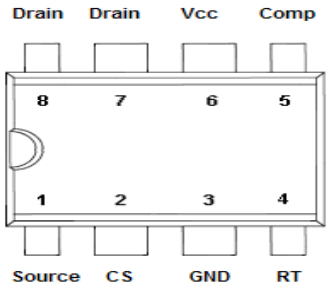
SP6851
Green-Mode Power Switch

DESCRIPTION
The SP6851 is a low cost, low startup current, current mode PWM controller with green-mode power-saving operation. Built-in 650V MOSFET provides simple design for adapter. The integrated functions include the leading-edge blanking of the current sensing, internal slope compensation. It would provide the users a superior AC/DC power application of higher efficiency, low external component counts, and lower cost solution for applications.
The SP6851 features more protections or functions for the following characteristics :
※Add OLP (Over Load Protection) function to provide better protection performance for fault conditions like short circuit or over load.
※Modify the OVP (Over Voltage Protection) mechanism from the cycle-by-cycle mode to the hiccup mode.
SP6851 is available in DIP-8P package.

APPLICATIONS
- AC/DC Switching Power Adaptor
- Battery Charger
- PC 5V Standby Power.
- Open-Frame Switching Power Supply

FEATURES
- High-Voltage BiCMOS Process
- Very Low Startup Current (<20μA)
- Under Voltage Lockout (UVLO)
- Current Mode Control
- Non-audible-noise Green Mode Control
- Current Limiting
- OLP (Over Load Protection)
- OVP (Over Voltage Protection) on Vcc Pin
- Leading-Edge Blanking
- Programmable Switching Frequency
- Internal Slope Compensation
- Green-Mode Control for Power Saving
- Building in 650V MOSFET

