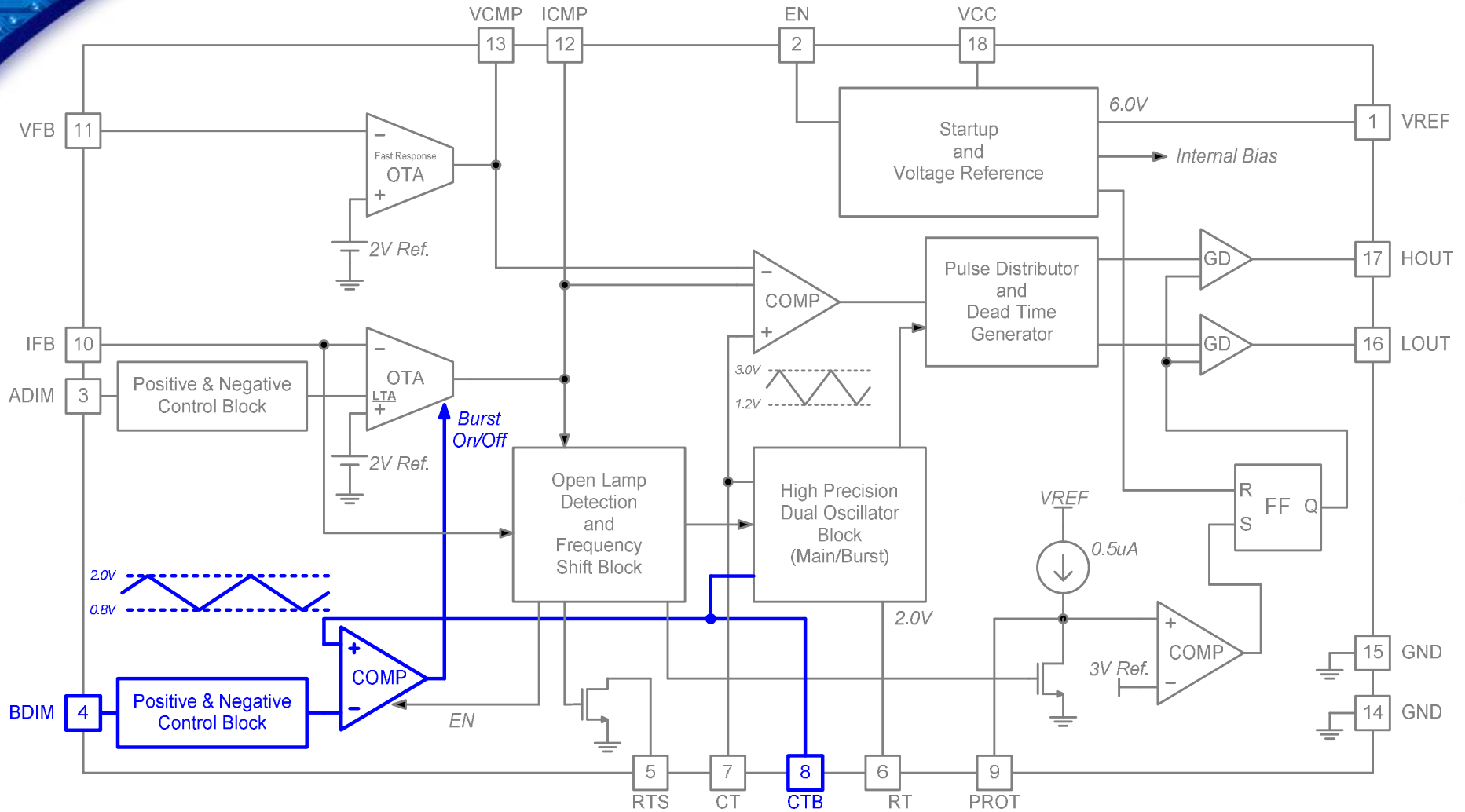
- Polarity & Dimming Range is selectable by controlling R_{IN} , R_H , R_L value.
- Non-function Bdim : Remove R_{IN} , R_H , R_L ; When Bdim Pin is opened, Bdim is Max

Burst Dimming (Pulse Dimming)



