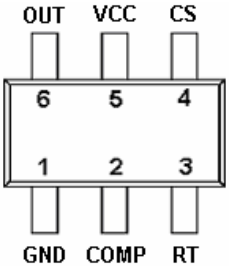
SP6853
Green-Mode PWM Controller

DESCRIPTION
The SP6853 is a low cost , low startup current , current mode PWM controller with green-mode power-saving operation. 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 SP6853 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.
SP6853 is available by SOT-23-6L / DIP-8P packages.

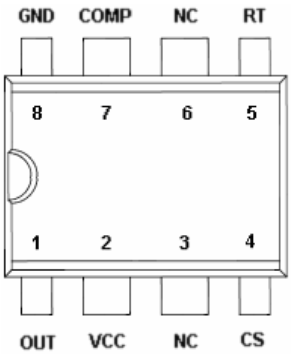
APPLICATIONS
- AC/DC Switching Power Adaptor
- Battery Charger
- PC 5V Standby Power.
- Open-Frame Switching Power Supply

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
- LEB (Leading-Edge Blanking) on CS Pin
- 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
- 300mA Driving Capability
-

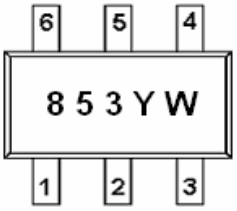
PIN CONFIGURATION
SOT-23-6L



DIP-8P



PART MARKING
SOT-23-6L

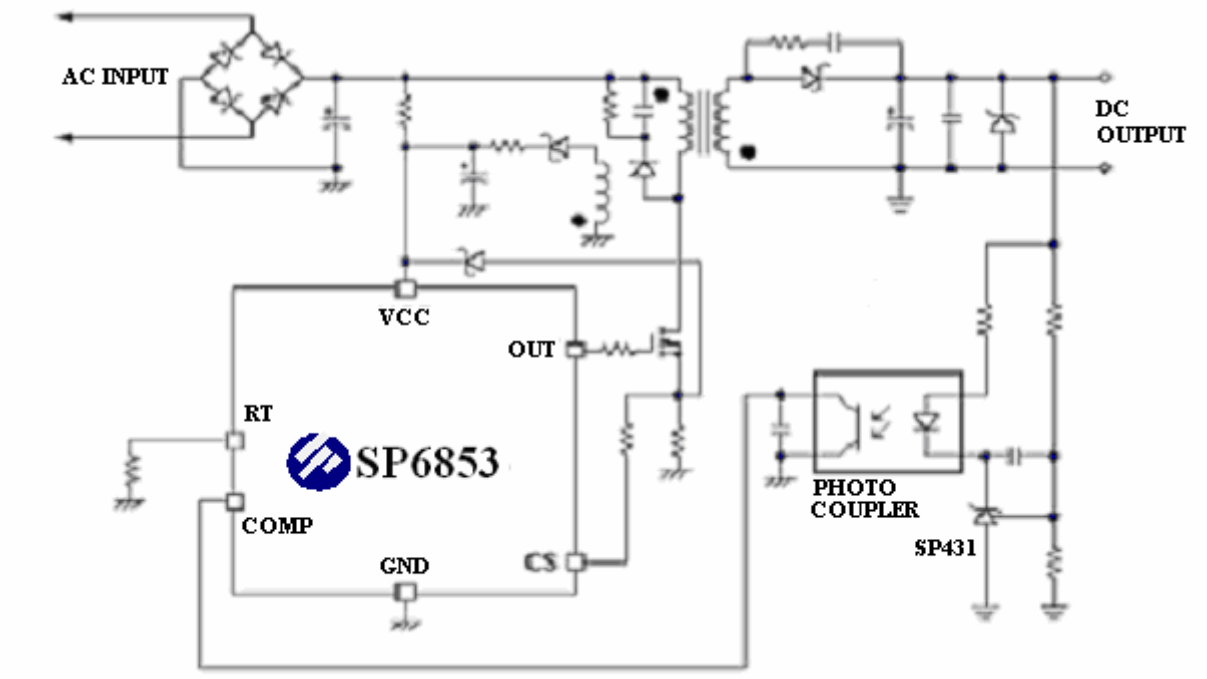


Y : Year Code
W : Week Code

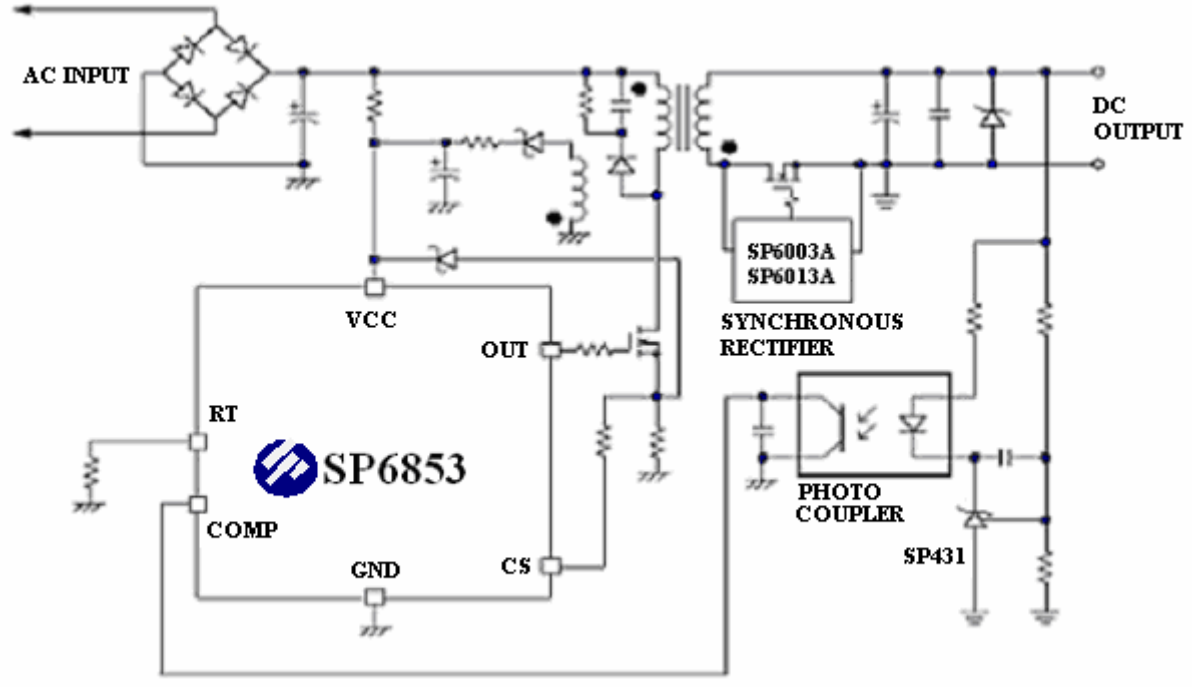
DIP-8P

A : Lot Code
B : Date Code

TYPICAL APPLCATION CIRCUIT



TYPICAL APPLCATION CIRCUIT (High Efficiency SMPS + Synchronous Rectifier)