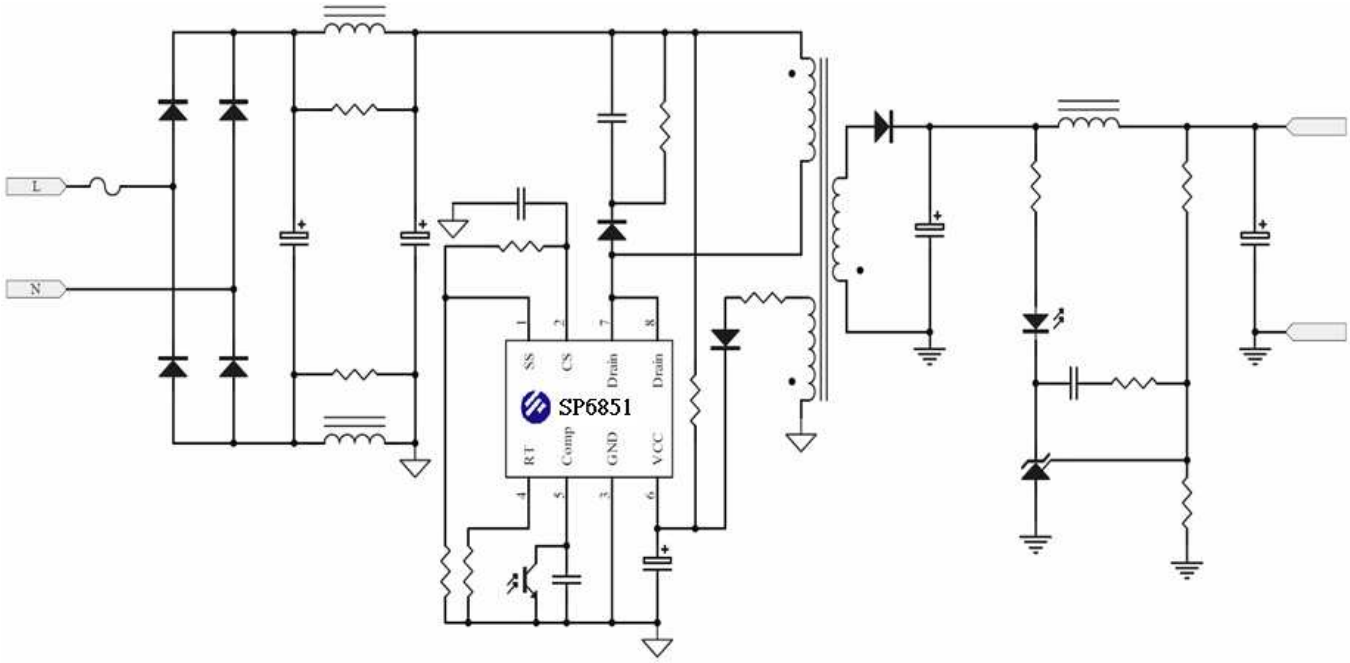
PIN CONFIGURATION
DIP-8P



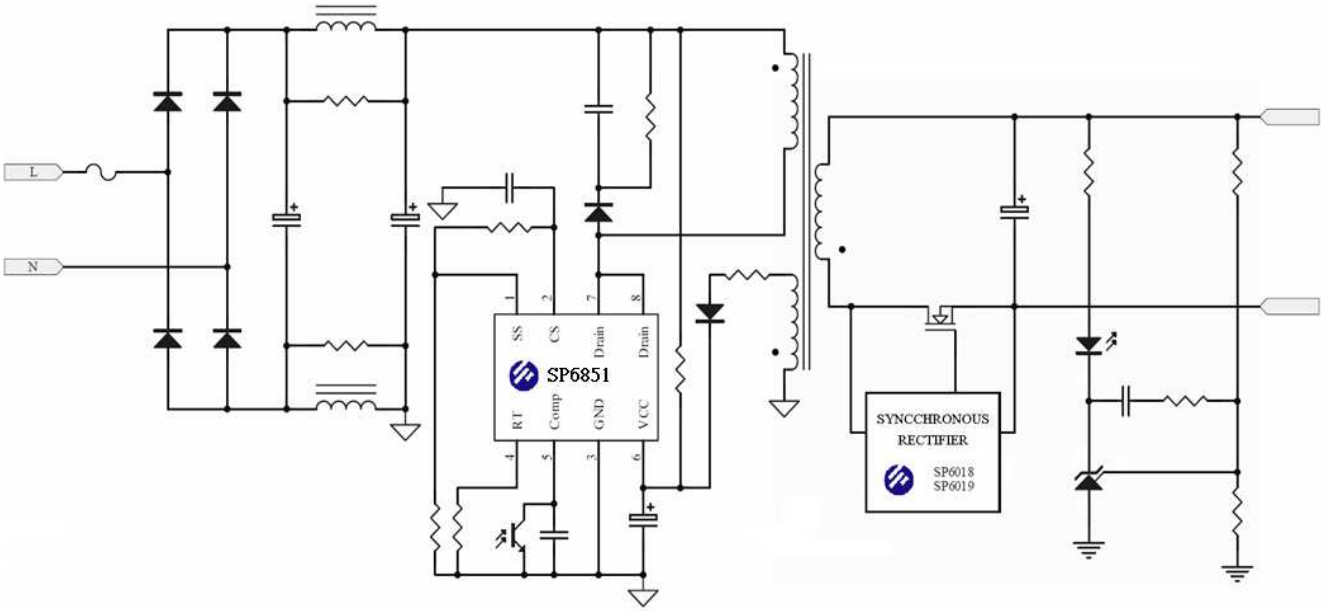
PART MARKING
DIP-8P

A : Lot Code
B : Date Code

TYPICAL APPLCATION CIRCUIT



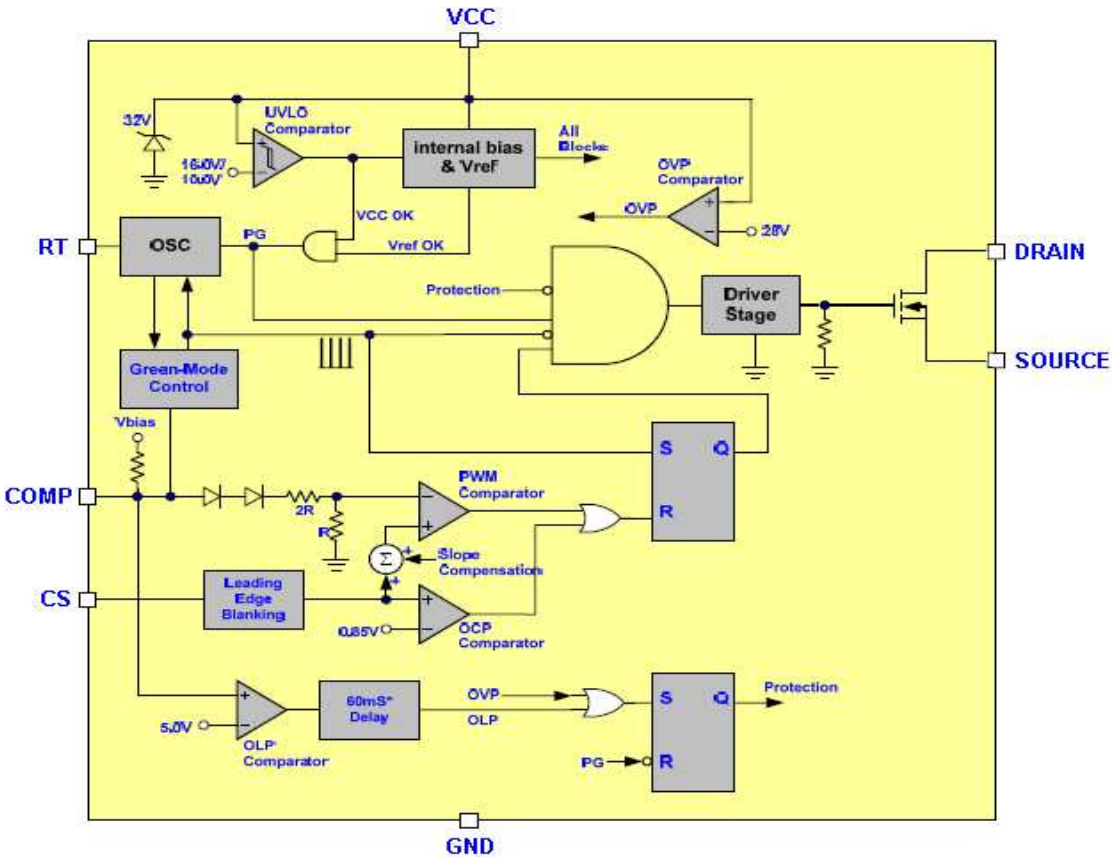
TYPICAL APPLCATION CIRCUIT for HIGH EFFICIENCY SMPS



PIN DESCRIPTION

Pin	Symbol	Description
1	Source	Power MOSFET Source
2	CS	Current sense. This pin senses the voltage across a resistor, to control PWM output. This pin also provides current amplitude information for current-mode control.
3	GND	Ground
4	RT	This current is used to charge an internal capacitor, to determine the switching frequency.
5	COMP	Voltage feedback. The pin provides the output voltage regulation signal, it provides feedback to the internal PWM comparator, so that the PWM comparator can control the duty cycle.
6	VCC	Supply Voltage in
7	Drain	Power MOSFET Drain
8	Drain	Power MOSFET Drain

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6851D8TG	DIP-8P	SP6851I
SP6851D8TGB	DIP-8P	SP6851I

※ SP6851D8TG : Tube ; Pb – Free

※ SP6851D8TGB : Tube ; Pb – Free ; Halogen – Free

ABSOULTE MAXIMUM RATINGS (T_A=25℃, unless otherwise specified.)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	36	V
$V_{COMP\,/\,RT\,/\,CS}$	COMP / RT / CS Voltage	-0.3 ~ 7.0	V
V_{DS}	MOSFET Breakdown Voltage	650	V
P_D	Power Dissipation @ T_A=85℃ (*)	0.3	W
ESD	Human Body Model	4	KV
	Machine Model	300	V
EAS	Single Pulse Avalanche Energy	49	mJ
T_{ope}	Operating Ambient Temperature	-40 ~ 85	℃
T_J	Operating Junction Temperature Range	-40 ~ 150	℃
T_{STG}	Storage Temperature Range	-40 ~ 150	℃
$R_{\Theta JC}$	Thermal Resistance Junction – Case (*)	95	℃/W

(*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.