- BDIM : External Pulse Dimming Input

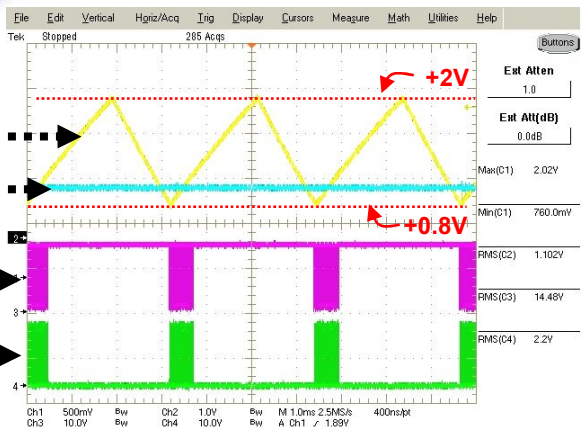
Burst Dimming Block Diagram



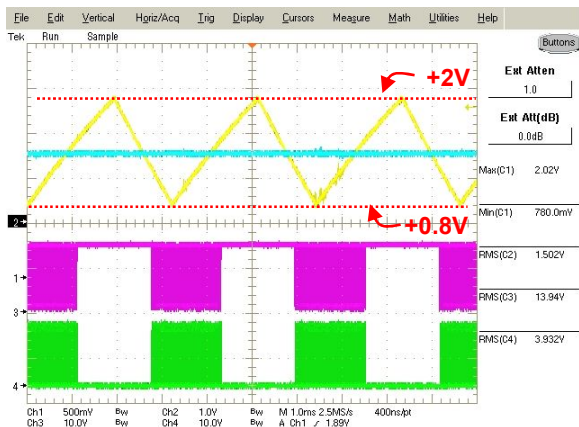
Burst Dimming Waveform

- Positive Mode

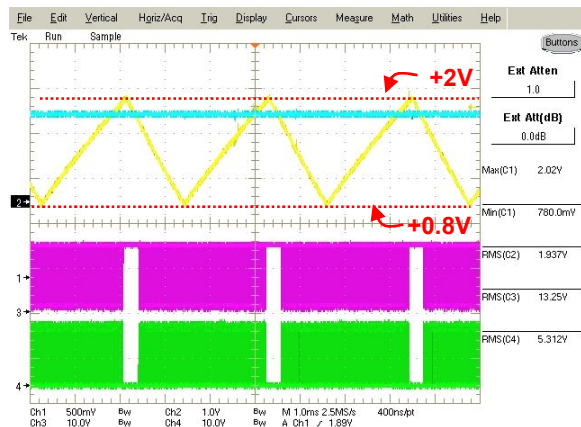
CTB
BDIM
HOUT
LOUT



Bdim Pin Voltage : 1.102V



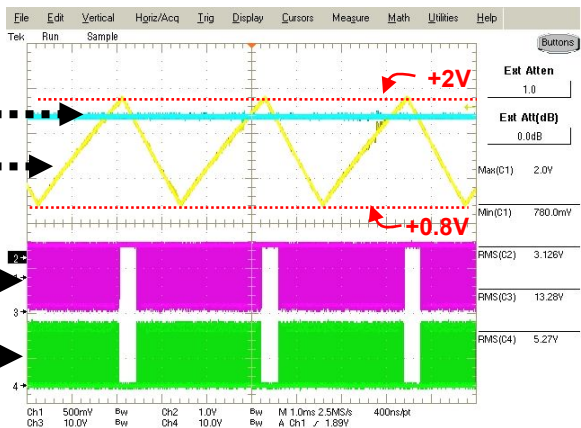
Bdim Pin Voltage : 1.502V



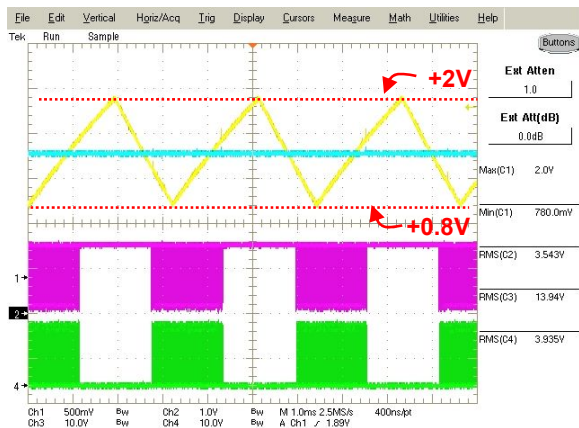
Bdim Pin Voltage : 1.937V

- Negative Mode

BDIM
CTB
HOUT
LOUT



Bdim Pin Voltage : 3.126V



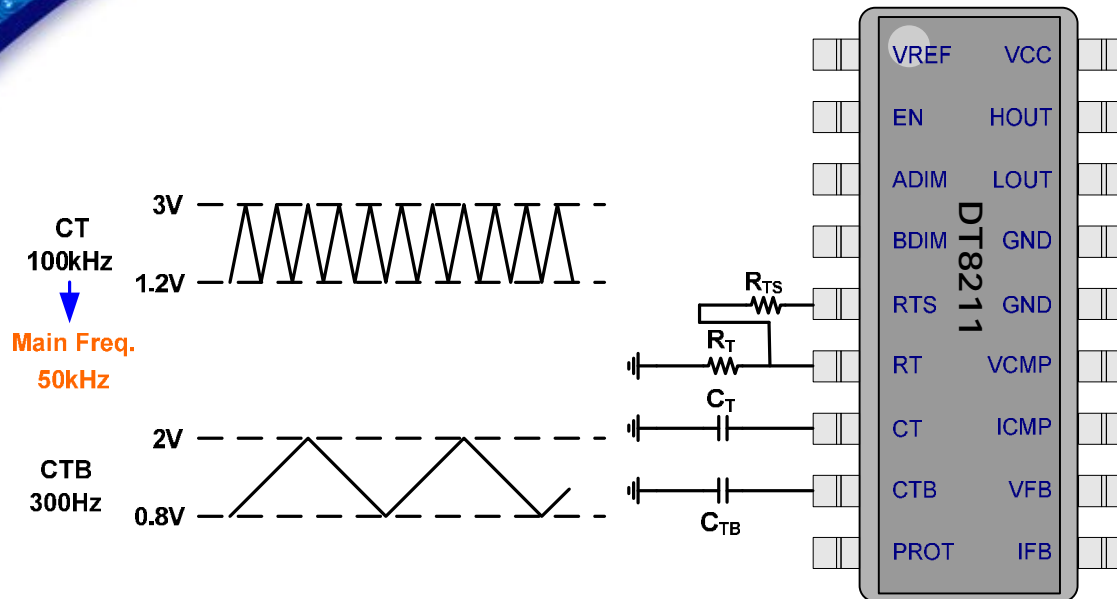
Bdim Pin Voltage : 3.543V



Bdim Pin Voltage : 4.027V



Frequency Setting (Main/ Burst/ Striking Frequency)



$$f_{Main} = \frac{0.232}{R_T C_T}$$

$$f_{Burst} = \frac{0.11}{C_{TB} R_T}$$

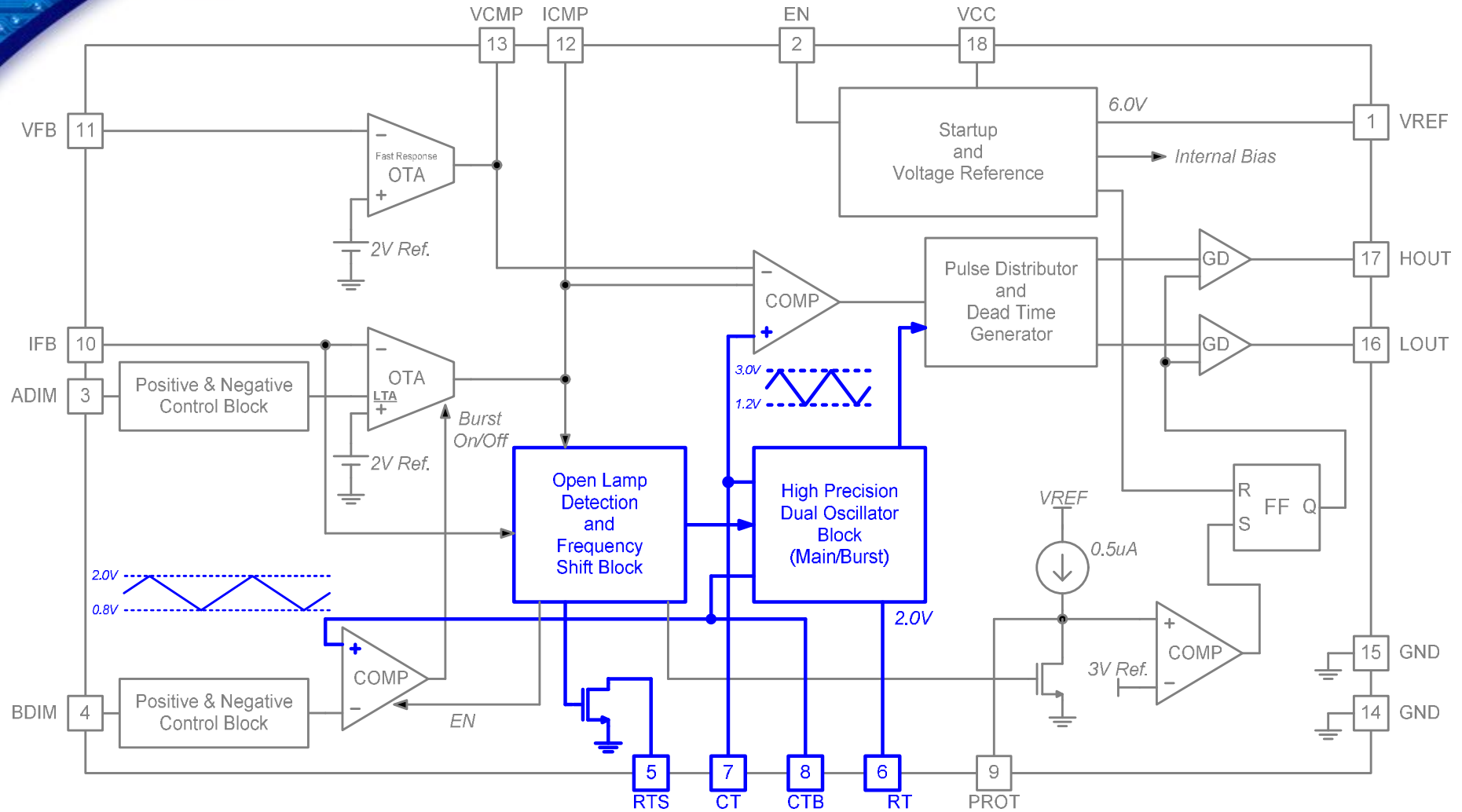
$$f_{STK} = \frac{0.228(R_T + R_{TS})}{R_T R_{TS} C_T}$$



Tip
- Under Open Lamp Protection, Striking Frequency is controlled by changing R_{ST} value.

- **RTS** : Frequency Trimming Resistor for Striking Frequency Setting
- **RT** : Frequency Trimming Resistor for Main and Burst Frequency Setting
- **CT** : Frequency Trimming Capacitor for Main Frequency Setting
- **CTB** : Frequency Trimming Capacitor for Burst Dimming Frequency Setting

Main/ Burst/ Striking Frequency Setting Block Diagram

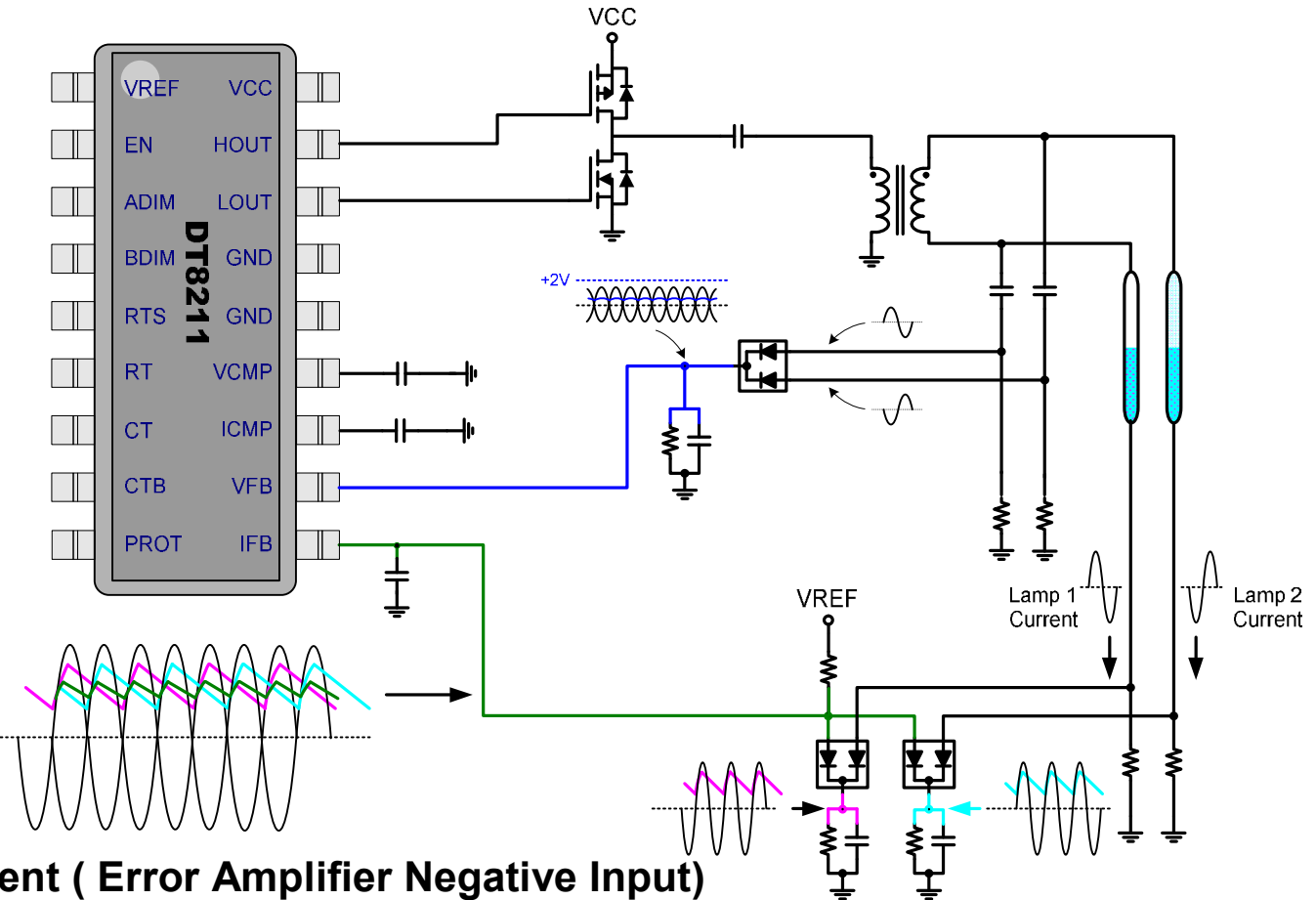
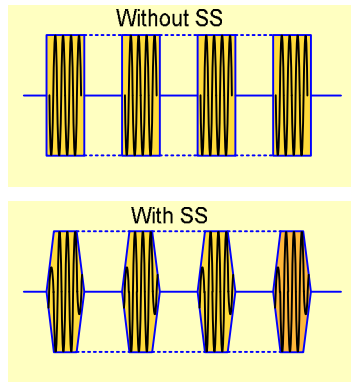


