A U K Semiconductor

SP6300

Quasi-Resonance Flyback Controller

Description

The SP6300 is specifically designed to satisfy the requirements for increased Integration and reliability in offline Quasi-resonant (ZVS: Zero Voltage Switching at switch turn-on) flyback converters. Quasi-resonant operation is achieved by means of a transformer demagnetization sensing input that triggers MOSFET's turn-on Converter's power capability variations with the mains voltage are compensated by line voltage feedforward.

At light load the device features a special function that automatically lowers the operating frequency still maintaining the operation as close to ZVS as possible. In addition to very low start-up and quiescent currents, this feature helps keep low the consumption from the mains at light load and be Blue Angel and Energy Star compliant.

Features

- Flyback Operation with Quasi-Resonant Soft Switching for Low Power Dissipation and EMI
- Temperature-Compensated Pulse-by-pulse Over-Current Protection
- Latched Over-Voltage and Thermal Protection
- Under-Voltage Lockout with Hysteresis
- Active Low-Pass Filter for Enhanced Light-Load Stability
- Regulated Soft Gate Drive

Applications

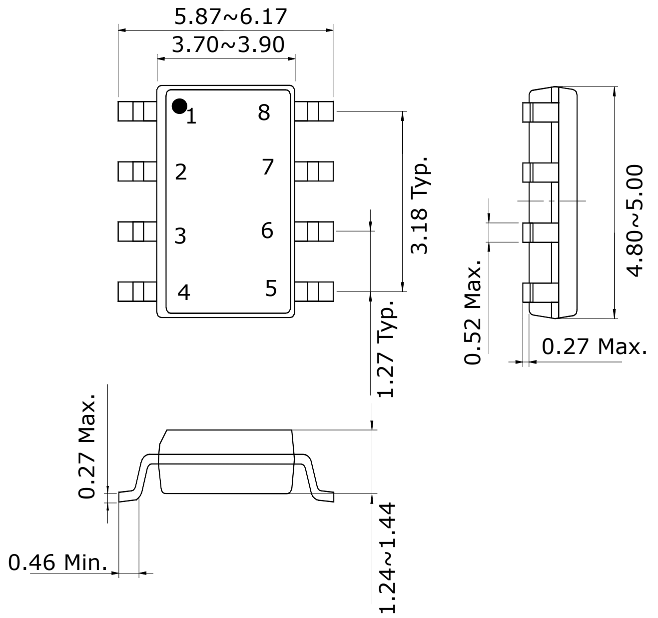
- TV/MONITOR SMPS
- DIGITAL CONSUMER
- AC-DC ADAPTERS/CHARGERS
- PRINTERS, FAX MACHINES, PHOTOCOPIERS AND SCANNERS

Ordering Information

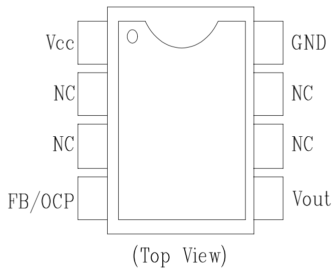
Type NO.	Marking	Package Code
SP6300P	SP6300	SOP-8