ELECTRICAL CHARACTERISTICS

(T_A=25℃, V_{CC}=15V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage (Vcc Pin)						
Istt	Startup Current			10	20	uA
Iop	Operating Current	VCOMP = 0V		2.7	4	mA
		VCOMP = 3V		2.4		mA
		Protection tripped (OLP, OVP)		1.0		mA
UVLO (off)	Min. Operating Voltage		9.0	10.0	11.0	V
UVLO (on)	Start Threshold Voltage		15.0	16.0	17.0	V
OVP Level	Over Voltage Protection		26	27	29.5	V
Voltage Feedback (Comp Pin)						
Isc	Short Circuit Current			1.25	2.2	mA
Vop	Open Loop Voltage			6		V
VTH(GM)	Green Mode Threshold VCOMP			2.35		V
Oscillator (RT Pin)						
FOSC	Frequency	RT=100KΩ	60.0	68.0	70.0	KHz
FOSC(GM)	Green Mode Frequency	Fs=65.0KHz		22		KHz
Fdt	Frequency Variation versus Temp. Deviation	(-40°C ~105°C)			3	%
Fdv	Frequency Variation versus VCC Deviation	(VCC=11V-22V)			1	%
Current Sensing (CS Pin)						
Vcs(off)	Maximum Input Voltage		0.8	0.85	0.9	V
TLEDD	Leading Edge Blanking Time			280		nS
Zcs	Input impedance		1			MΩ
TPD	Delay to Output			100		nS
MOSFET						
DC (Max)	Maximum Duty Cycle		70	75	80	%
DC (Min)	Minimum Duty Cycle			0		%
VDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250uA	650			V
IDSS	Drain-Source Leakage Current	VGS=0V, VDS=550V			10	uA
RDS(ON)	On-State Resistance	VGS=10V, ID=1A			4.95	Ω
VSD	Forward On Voltage	VGS=0V, IS=1.4A			1.5	V
Co	Output capacitance	VGS=0V, VDS=25V, f=1.0MHz		27		pF
Tr	Rising Time			50	200	nS
Tf	Falling Time			30	120	nS
OLP (Over Load Protection)						
TLOLP	OLP Trip Level			5.0		V
TDOLP	OLP Delay Time (note)			60		mS

Note: The OLP delay time is proportional to the period of switching cycle. So that, the lower RT value will set the higher switching frequency and the shorter OLP delay time.

PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)