IFB & VFB & ICMP & VCMP



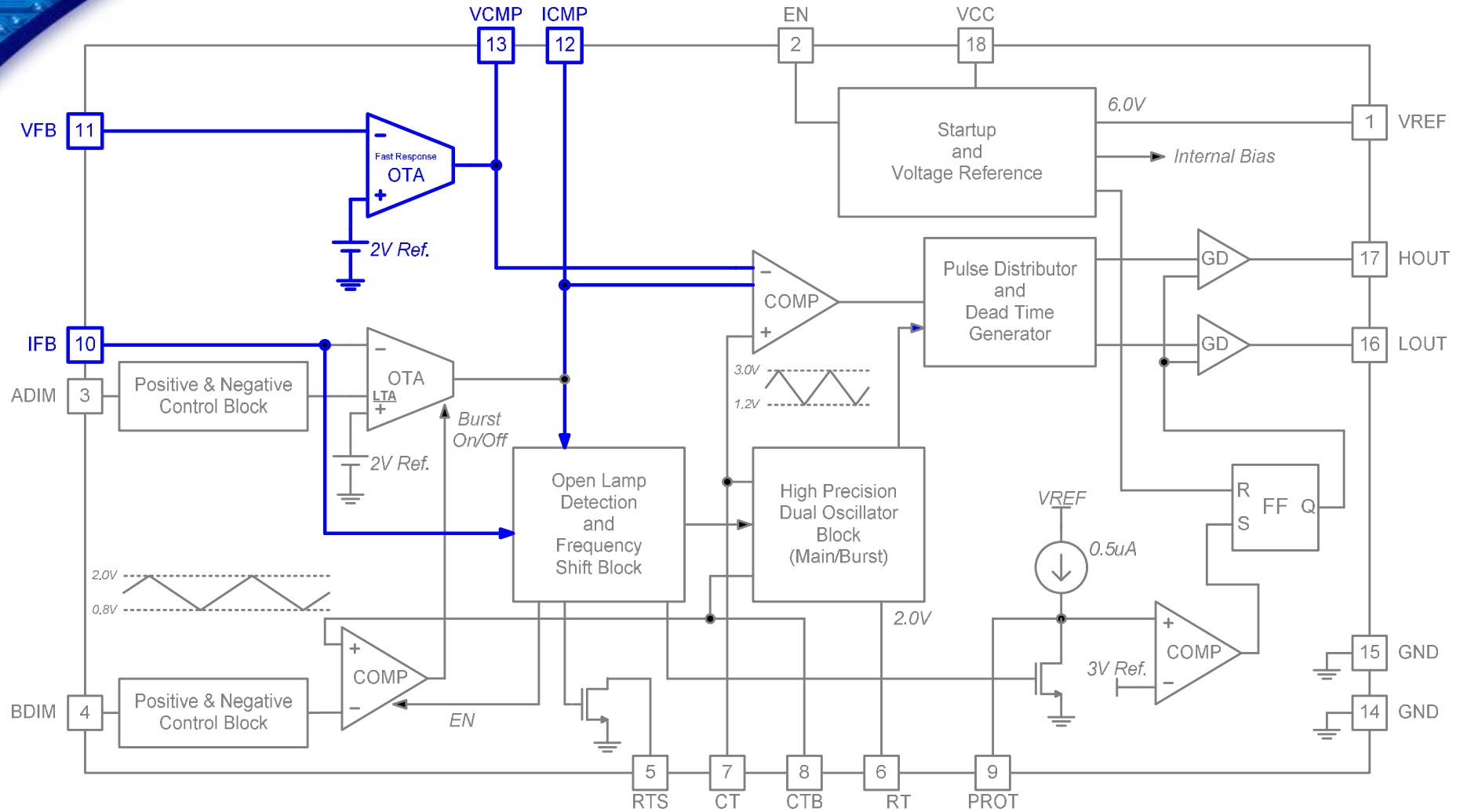
Tip

- Rising/falling time is controlled based on ICMP Pin Cap size at Burst Dimming. (Soft Start)

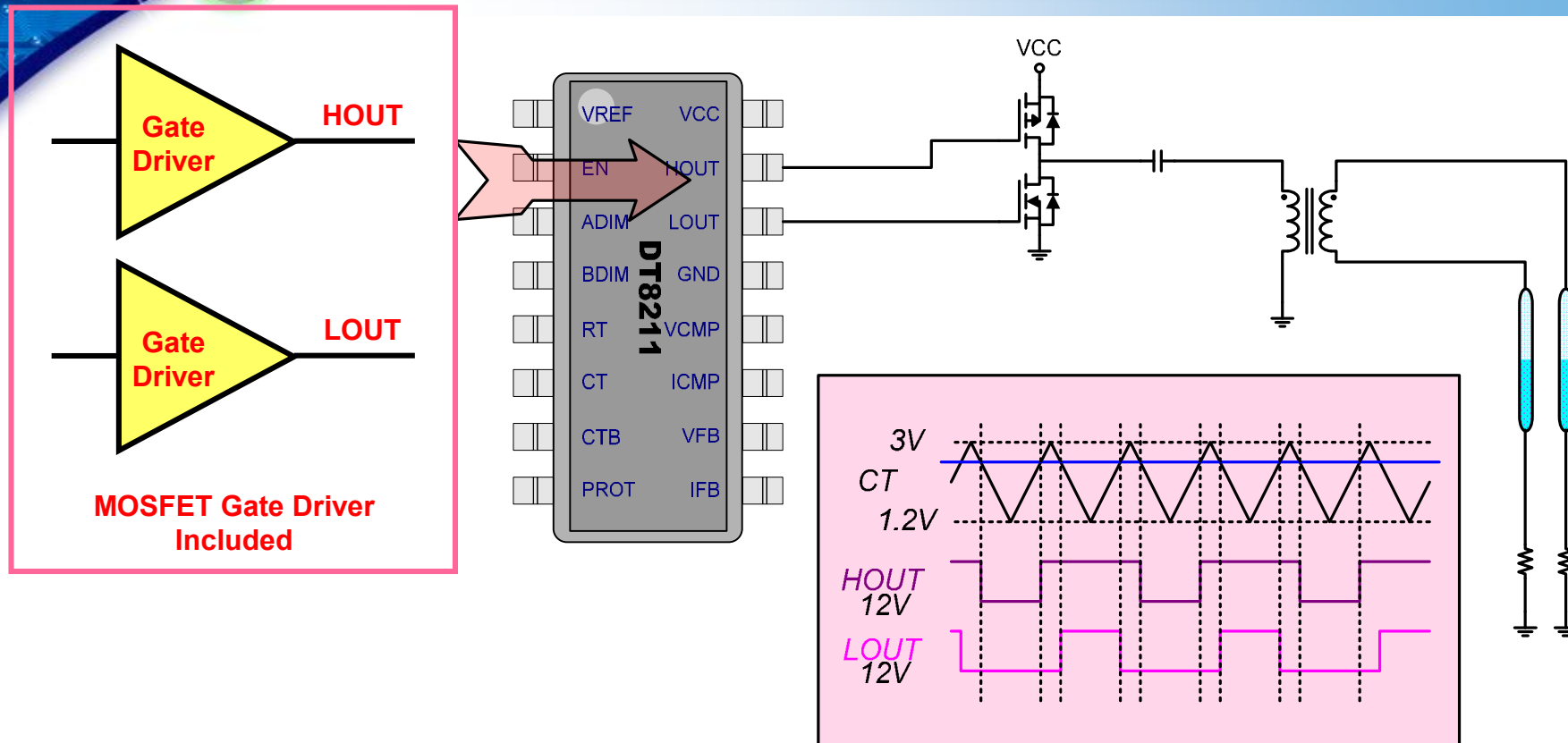


- IFB : Feedback of Current (Error Amplifier Negative Input)
- VFB : Feedback of Voltage (Error Amplifier Negative Input)
- ICMP : Error Amplifier Output for Current Feedback
- VCMP : Error Amplifier Output for Voltage Feedback