Outline Dimensions

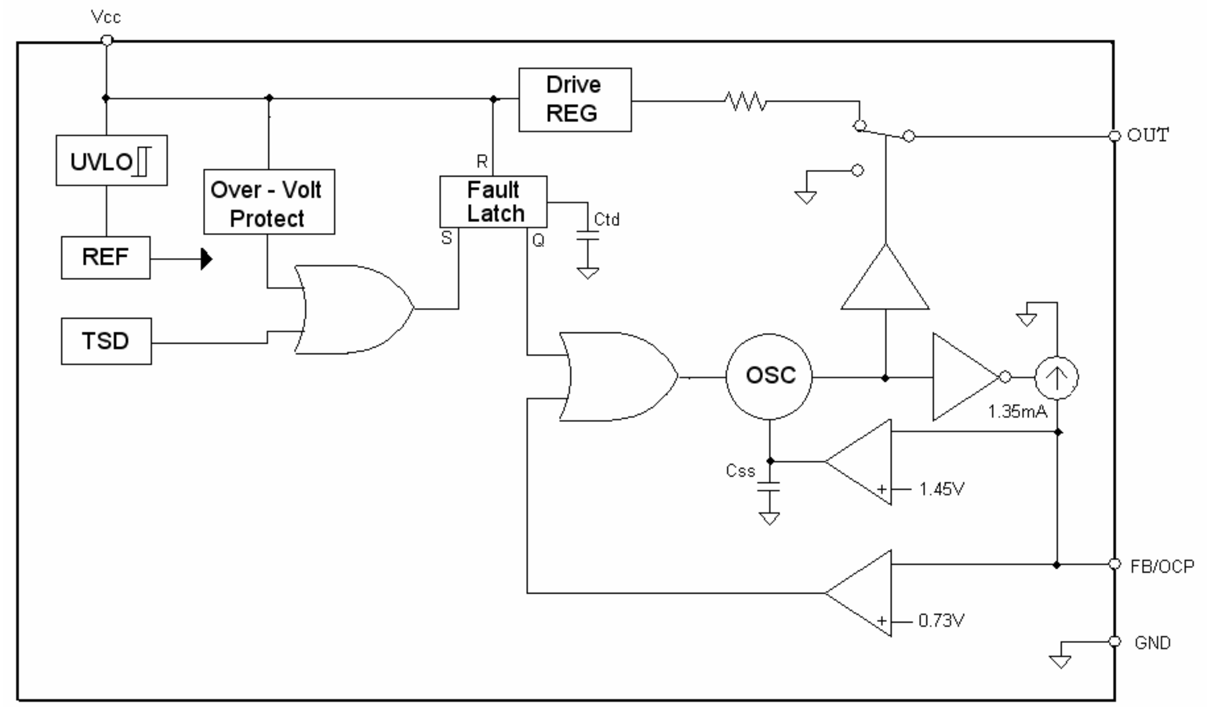
unit : mm



PIN Collection



Internal Block Diagram



Pin Function

Pin Number	Pin Name	Pin Function Description
1	Vcc	Supply voltage of both the signal part of the IC and the gate driver
2, 3	NC	No Connection
4	FB/OCP	Voltage mode control feedback signal, and over current detection
5	OUT	Gate driver output. The totem-pole output driver to drive the power MOSFET.
6, 7	NC	No Connection
8	GND	Ground. Current return for both the signal part of the IC and the gate driver.

Absolute maximum ratings

Characteristic	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	20	V
Peak Drive Output Current	I_{OH} / I_{OL}	+400 / -100	mA
FB/OCP Voltage Range	$V_{FB/OCP}$	-0.3 ~ +6	V
Power Dissipation	P_D	0.5	W
Operating Temperature Range	T_{opr}	-25 ~ +125	°C
Storage Temperature Range	T_{stg}	-55 ~ +150	°C