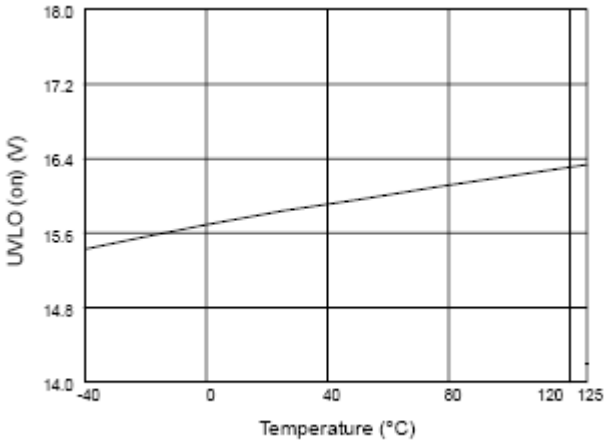


Fig. 1 UVLO (on) vs. Temperature

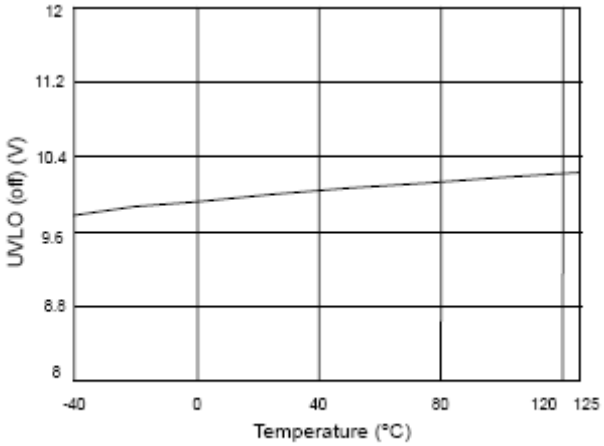


Fig. 2 UVLO (off) vs. Temperature

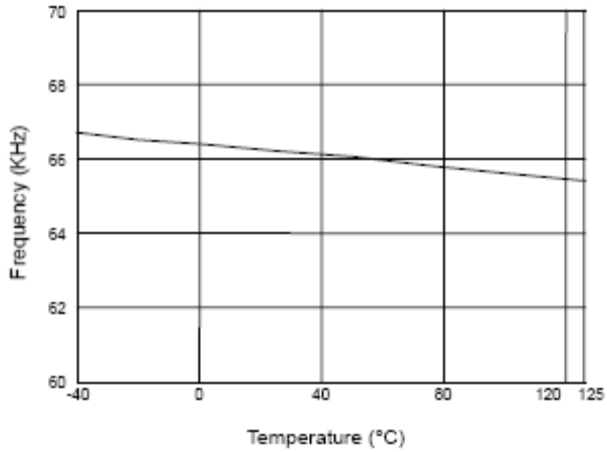


Fig. 3 Frequency vs. Temperature

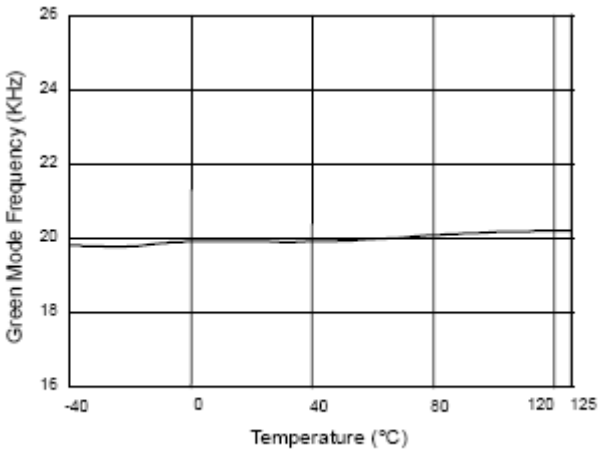


Fig. 4 Green Mode Frequency vs. Temperature

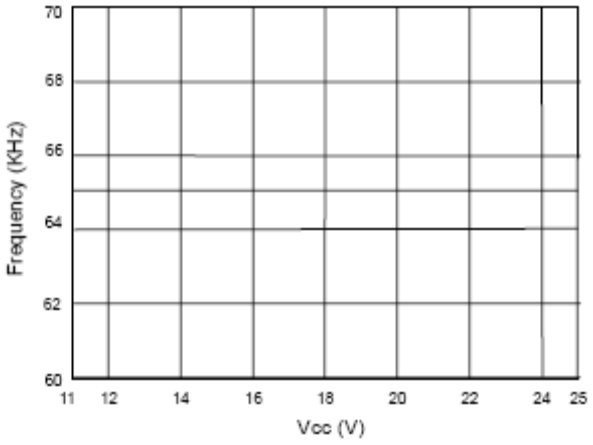


Fig. 5 Frequency vs. Vcc

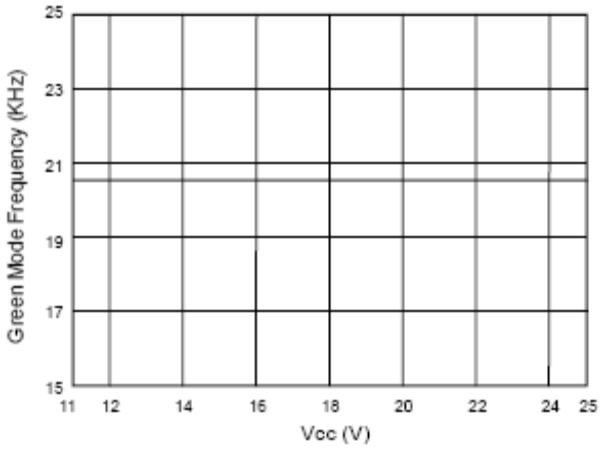


Fig. 6 Green Mode Frequency vs. Vcc

PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)