PIN DESCRIPTION

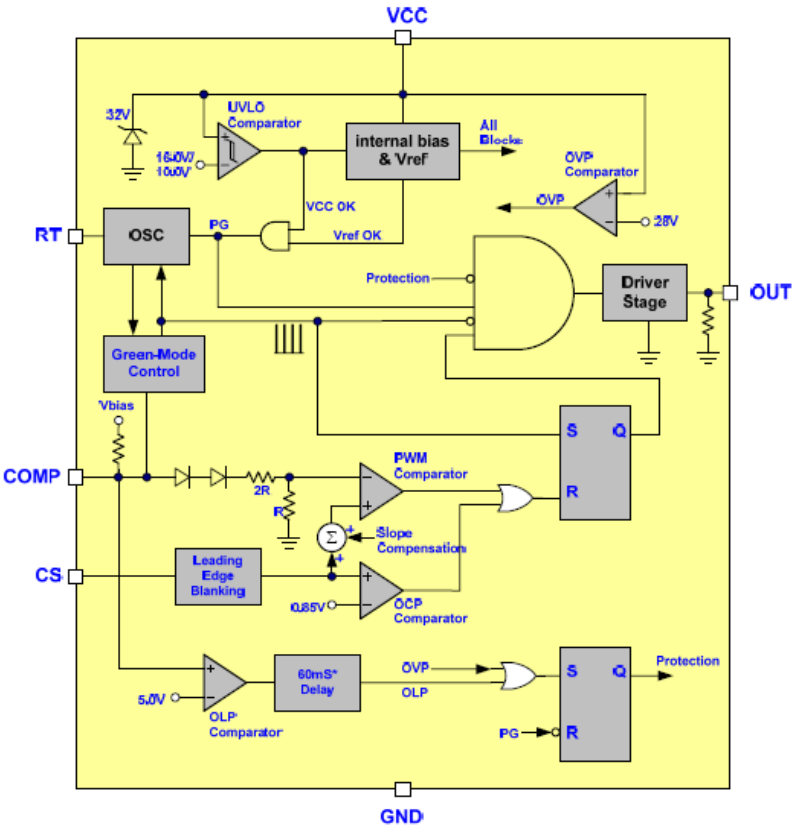
SP6853D8TG

Pin	Symbol	Description
1	OUT	Gate driver output to drive the external MOSFET
2	VCC	Supply Voltage in
3	NC	Unconnected pin
4	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.
5	RT	This current is used to charge an internal capacitor, to determine the switching frequency.
6	NC	Unconnected pin
7	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.
8	GND	Ground

SP6853S26RG

Pin	Symbol	Description
1	GND	Ground
2	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
3	RT	This current is used to charge an internal capacitor, to determine the switching frequency.
4	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
5	VCC	Supply Voltage in
6	OUT	Gate driver output to drive the external MOSFET

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6853D8TGB	DIP-8P	SP6853**I**
SP6853S26RGB	SOT-23-6L	853YW

※ SP6853D8TG : Tube ; Pb – Free ; Halogen-Free

※ SP6853S26RG : Tape Reel ; 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
P_D	Power Dissipation @ T_A=85℃ (*)		0.3	W
ESD	Human Body Model		4	KV
	Machine Model		300	V
T_{ope}	Operating Ambient Temperature		-40 ~ 85	℃
T_J	Operating Junction Temperature Range		-40 ~ 150	℃
T_{STG}	Storage Temperature Range		-40 ~ 150	℃
T_{LEAD}	Pb-Free Lead Soldering Temperature for 5 sec.		260	℃
$R_{\Theta JC}$	Thermal Resistance Junction – Case (*)	SOT-23-6L	210	℃/W
		DIP-8P	95	

(*) 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		24	26	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	75.0	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-25V)			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
Gate Driver Output (OUT Pin)						
DC (Max)	Maximum Duty Cycle		70	75	80	%
DC (Min)	Minimum Duty Cycle			0		%
VOL	Output Low Level	VCC=15V, Io=20mA			1	V
VOH	Output High Level	VCC=15V, Io=20mA	8			V
Tr	Rising Time	Load Cap=1000pF		50	200	nS
Tf	Falling Time	Load Cap=1000pF		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.)