Electrical Characteristics

(V_{CC} = 11V, -25°C ≤ Ta ≤ +125°C ; Unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SUPPLY VOLTAGE & CURRENT SECTION						
Start Threshold Voltage	$V_{TH(ST)}$	Vcc Increasing	8.5	9.5	10.5	V
Stop Threshold Voltage	$V_{TH(SP)}$	Vcc Decreasing after Turn on Start Threshold Voltage	7.2	8	8.8	V
Start up Supply Current	I_{ST}	Vcc = $V_{TH(ST)}$ - 0.1V	-	-	100	µA
Operating Supply Current	I_{CC}	V_{FB} = 1V	-	3	7	mA
Dynamic Operating Supply Current (Note1)	I_{DCC}	Co = 1.0nF	-	4	10	mA
PROTECTION SECTION						
Over Voltage Threshold	V_{OVP}	Vcc Increasing until Shut down Output	15.3	17	18.7	V
Thermal Shutdown Activation Temperature	$T_{j\ (TSD)}$	-	-	140	-	°C
Latch Release Voltage	V_{RE}	Vcc Decreasing until Latch Releasing	2.5	-	6.0	V
Latch Holding Current	$I_{CC(RE)}$	-	-	-	400	µA
FEEDBACK SECTION						
Feedback Threshold Voltage	V_{FB}	-	0.68	0.73	0.78	V
Css Synchronized Voltage	V_{SYNC}	-	1.30	1.45	1.60	V
Feedback Sink Current	I_{SINK}	V_{FB} = 1V	1.20	1.35	1.50	mA
MAXIMUM & MINIMUM OFF TIME SECTION						
Maximum Off Time	t_{MAX}	-	30	-	60	µs
Minimum Off Time (Note1)	t_{MIN}	-	-	-	1.5	µs
Minimum Input Pulse Width (Note1)	$t_{MIN(W)}$	-	-	-	1.0	µs
OUTPUT SECTION						
Output Voltage High	V_{OH}	V_{FB} = 0V, I_{SOURCE} = 5mA	9.5	10	10.5	V
Output Voltage Low	V_{OL}	V_{FB} = 1V, I_{SINK} = 5mA	-	10	50	mV
Output Sink Current	I_{GDSINK}	Vo = 7V	-	300	-	mA
Output Source Current	$I_{GDSOURCE}$	Vo = 5V	-	80	-	mA
Output Voltage Rising Time	t_r	C_O = 1nF	-	150	-	ns
Output Voltage Falling Time	t_f	C_O = 1nF	-	50	-	ns

Note 1 : Feedback is square wave, V1 = 0V, V2 = 2V, Td = 0, Tr = 1ns, Tf = 1ns, PW = 1us, PER =36us

