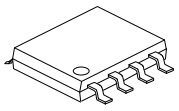
PWM CONTROLLER



SOP-8

■ DESCRIPTION

Featured Device, UTC **US321S**, is a PWM controller with innovative technology. The controller can work in high voltage with a high voltage MOS in PCB.

UTC **US321S** provides several protection features. It includes a cycle-by-cycle current limit to the power switch; output over-voltage protection; V_{DD} UVLO protection.

■ FEATURES

* Integrated 650V HV start-up circuit
* Low standby power dissipation
* Under-voltage lockout (UVLO) with hysteresis
* Provides complete protection functions
  Cycle-by-cycle current limit
  Output over-voltage Protection

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
US321SL-S08-R	US321SG-S08-R	SOP-8	Tape Reel

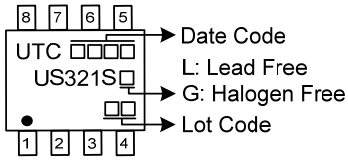
US321SG-S08-R

(1)Packing Type — (1) R: Tape Reel

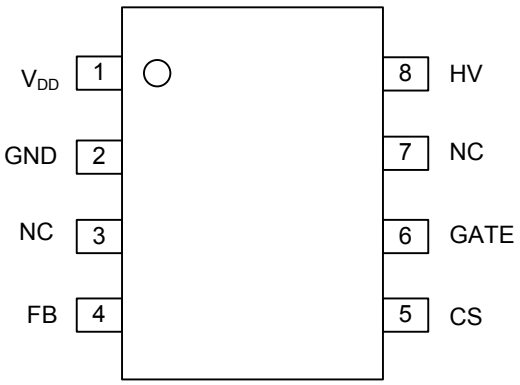
(2)Package Type — (2) S08: SOP-8

(3)Green Package — (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION

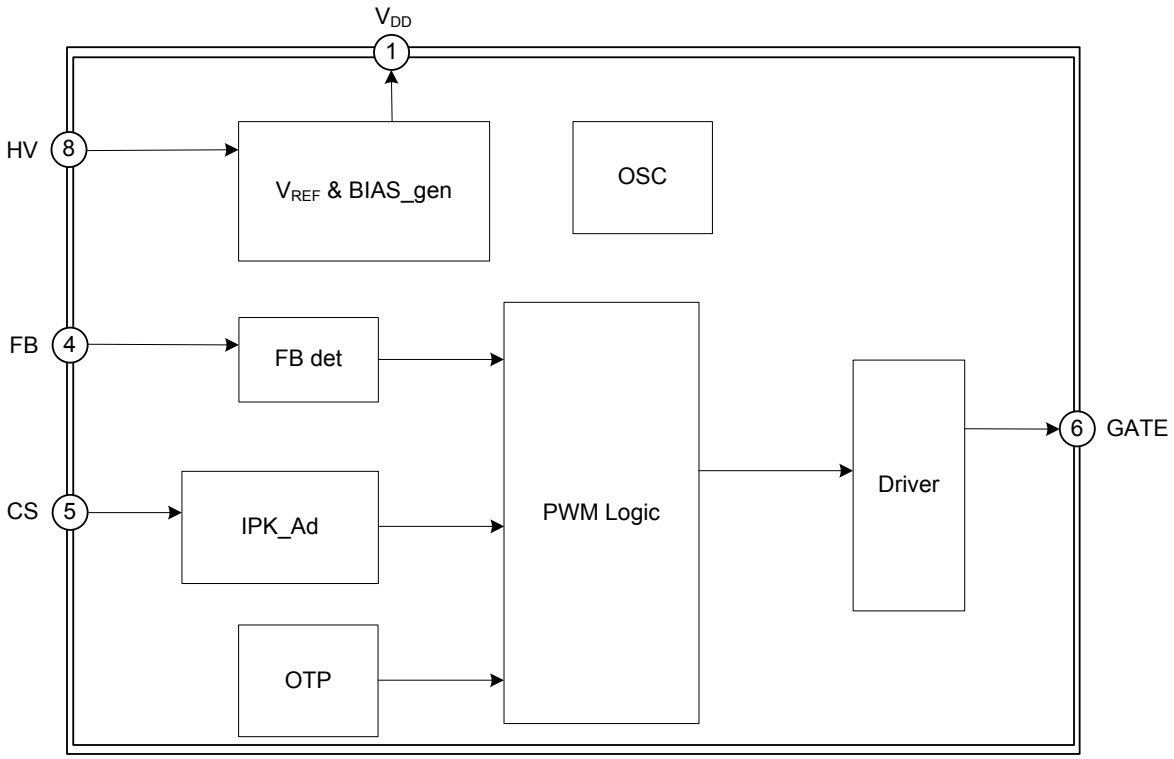


■ PIN DESCRIPTION

PIN NO.	PIN NAME	I/O (Note 1)	DESCRIPTION
1	V_{CC}	V_{DD}	Power supply
2	V_B	GND	Power ground
3, 7	HO	NC	No connection
4	V_S	FB	Output feedback
5	HIN	CS	Sensed current of power mos
6	LIN	GATE	Gate driver for power mos
8	COM	HV	HV input

Note: I=Input, O=Output

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
HV Pin Voltage	HV	-0.3 ~ 650	V
V_{DD} Pin Voltage	V_{DD}	30	V
FB, CS, GATE Pin Voltage		-0.3 ~ 7	V
Maximum Operating Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-55 ~ +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.

■ RECOMMENDED OPERATING RANGE

PARAMETER	SYMBOL	RATINGS	UNIT
Switch Frequency	f_{SW}	40 ~ 60	kHz
Operation Ambient Temperature	T_A	-40 ~ +85	°C
Operating Junction Temperature	T_J	+125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	165	°C/W