IFB & VFB & ICMP & VCMP Block Diagram

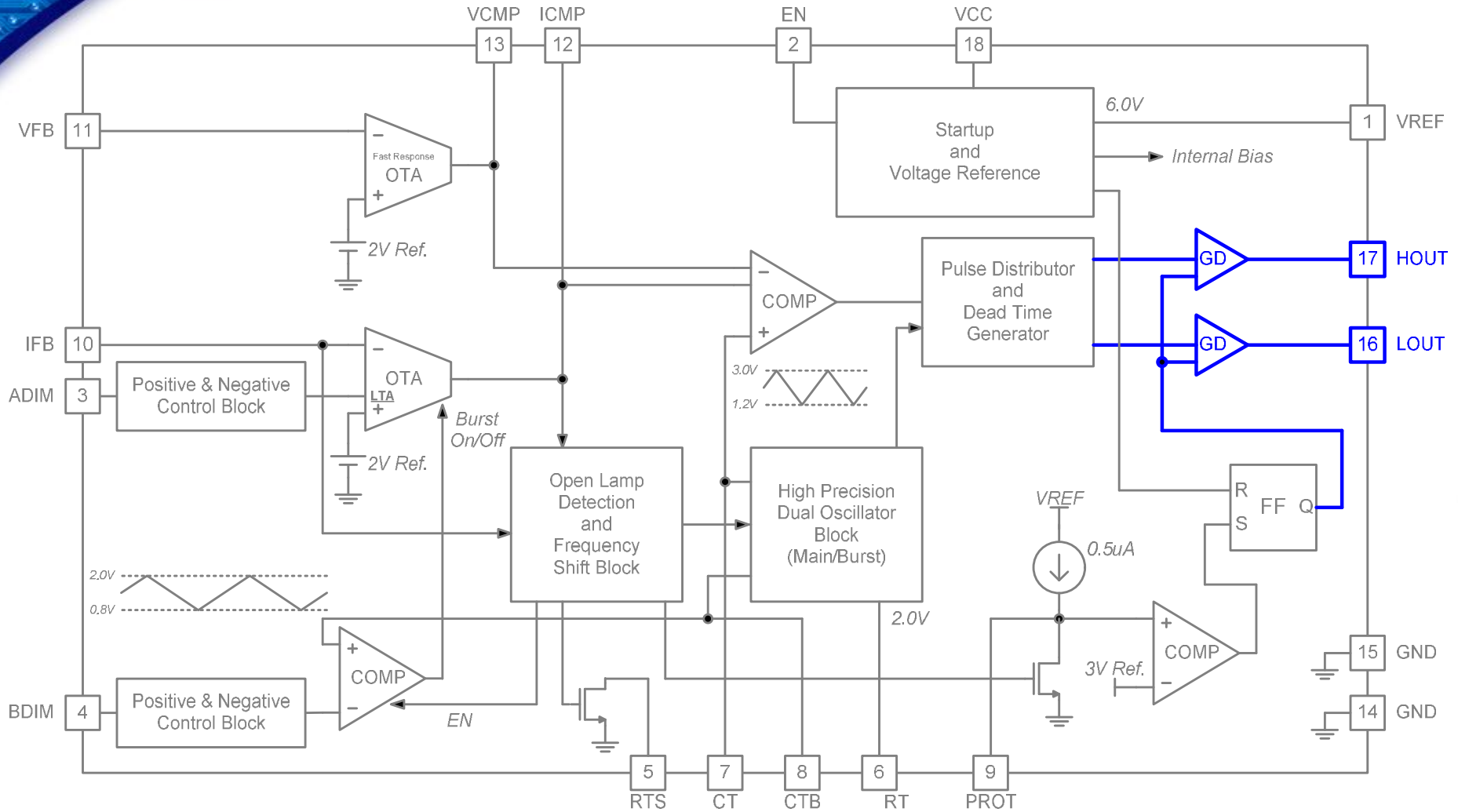


HOUT & LOUT

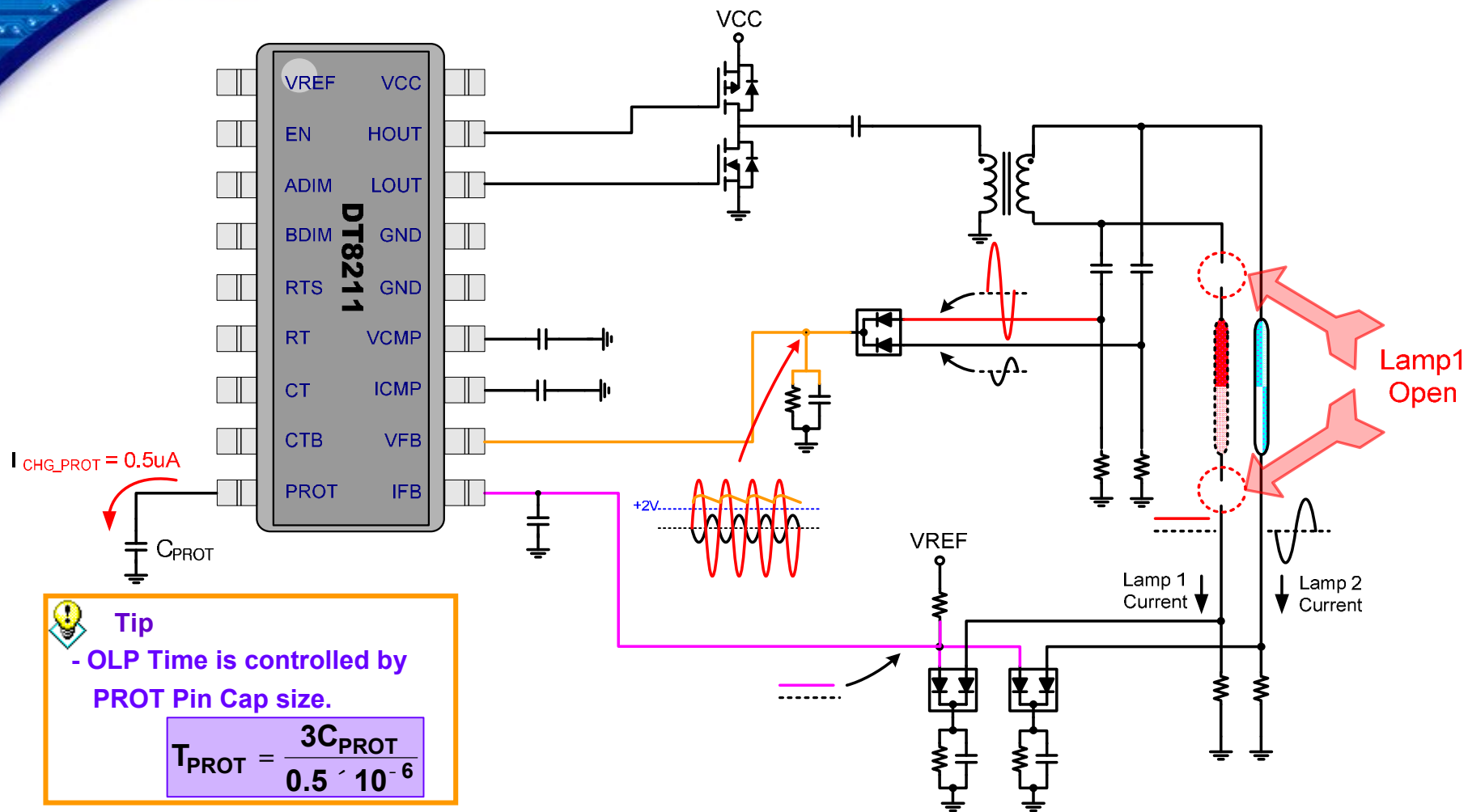


- HOUT : High Side Gate Driver Output for P Channel MOSFET Direct Driving
- LOUT : Low Side Gate Driver Output for N Channel MOSFET Direct Driving