Electrical Characteristic Curves

Fig. 1 I_{CC} vs. Ta

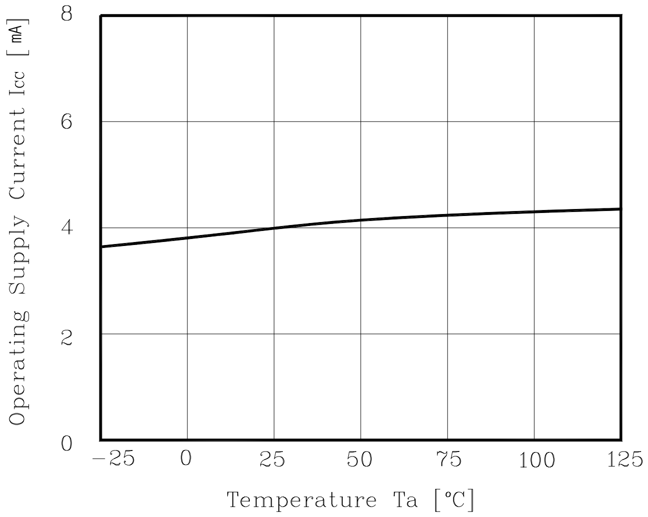


Fig. 2 $V_{TH(SP)}$ vs. Ta

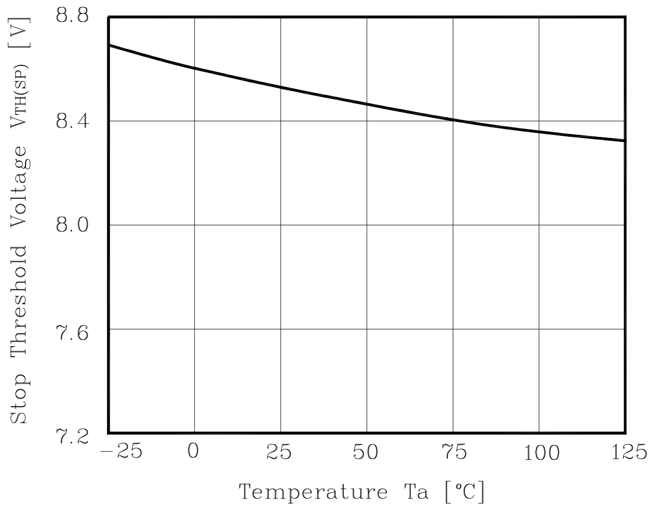


Fig. 3 I_{ST} vs. Ta

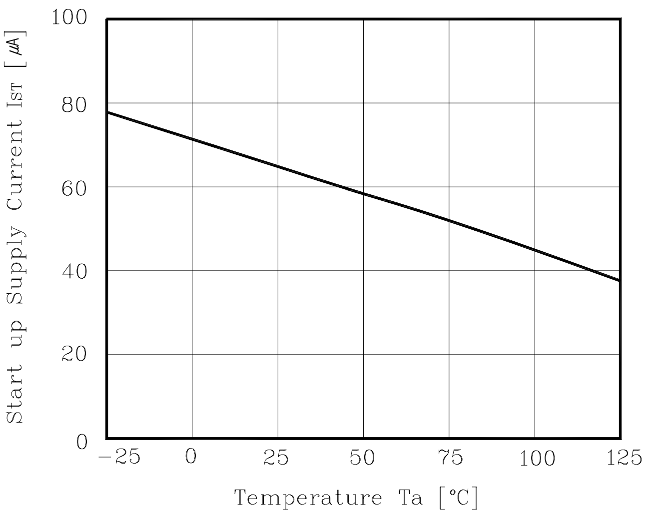


Fig. 4 V_{FB} vs. Ta

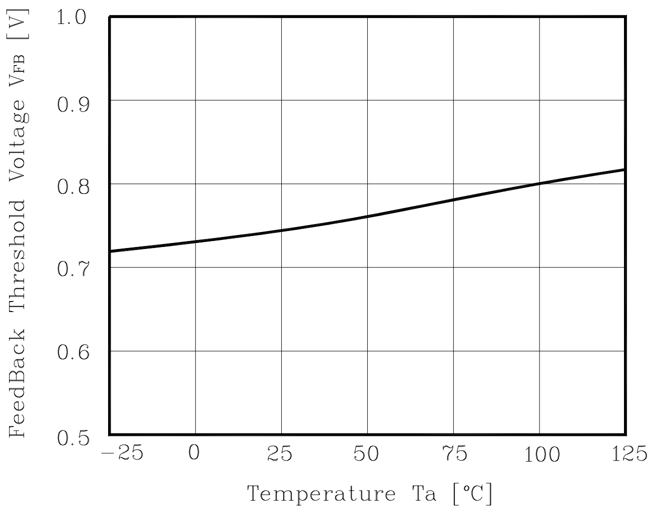


Fig. 5 $V_{TH(ST)}$ vs. Ta