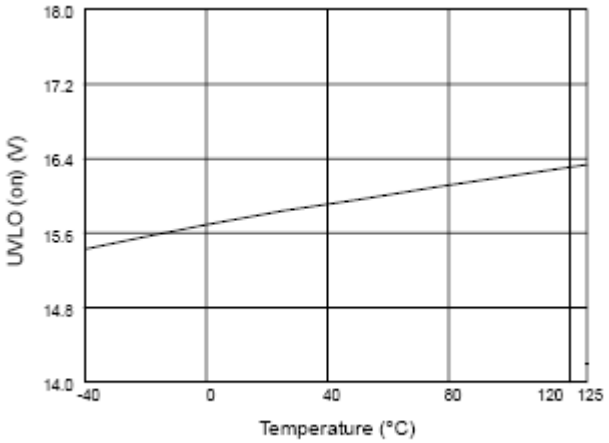


Fig. 1 UVLO (on) vs. Temperature

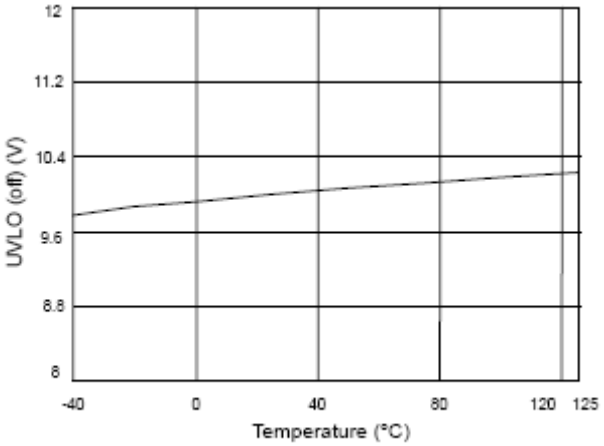


Fig. 2 UVLO (off) vs. Temperature

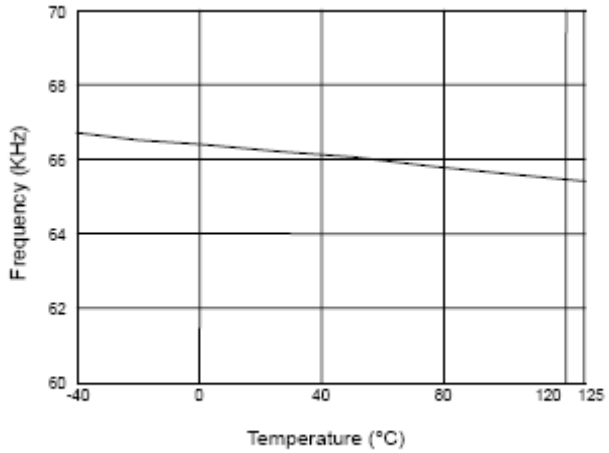


Fig. 3 Frequency vs. Temperature

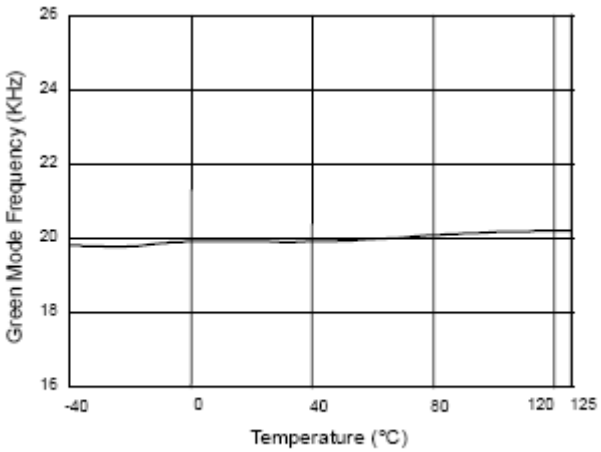


Fig. 4 Green Mode Frequency vs. Temperature

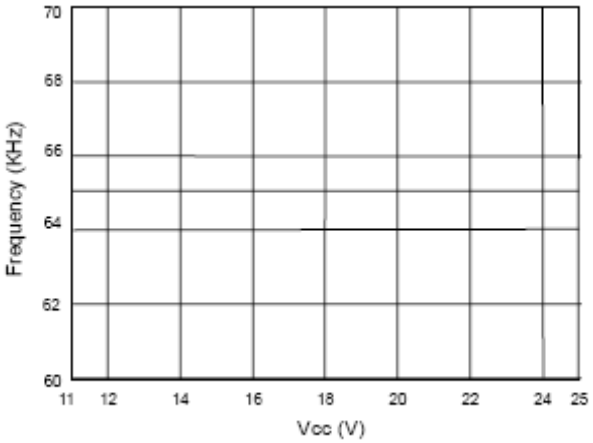


Fig. 5 Frequency vs. Vcc

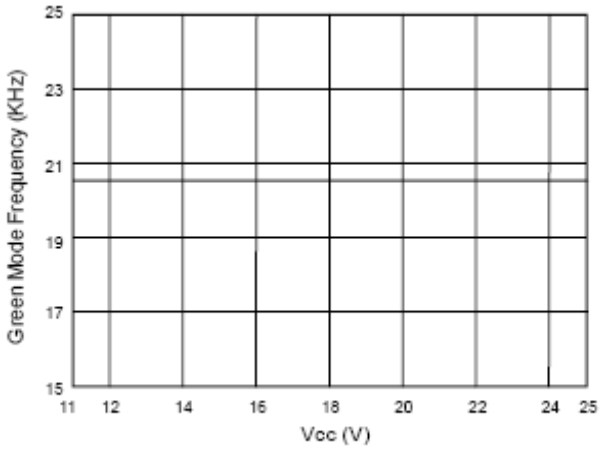


Fig. 6 Green Mode Frequency vs. Vcc