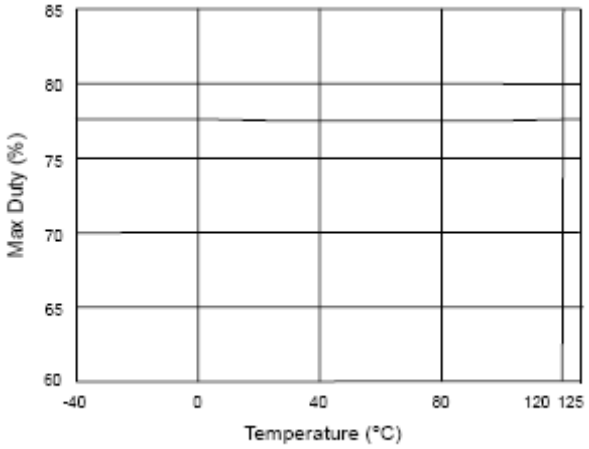


Fig. 7 Max Duty vs. Temperature

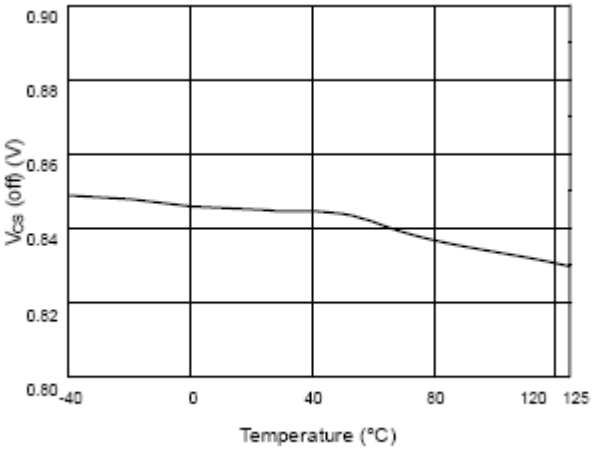


Fig. 8 V_{CS} (off) vs. Temperature

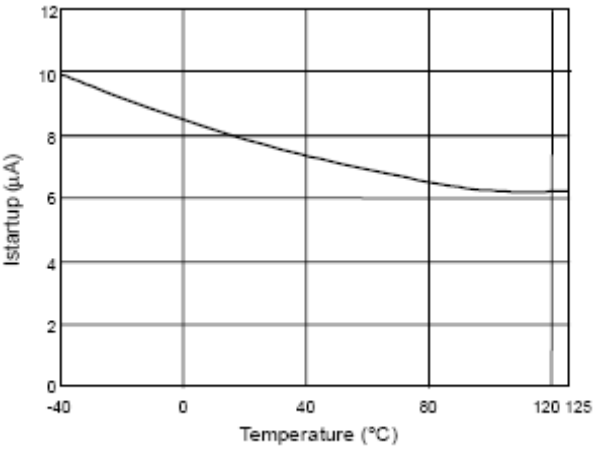


Fig. 9 Startup Current (Istartup) vs. Temperature

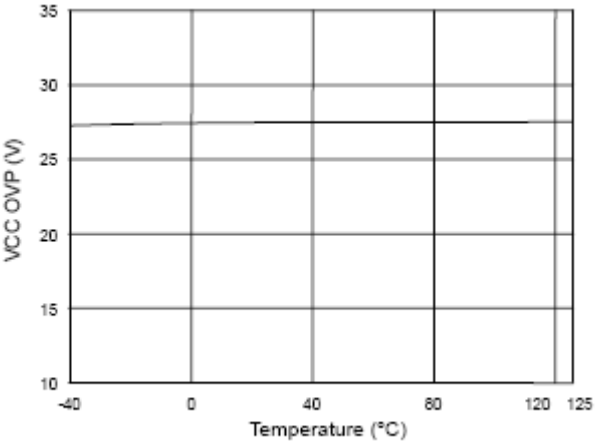


Fig. 10 VCC OVP vs. Temperature

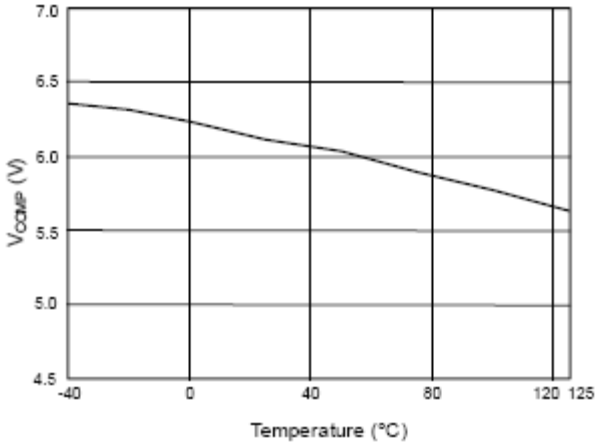


Fig. 11 V_{COMP} open loop voltage vs. Temperature

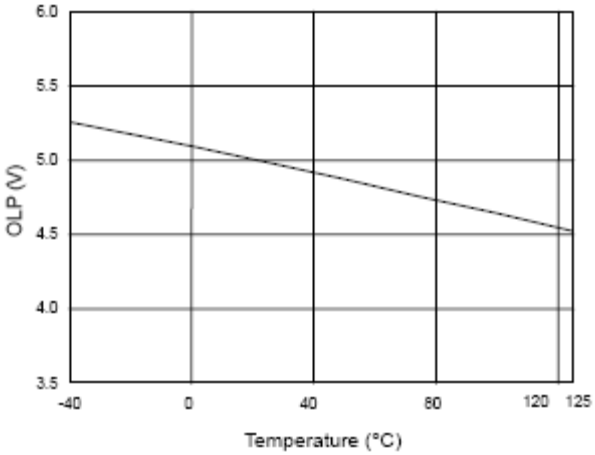
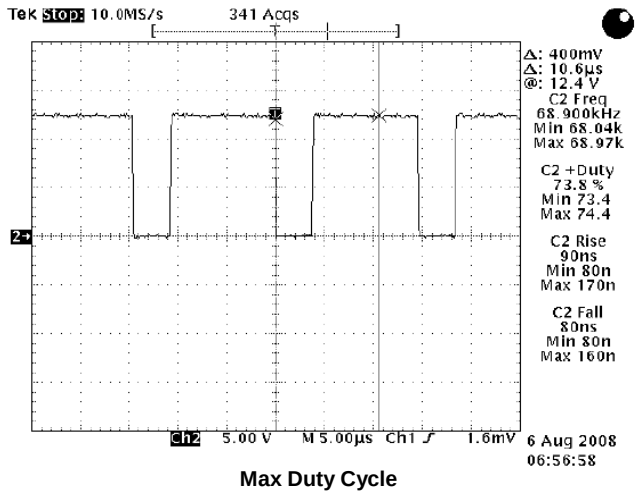
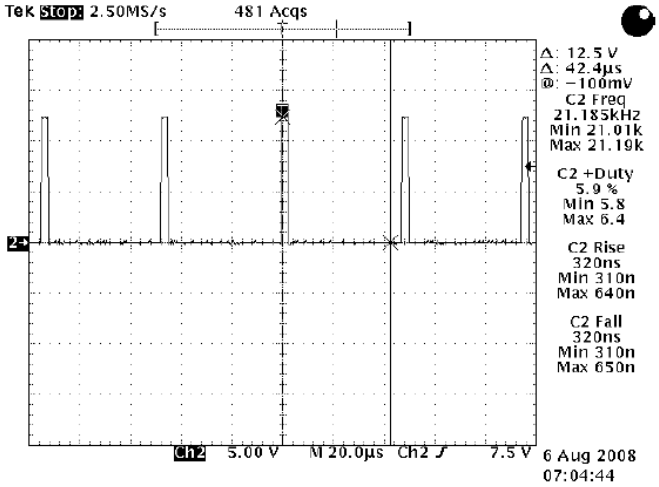


Fig. 12 OLP-Trip Level vs. Temperature

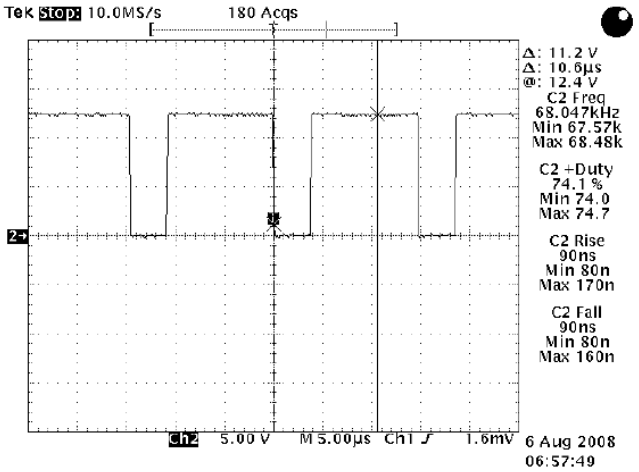
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