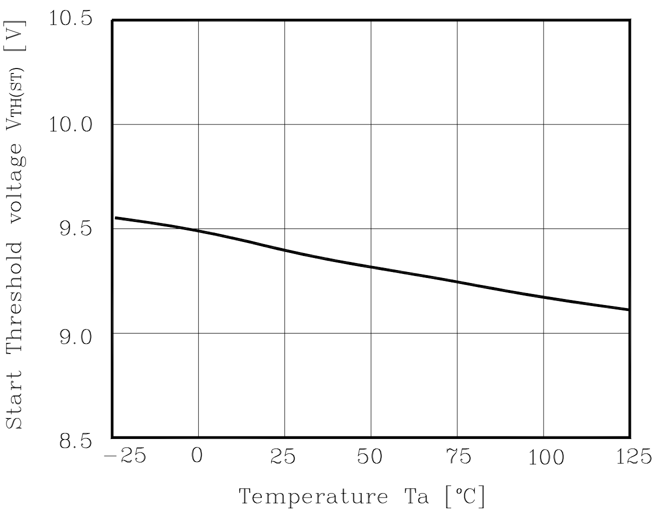
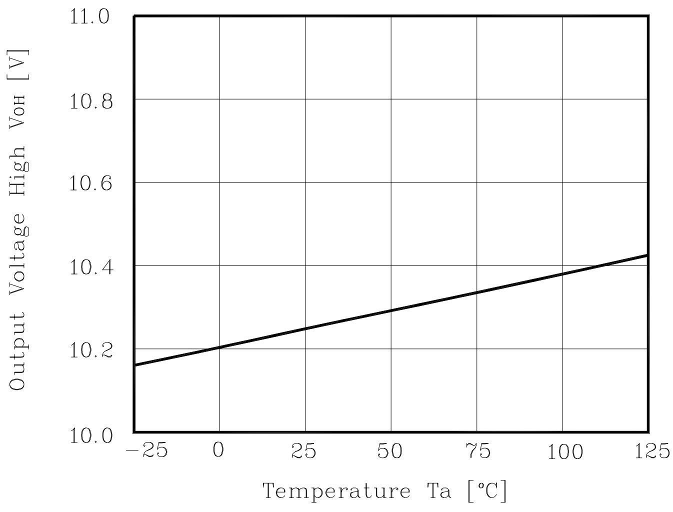


Fig. 6 V_{OH} vs. Ta



Electrical Characteristic Curves

Fig. 7 V_{OL} vs. Ta

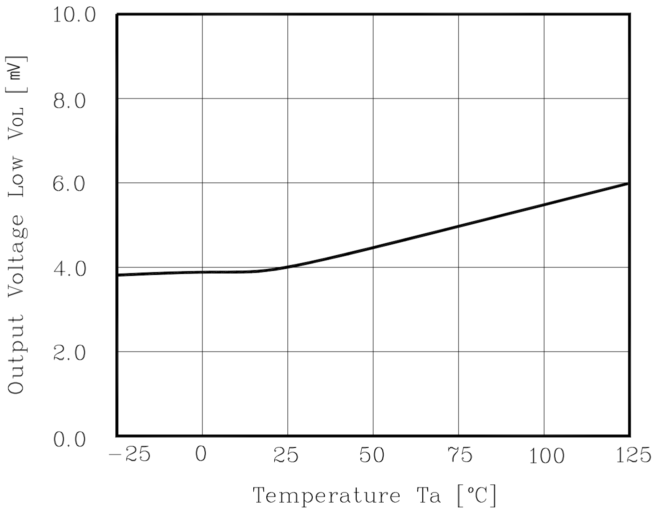


Fig. 8 V_{OUT} vs. Isink

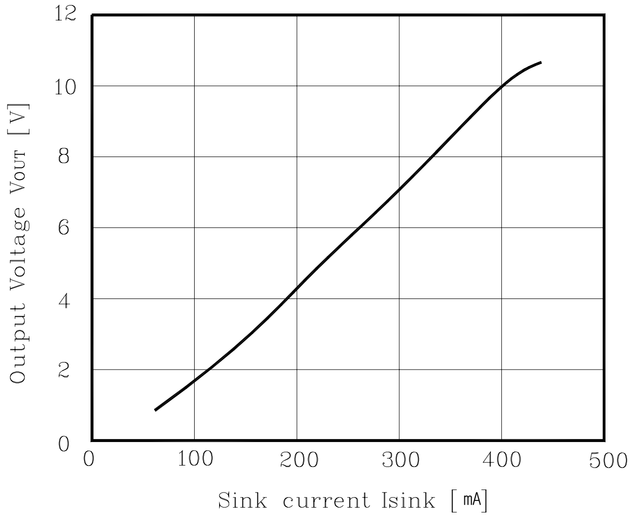


Fig. 9 V_{OUT} vs. Isource