HOUT & LOUT Block Diagram

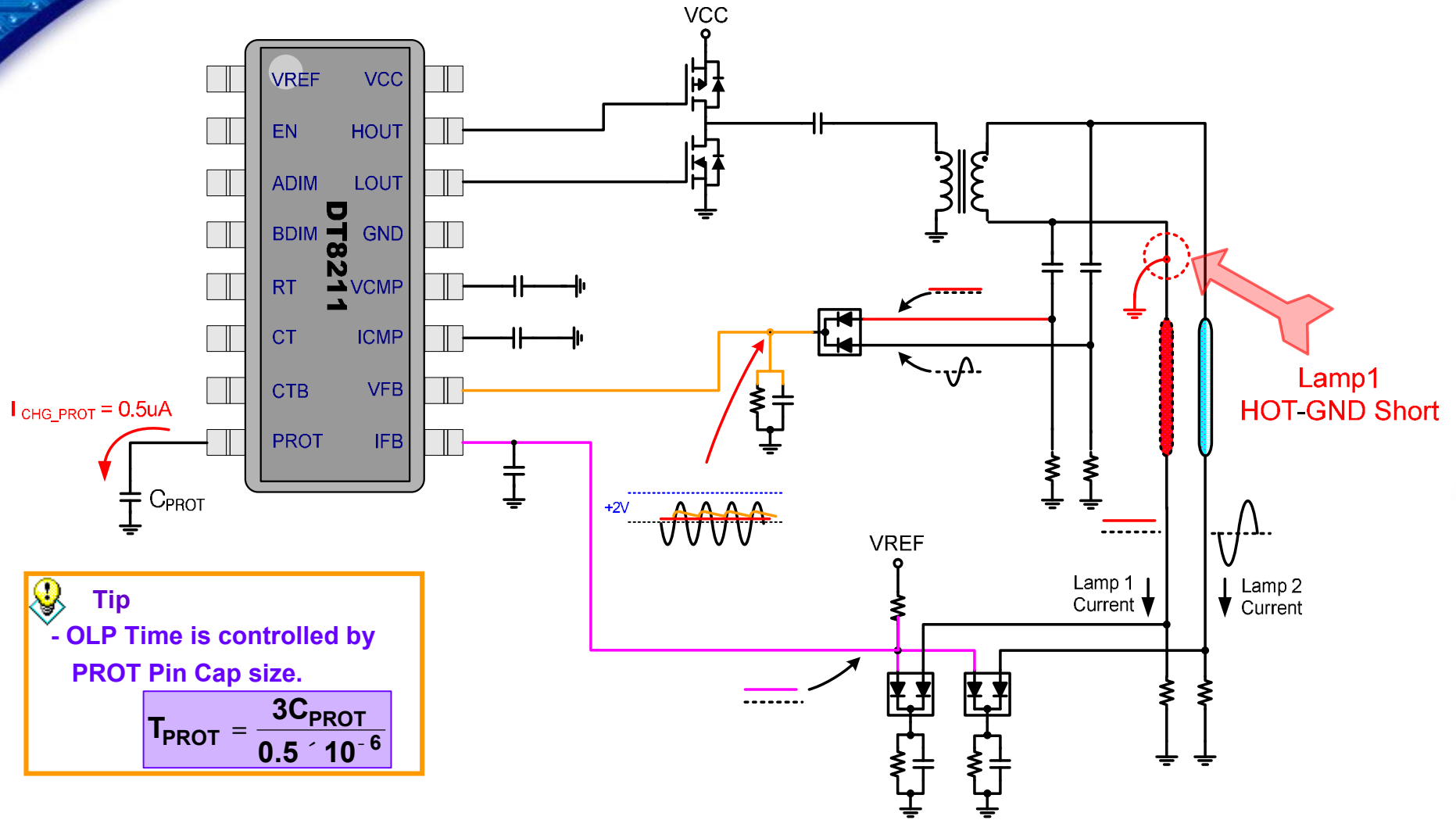


Open Lamp Protection



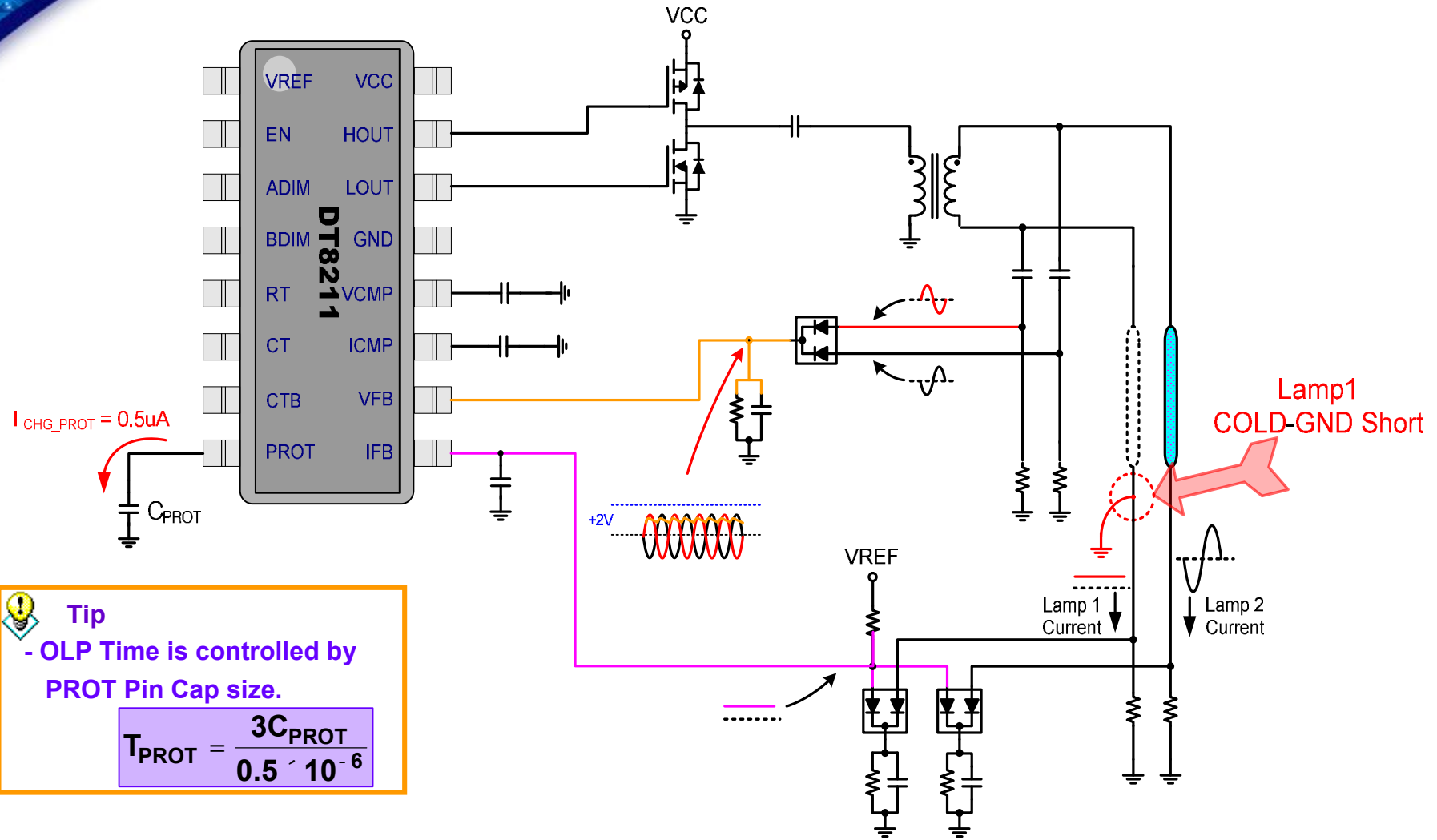
-PROT : Protection Time Trimming Pin

Short Circuit Protection (HOT-GND Short)



-PROT : Protection Time Trimming Pin

Short Circuit Protection (COLD-GND Short)