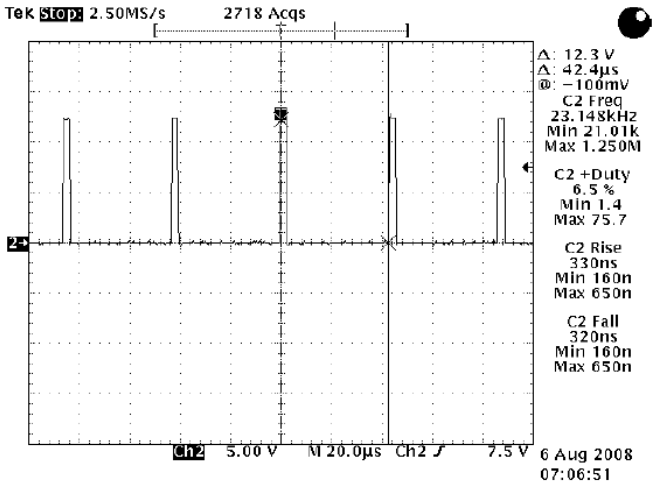
Max Duty Cycle



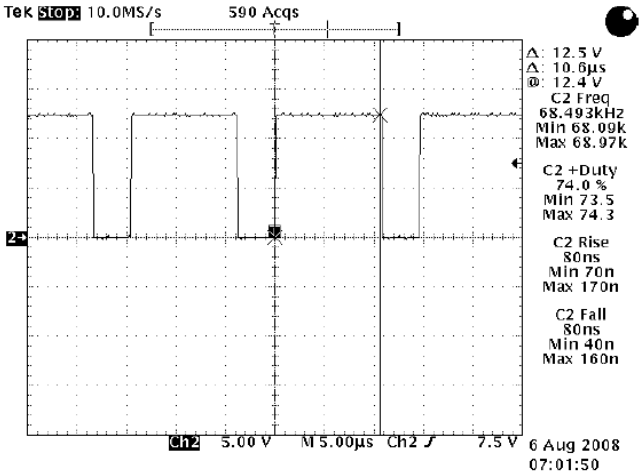
Min Duty Cycle



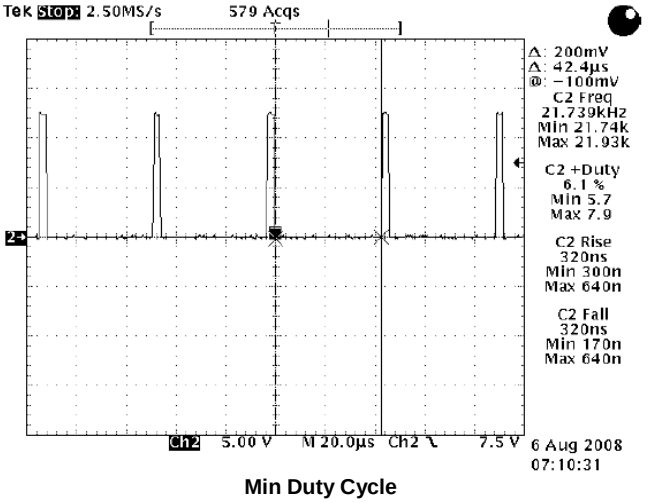
Max Duty Cycle



Min Duty Cycle

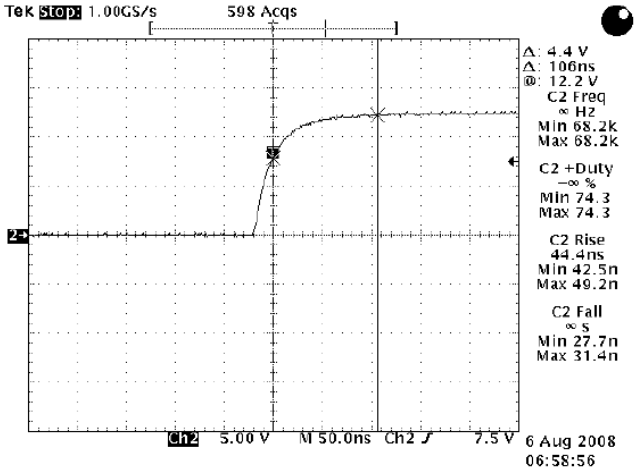


Max Duty Cycle

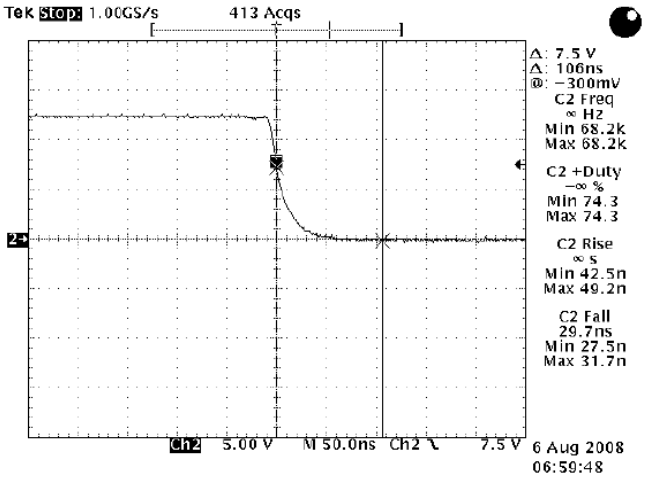


Min Duty Cycle

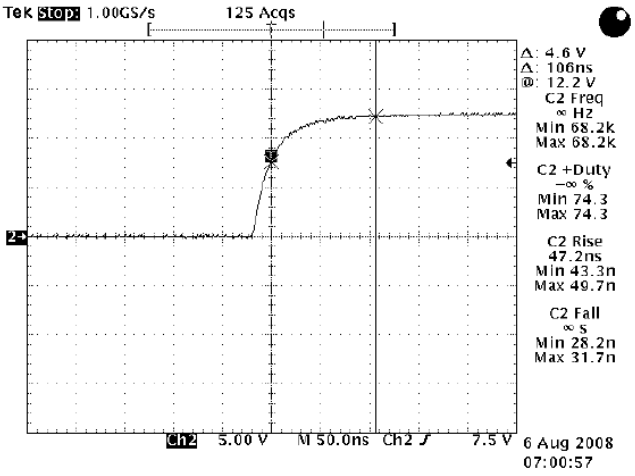
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



