

Description

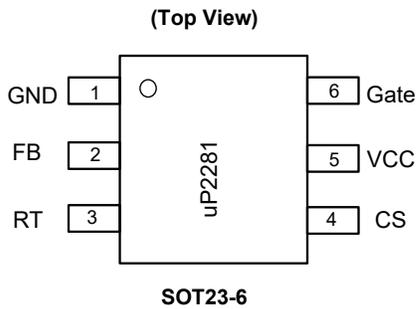
The uP2281 is current mode PWM controller for off-line AC-DC adapters with low standby power and high conversion efficiency.

The switching frequency of uP2281 at normal operation is internally fixed, and it operates in burst mode to lower switching loss under light or no load.

The uP2281 provides complete protection functions with automatic self-recovery feature including cycle-by-cycle current limiting, over load protection (OLP), over temperature protection(OTP), Vcc over voltage clamp and under voltage lockout.

The uP2281 is offered in SOT23-6 package.

Pin Assignments



Applications

- AC-DC off-line flyback converters
- Power Adapters
- Chargers, STB, Printer, Power tools

Features

- Wide Input AC Range with external MOSFET
- Output Power: up to 120W
- Burst mode under no load
- Audible noise free operation
- OTP, OLP, OVP
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin1	GND	Signal ground
Pin2	FB	Feedback.Connected to the opto-oupler
Pin3	RT	Connect NTC resistor to GND or NC
Pin4	CS	Current sense
Pin5	VCC	Supply voltage
Pin6	Gate	Driver output