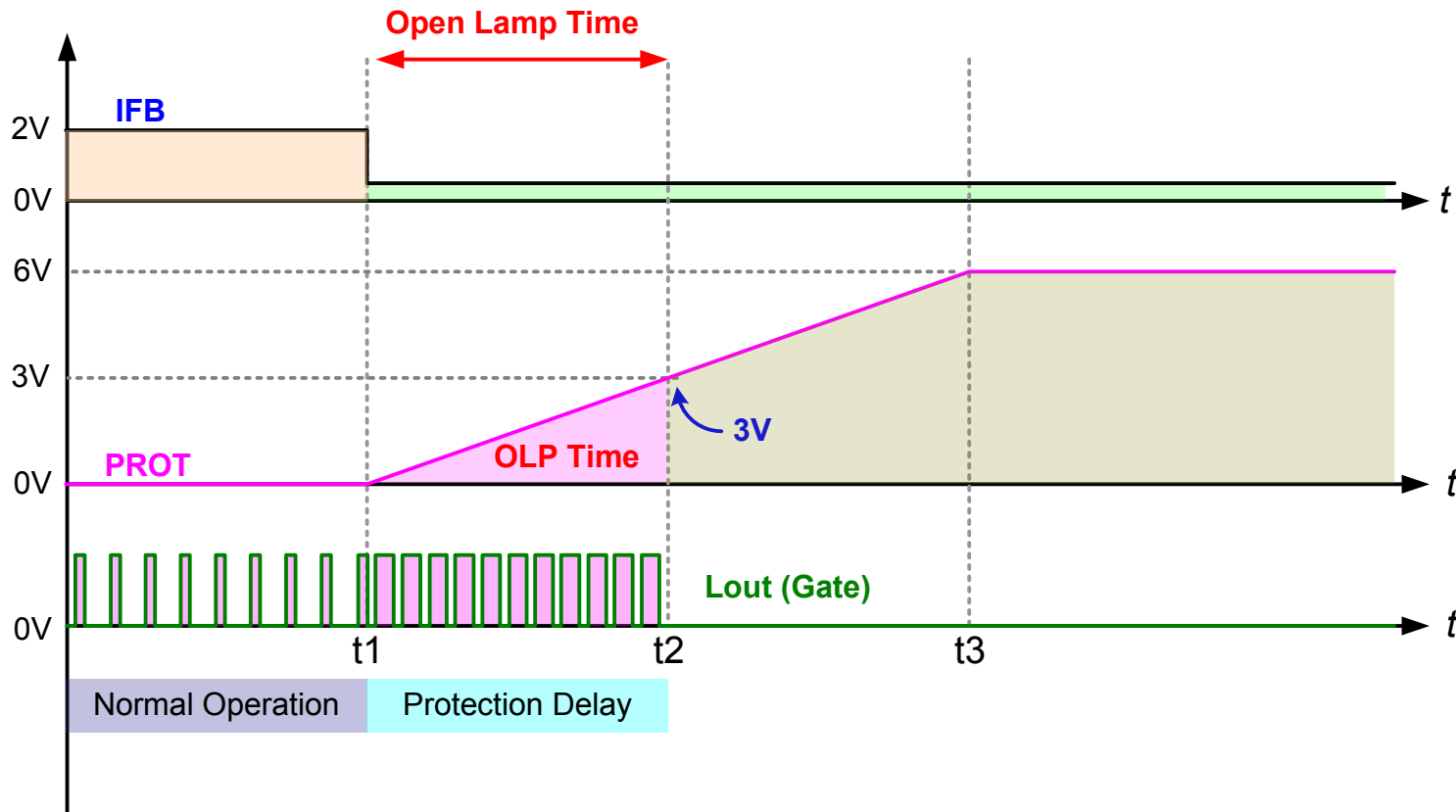


Tip
 - OLP Time is controlled by PROT Pin Cap size.