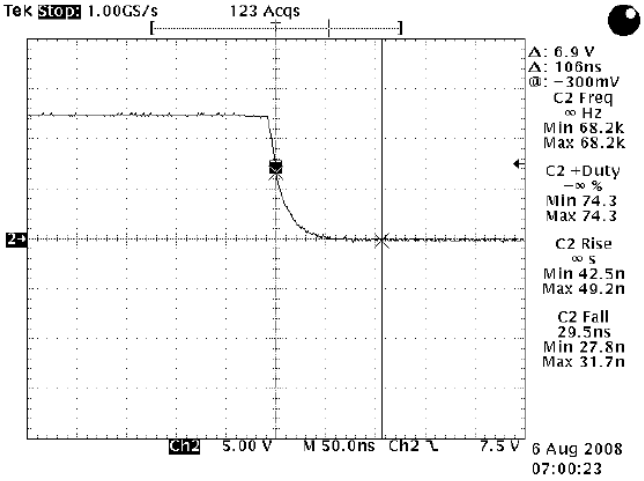
Rising Time Load



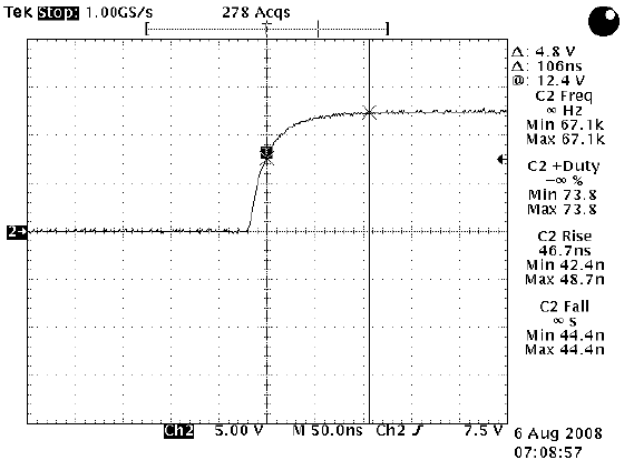
Falling Time Load



Rising Time Load



Falling Time Load



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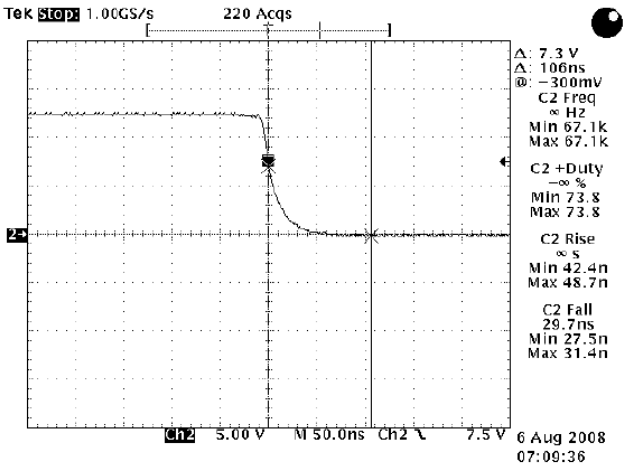
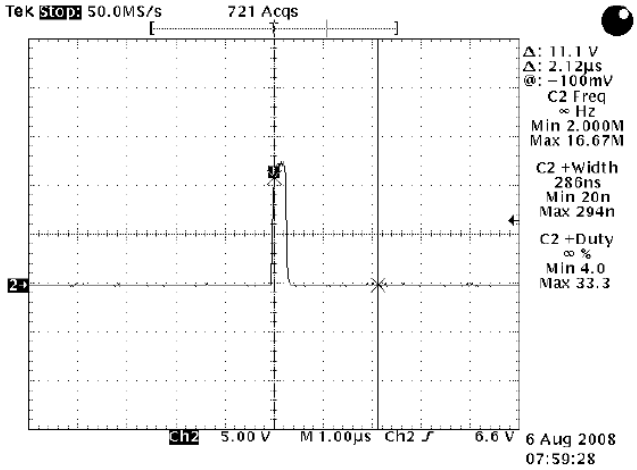
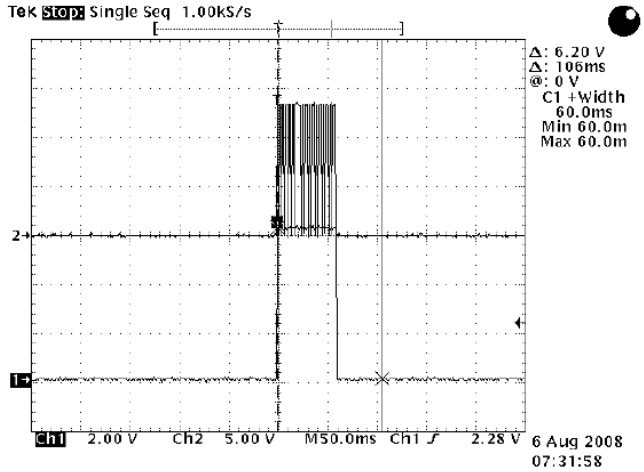


Falling Time Load

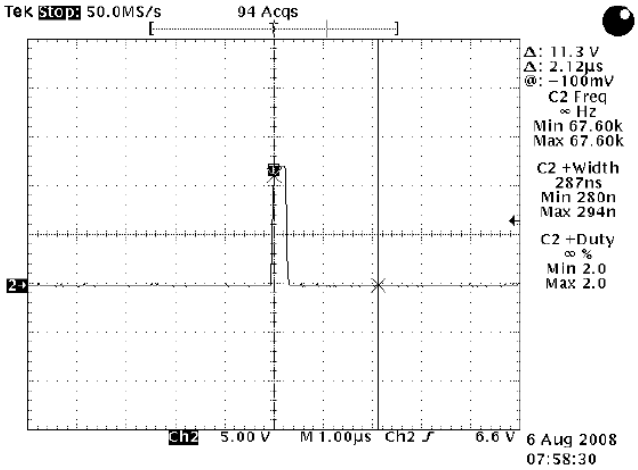
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