Note: Not to exceed the maximum junction temperature of the IC, which relates to the operating power of the IC and the thermal resistance of the IC/package as above. The operation power of the IC can be calculated by $P_D = V_{DD\_IN} \times I_{IN}$, where V_{DD_IN} represents the input voltage at the V_{DD} pin of the IC and I_{IN} represents the current flow into the V_{DD} pin of the IC.

■ ELECTRICAL CHARACTERISTICS (T_A=25°C unless additional specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage						
HV Pin Current	I_HV			2		mA
V_{DD} Startup Current	I_{VDD_ST}			100	300	uA
V_{DD} Operation Current	I_{VDD_OP}			800		uA
V_{DD} Static Current	IV_{DD_Q}			200		uA
V_{DD} ON Voltage	V_{DD_ON}			7.5		V
V_{DD} off Voltage	V_{DD_OFF}			7		V
V_{DD} OVP Threshold	V_{DD_OVP}			28		V
V_{DD} Clamp Voltage	V_{DD_CLAMP}			30		V
V_{DD} Regulation Voltage	V_{DD_reg1}		11.8	12	12.2	V
FB PIN						
Reference for Non-Inverting Input	V_{FB_REF}		1.97	2	2.03	V
FB OVP Threshold	V_{FB_OVP}			2.4		V
FB OLP Threshold	V_{FB_OLP}			1.87		V
CS PIN						
LEB Time	$T_{\_LEB}$			350		ns
Peak Current Threshold	$V_{\_IPK}$		0.5	0.55	0.6	V
OCP Threshold	$V_{\_AOCP}$			0.9		V
GATE Drive Output						
Typical Minimum Off Time	T_{OFF_MIN}			16		uS
Typical Maximum Off Time	T_{OFF_MAX}			1.4		mS
Maximum on Time	T_{ON_MAX}			12		uS
Auto-Recovery Time	$T_{\_AUR}$			500		mS

■ FUNCTIONAL DESCRIPTION

Refer to both the Block Diagram and a reference design circuit for the following discussions. All parameters mentioned below are typical values.

Start-up Circuit

Applying power to the input port in Figure 4, initiates the operation. V_{DD} voltage is lower than V_{DD_OFF} pwm logic is off and output voltage cannot keep at a constant value.

After V_{DD} voltage is over V_{DD_ON} normal operation starts. PWM logic is running and output voltage goes to pre-set value gradually.

Output voltage Setting

Output voltage can be set by two divided-resistors. Reference voltage in the chip is 2V. The output voltage can be calculated by

$$V_{OUT}=(1+R_{FB1}/R_{FB2})\times 2+V_{D1}.$$

V_{D1} is forward voltage drop of a diode, 0.6V typically.

■ TYPICAL APPLICATION CIRCUIT