$$T_{PROT} = \frac{3C_{PROT}}{0.5 \cdot 10^{-6}}$$

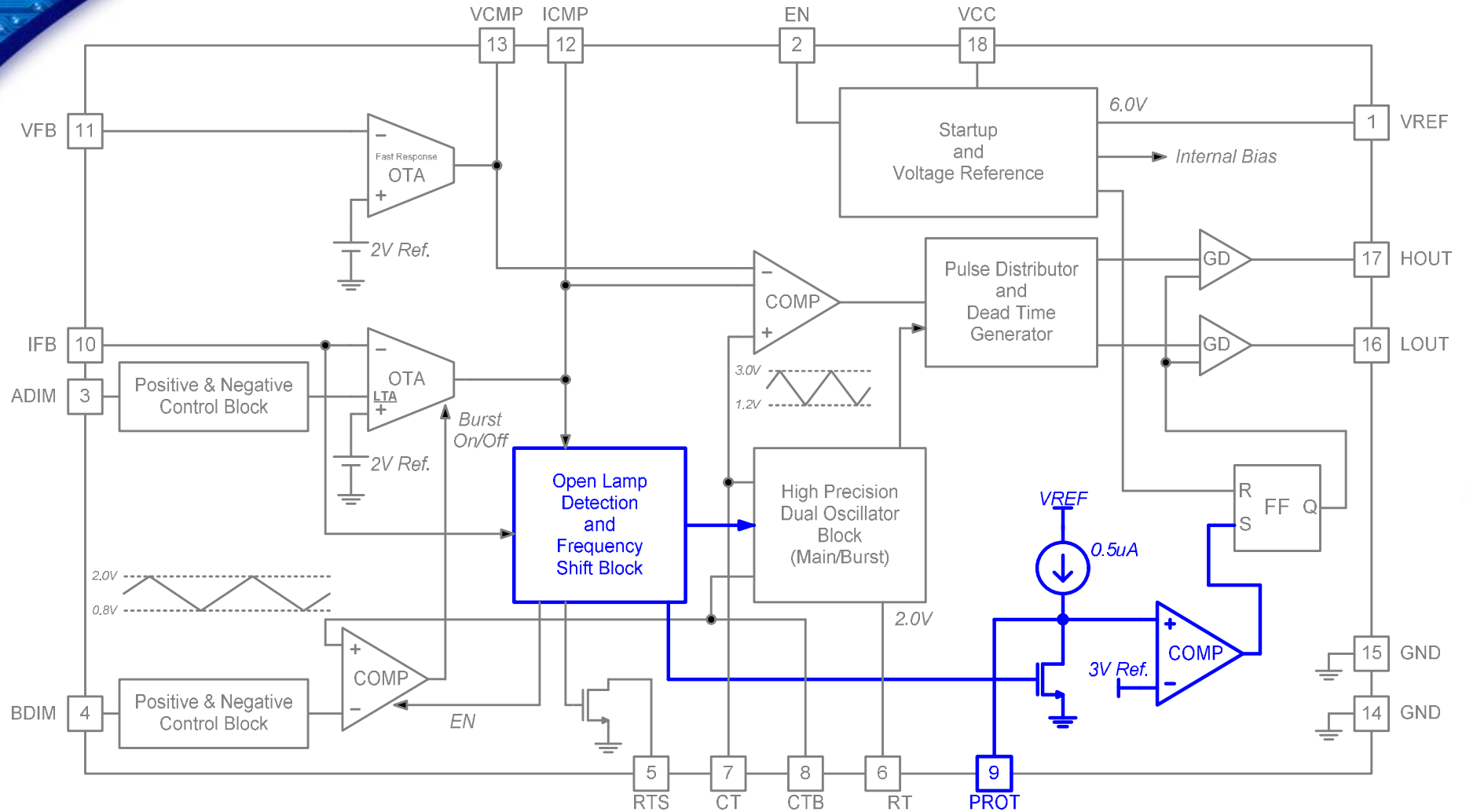
-PROT : Protection Time Trimming Pin

Open Lamp Detection Sequence

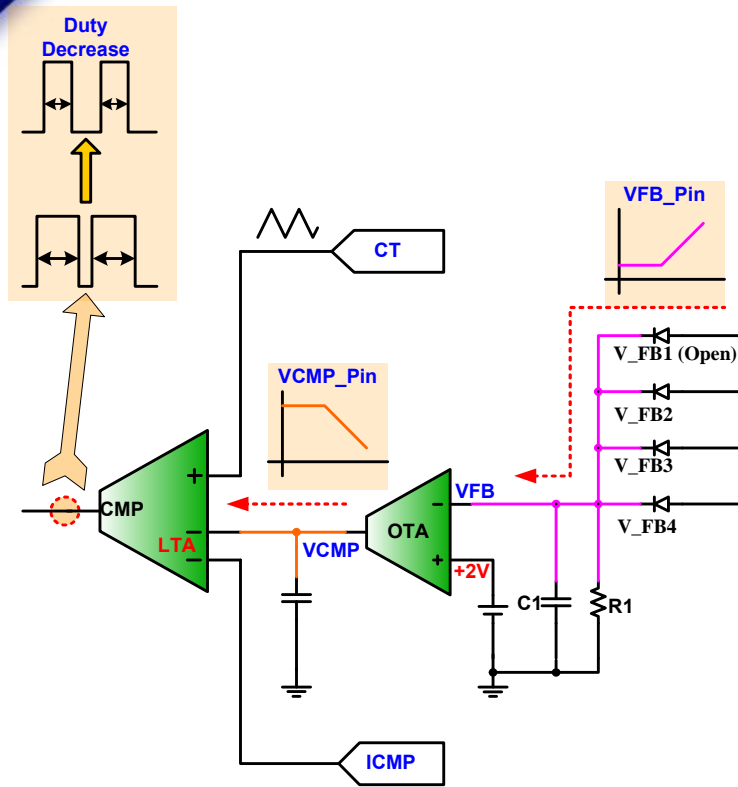


Open Lamp State Sequence

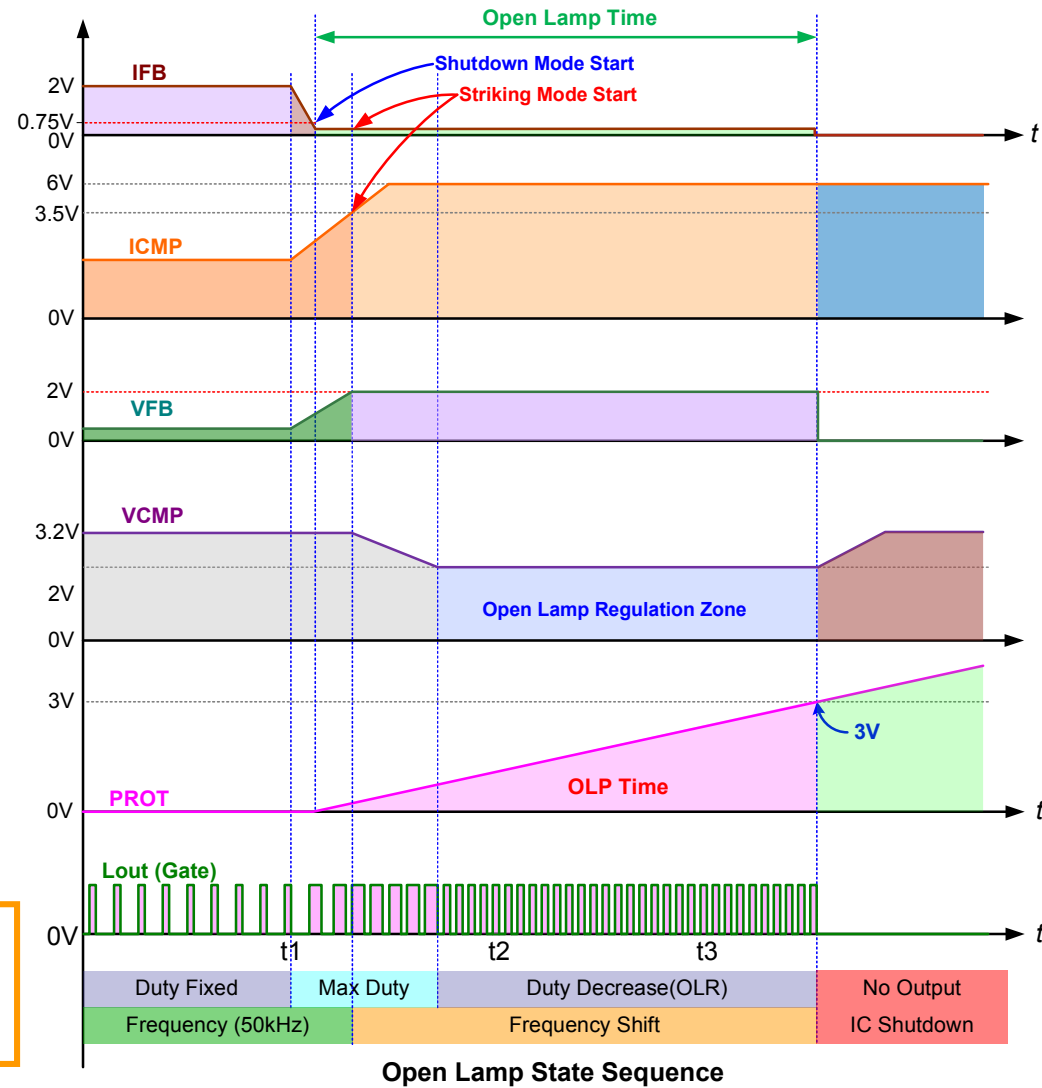
Protection (Open Lamp Detection Diagram)



Open Lamp Regulation(= Over Voltage Protection Sequence)



Tip
- OLR Level is set by controlling R1 value.





Protection

➤ OLP – Open Lamp Protection

- When Lamp is *OPEN*, OLP function is activated.

➤ SCP – Short Circuit Protection

- When the *HOT* of Lamp is short to *GND*, SCP function is activated.
- When the *COLD* of Lamp is short to *GND*, SCP function is activated.

➤ OVP – Over Voltage Protection

- When the voltage of Lamp is *OVER*, OVP function is activated.



Open Lamp Protection & Striking mode Condition

➤ Striking Mode Condition

$IFB < 0.75V$
&
 $ICMP > 3.5V$



Striking Mode
-RTS PIN goes to 0V
-BDIM Disable

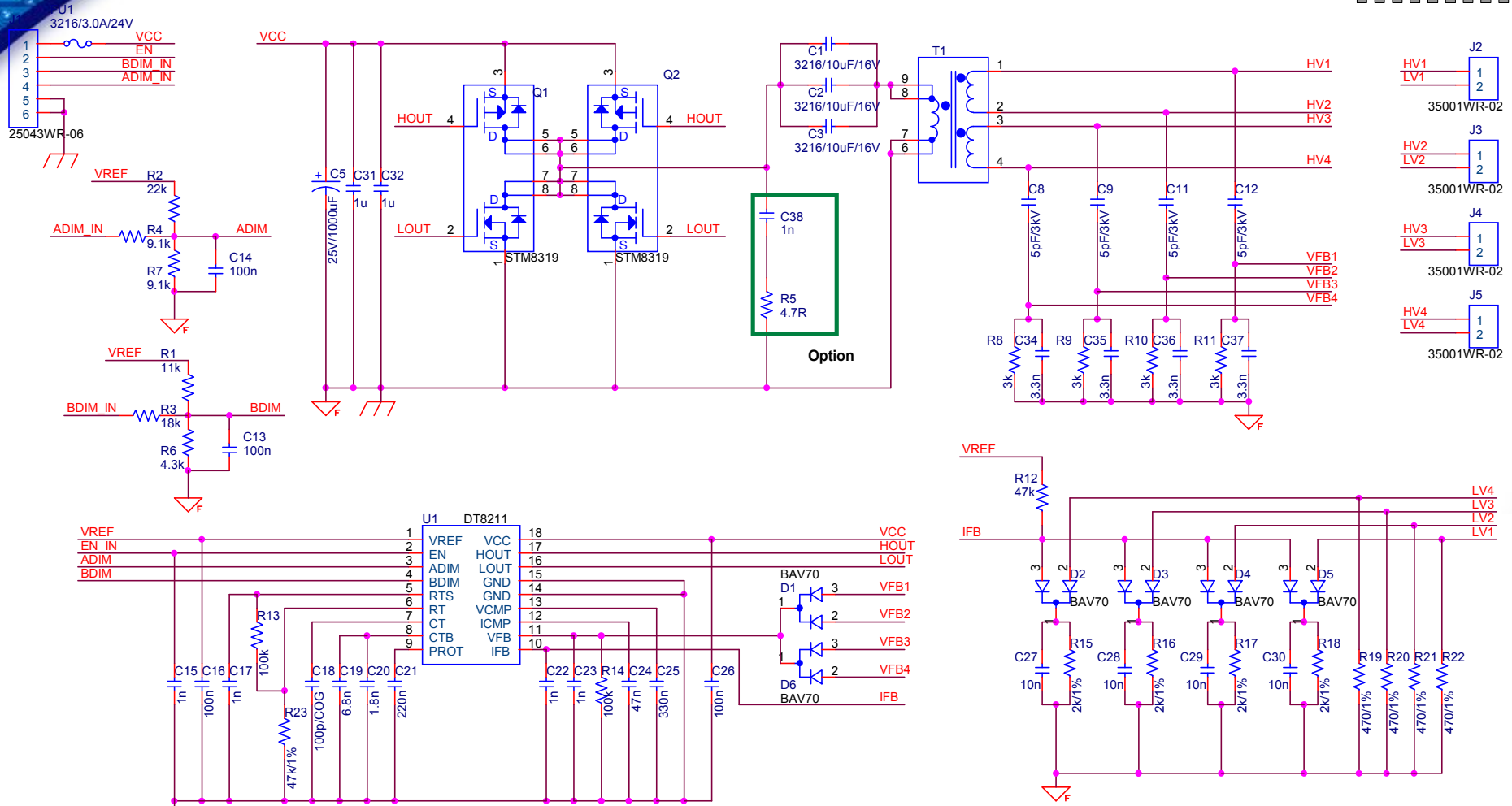
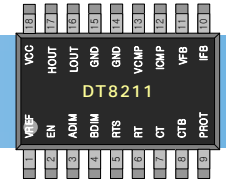
➤ Shutdown Condition

$IFB < 0.75V$



Shutdown Mode
- C_{PROT} will be charged by the 0.5uA
→ V_{PROT} goes UP.
→ If $V_{PROT} > 3V$, IC Shutdown