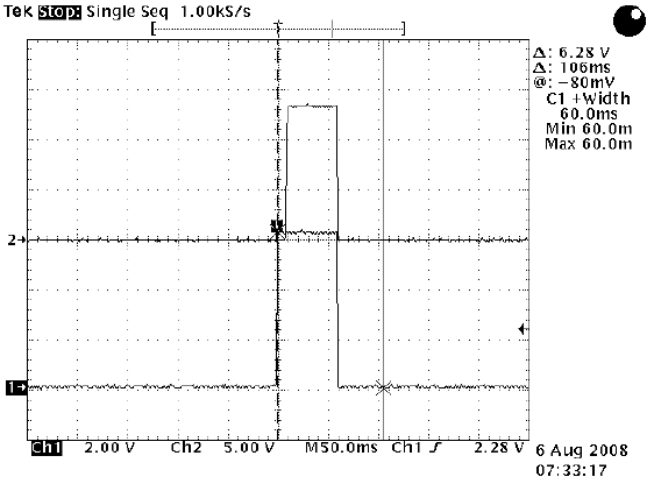
Leading Edge Blanking Time



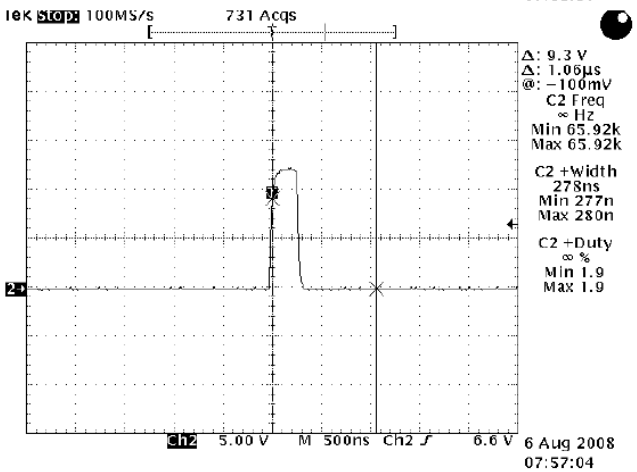
OLP Delay Time



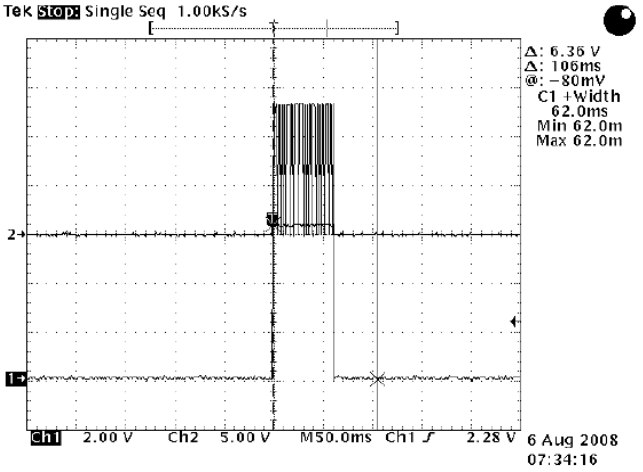
Leading Edge Blanking Time



OLP Delay Time

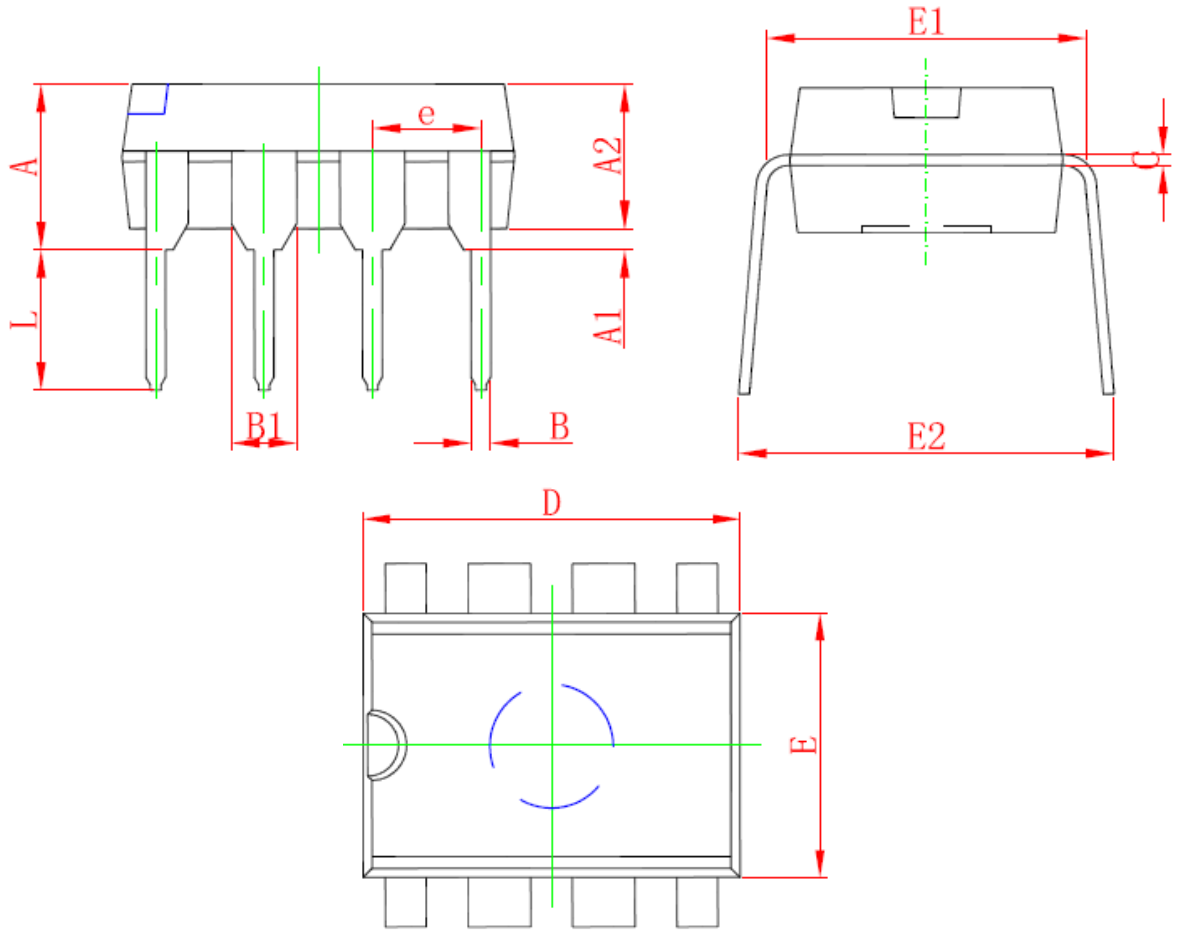


Leading Edge Blanking Time



OLP Delay Time

DIP- 8P PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

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