Ordering Information

Part Number	Package	Marking ID	Packing
uP2281K	SOT23-6	81K	3000/tape and reel

Typical Applications Circuit

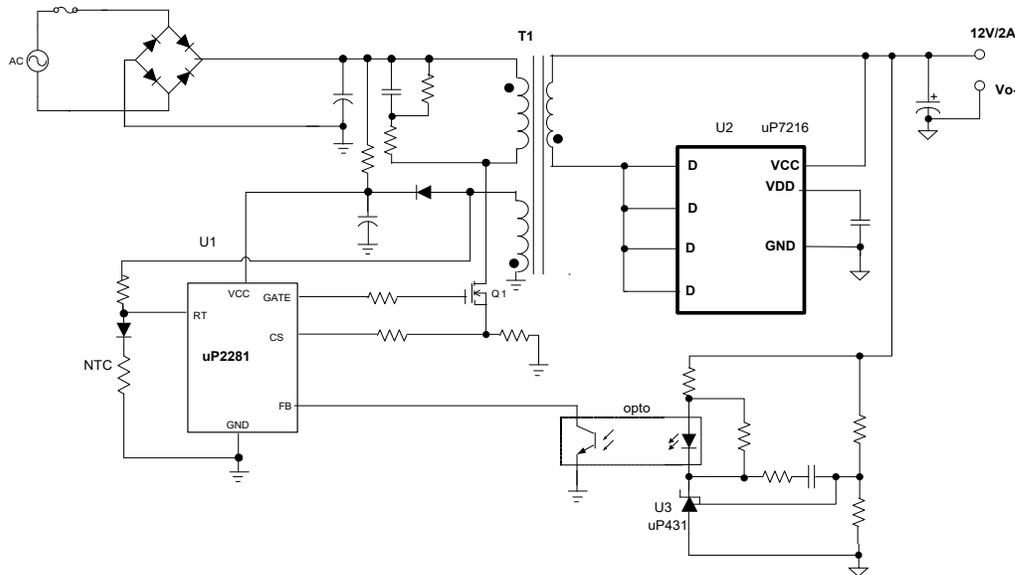


Figure 1. Typical Application Circuit of uP2281

Functional Block Diagram

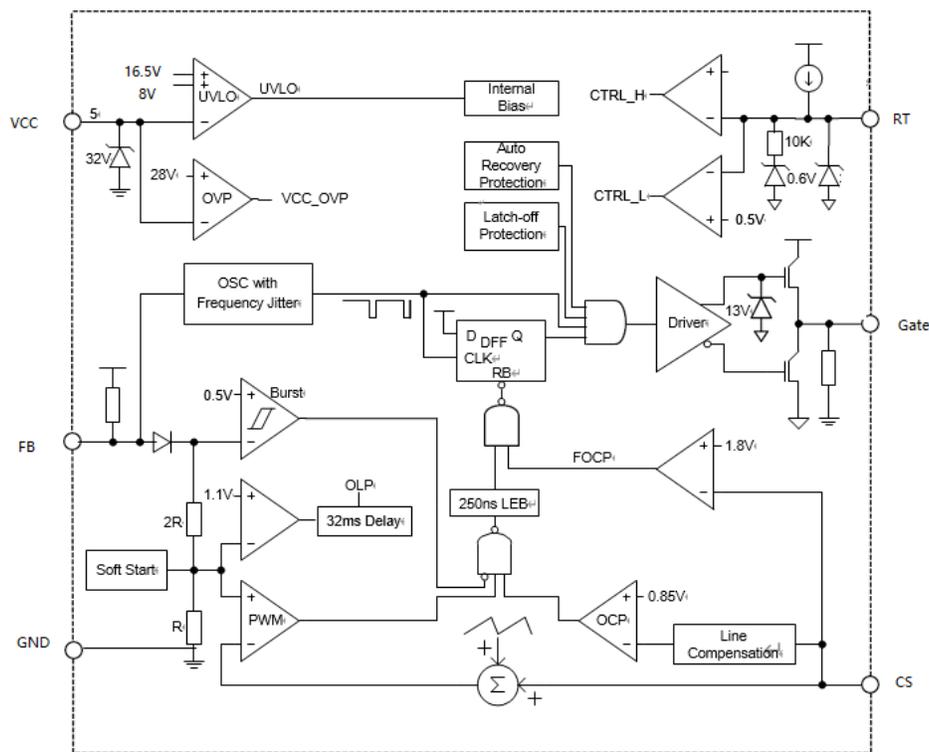


Figure 2. Functional Block Diagram of uP2281M

Absolute Maximal Ratings (Note3&4)

Symbol	Parameter	Rating	Unit
VCC	Supply Voltage	-0.3 to 32	V
FB, CS, RT	FB Input Voltage	-0.3 to 7	V
T _J	Operating Junction Temperature	-40 to +150	°C
T _{STG}	Storage Temperature	-55 to +150	°C
T _{LEAD}	Lead Temperature (Soldering, 10 sec)	+260	°C
—	ESD (Human Body Model)	3000	V
—	ESD (Charged Device Model)	1000	V

Notes: 3. Stresses greater than those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods may affect device reliability.

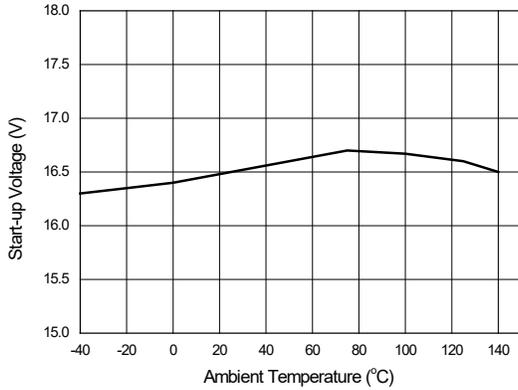
4. Test condition: Device mounted on FR-4 substrate PC board, 2oz copper, with 1in² cooling area.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, $V_{CC} = 20\text{V}$, TEMP mean temperature, unless otherwise specified.)