Application Circuit of DT8211 @ 4Lamp



Pin Description

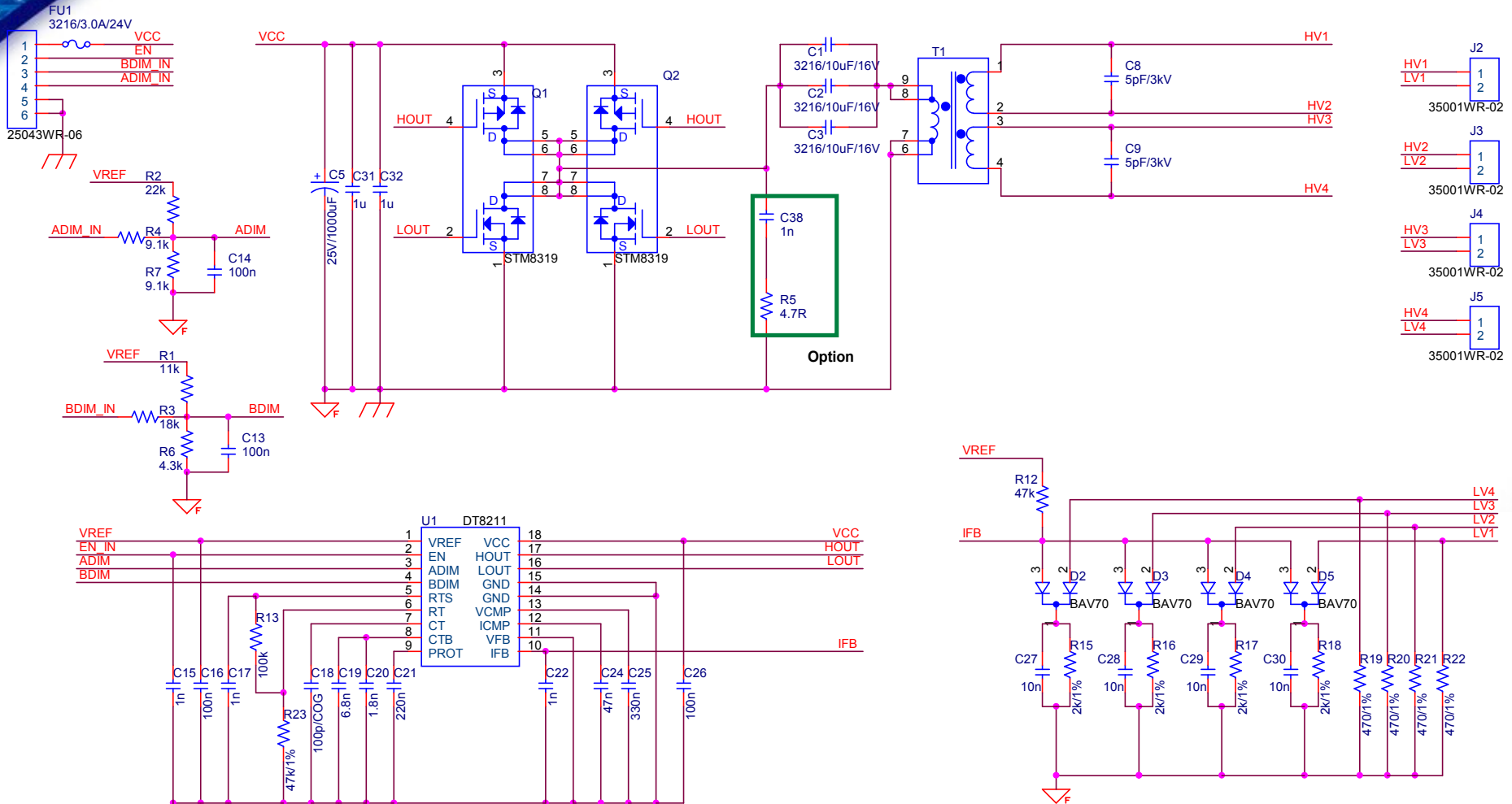
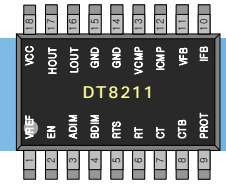
- 1.VCC = 8V~45V
- 2.Ena = TTL LEVEL
- 3.BDIM = 0~4.5V(P)
- 4.ADIM = 0~3.3V(P)
- 5.GND
- 6.GND

Specification

Lamp Frequency = 50kHz±3kHz
 Burst Frequency = 300Hz±20Hz
 Striking Voltage = 1.6kV rms
 Output Current = 3.5mA~7.5mA



Application Circuit of DT8211 Without OLR



Pin Description

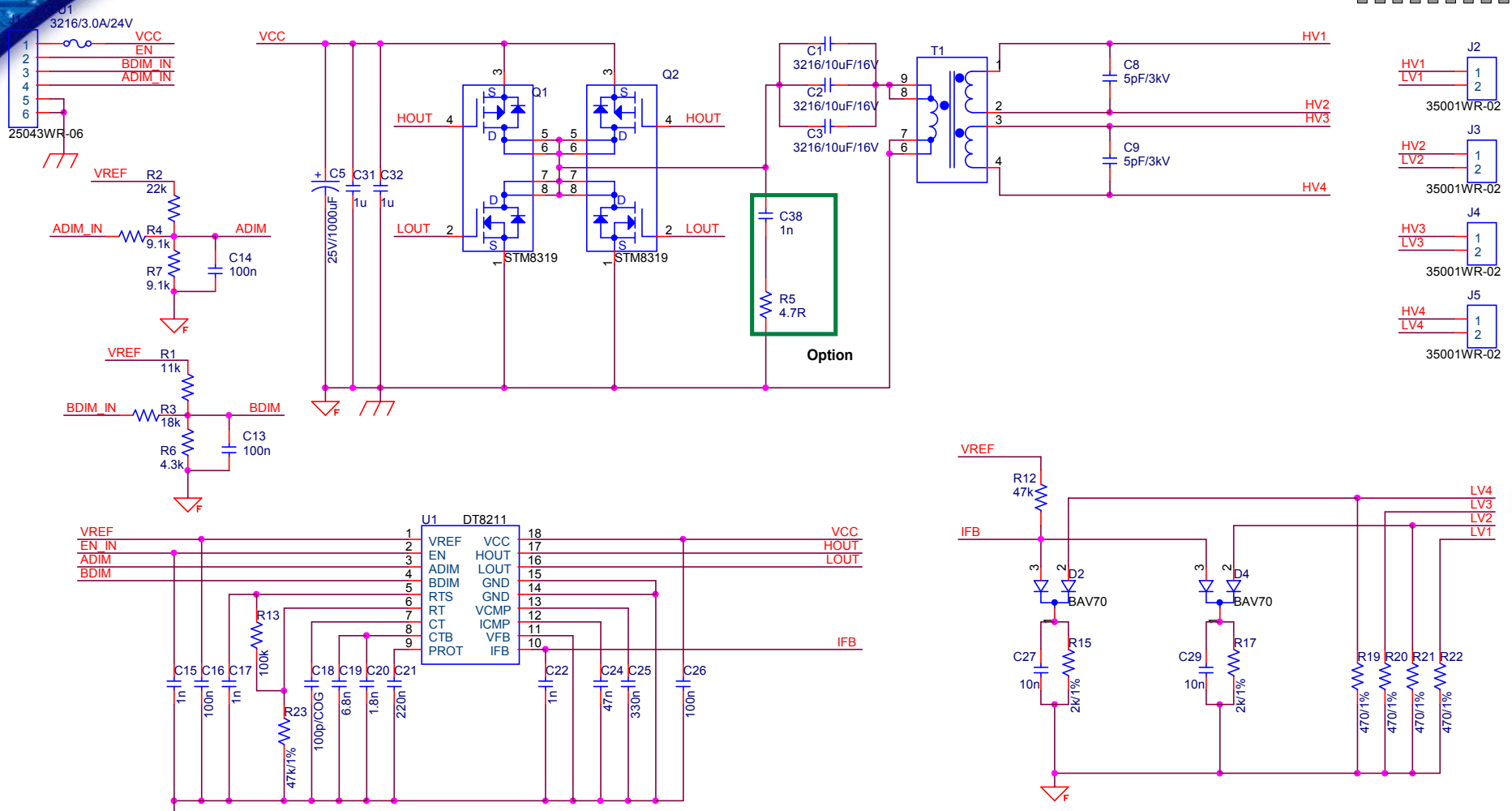
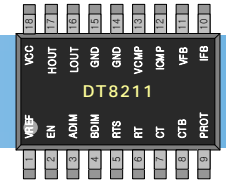
1. VCC = 8V~45V
2. EN = TTL LEVEL
3. BDIM = 0~4.5V(P)
4. ADIM = 0~3.3V(P)
5. GND
6. GND

Specification

- Lamp Frequency = 50kHz±3kHz
- Burst Frequency = 300Hz±20Hz
- Striking Voltage = 1.6kV rms
- Output Current = 3.5mA~7.5mA



Application Circuit of DT8211 For Low Price (Only Open Lamp Protection Function)



Pin Description	Specification
1.VCC = 8V~45V	Lamp Frequency = 50kHz±3kHz
2.Ena = TTL LEVEL	Burst Frequency = 300Hz±20Hz
3.BDIM = 0~4.5V(P)	Striking Voltage = 1.6kV rms
4.ADIM = 0~3.3V(P)	Output Current = 3.5mA~7.5mA
5.GND	
6.GND	