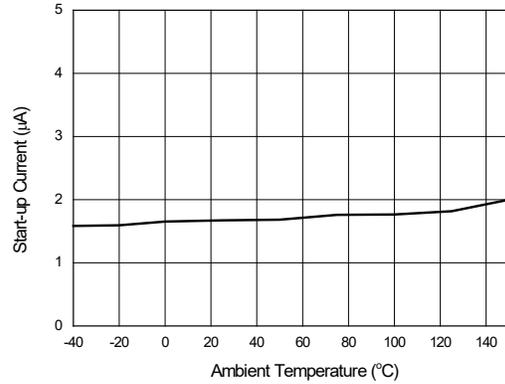
Symbol	Parameter	Condition	Min	Typ.	Max	Unit
STARTUP and UVLO Section						
V_{TH_ST}	Startup Voltage		14.8	16.3	17.8	V
$V_{OPR(MIN)}$	Minimum Operating Voltage		7	8	9	V
OVP	VCC Over Voltage Protection	$V_{FB}=3\text{V}, V_{CS}=0\text{V}$	28	29.5	31	V
Standby Current Section						
I_{ST}	Startup Current	$V_{CC}=V_{TH_ST}-1$ before Startup	—	2	5	μA
I_{CC}	Operating Current	$V_{FB}=3\text{V}, V_{CS}=4\text{V}$	1.5	2	3	mA
I_{CC_burst}	Burst Current	$V_{FB}=0.5\text{V}, V_{CS}=0\text{V}$	—	0.56	0.75	mA
Current Sense Section						
V_{TH_OC}	Current Limit threshold voltage	Duty Cycle=0	0.43	0.45	0.47	V
$V_{TH_OC_Clamp}$	OCP CS Voltage Clamper		—	0.72	—	V
T_{D_OC}	OC detection and control delay		—	90	—	ns
T_{LEB}	Leading Edge Blanking		—	300	—	ns
T_{SST}	Soft Start Time		—	4	—	ms
Feedback Input Section						
V_{FB}	V_{FB} Open Loop Voltage		—	5.0	—	V
A_{VCS}	PWM Input Gain	$\Delta V_{FB} / \Delta V_{CS}$	—	3.5	—	V/V
I_{FB_Short}	FB Pin Short circuit current		—	0.21	—	mA
V_{TH_OLP}	FB Pin Voltage under OLP		—	4.4	—	V
D_{MAX}	Maximal Duty Cycle	$V_{FB}=3\text{V}, V_{CS}=0\text{V}$	75	80	85	%
RT Section						
I_{RT}	Output current through external resistor		93	100	107	μA
V_{OTP}	Threshold voltage of OTP		0.95	1.00	1.05	V
T_{OTP}	Threshold TEMP		—	140	—	$^\circ\text{C}$
T_{hys}	TEMP hysteresis		—	20	—	$^\circ\text{C}$
Oscillator Section						
F_{OSC}	Oscillator frequency	$V_{FB}=3\text{V}, V_{CS}=4\text{V}$	60	65	70	kHz
F_{OSC_MAX}	Maximal OSC Frequency	$V_{FB}=4\text{V}, V_{CS}=0\text{V}$	—	130	—	kHz
T_{SST_FRE}	Soft start time of frequency		—	30	—	ms
ΔFre_Temp	Frequency TEMP. Stability	-40°C to 125°C	—	1	—	%
ΔFre_VCC	Frequency VCC Stability		—	1	—	%
Gate Driver Section						
Output Clamp Voltage			—	11.5	—	V
Output Low Level		$V_{CC}=18\text{V}, I_O=5\text{mA}$	—	—	1	V
Output High Level		$V_{CC}=18\text{V}, I_O=20\text{mA}$	6	—	—	V
Output Rising Time		$C_L=1\text{nF}$	—	150	—	ns
Output Falling Time		$C_L=1\text{nF}$	—	50	—	ns

Performance Characteristics

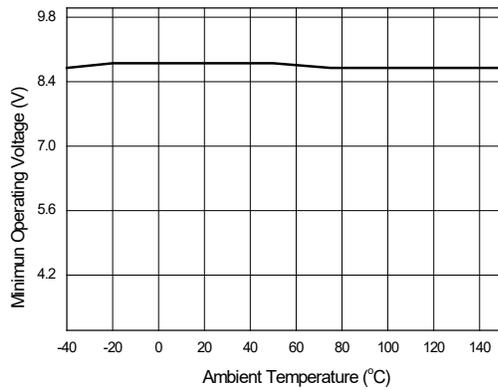
Start-Up Voltage vs. Ambient Temperature



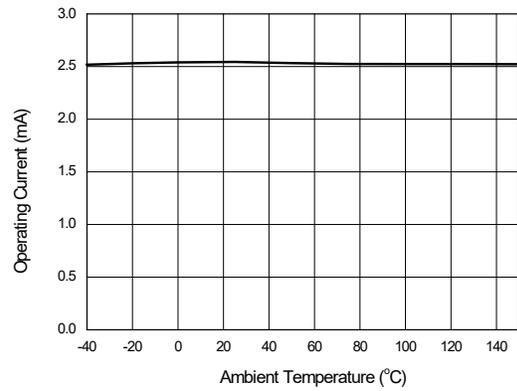
Start-Up Current vs. Ambient Temperature



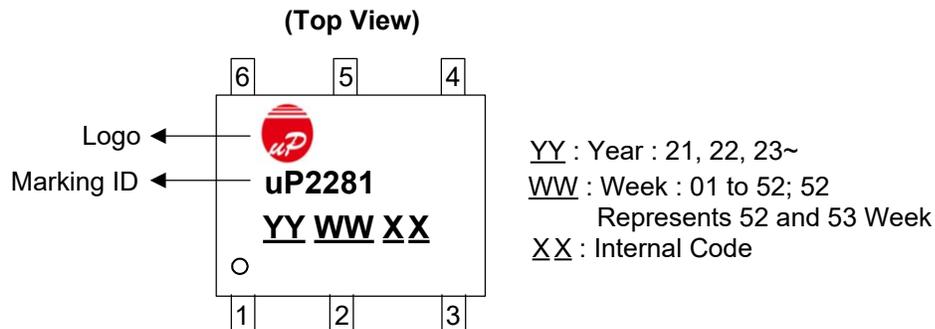
Minimal Operating Voltage vs. Ambient Temperature



Operating Current vs. Ambient Temperature



Marking Information



Package Outline Dimensions

SOT23-6 Package