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

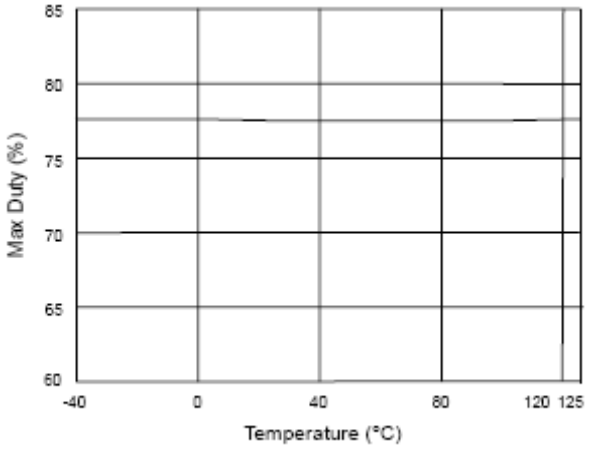


Fig. 7 Max Duty vs. Temperature

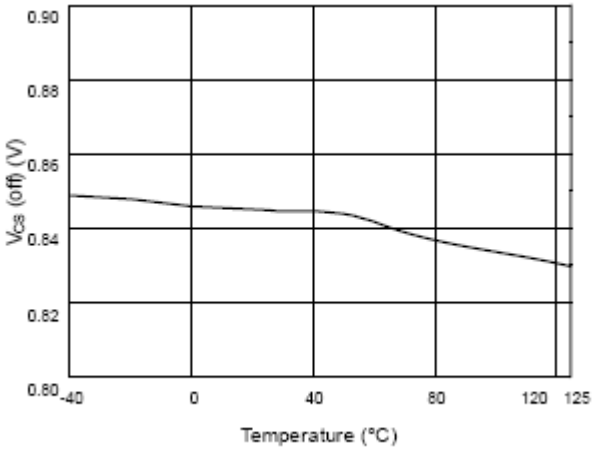


Fig. 8 V_{CS} (off) vs. Temperature

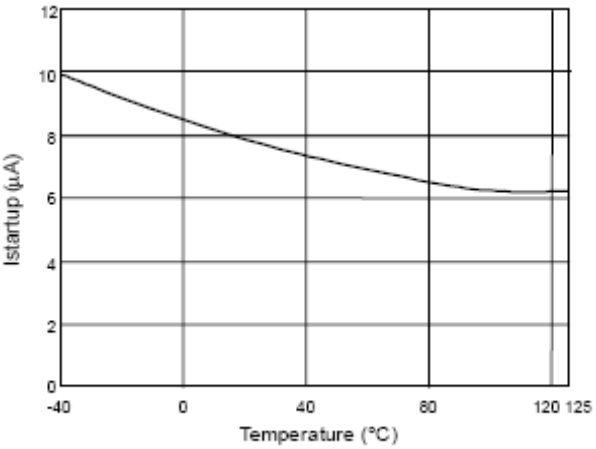


Fig. 9 Startup Current (Istartup) vs. Temperature

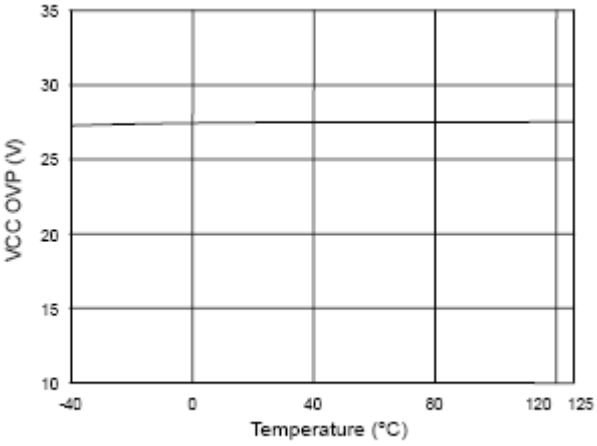


Fig. 10 VCC OVP vs. Temperature

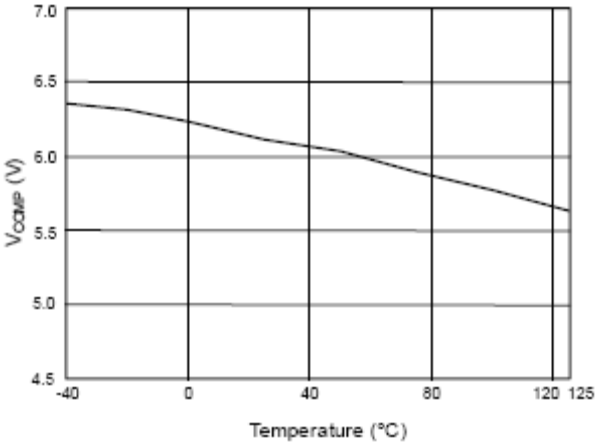


Fig. 11 V_{COMP} open loop voltage vs. Temperature

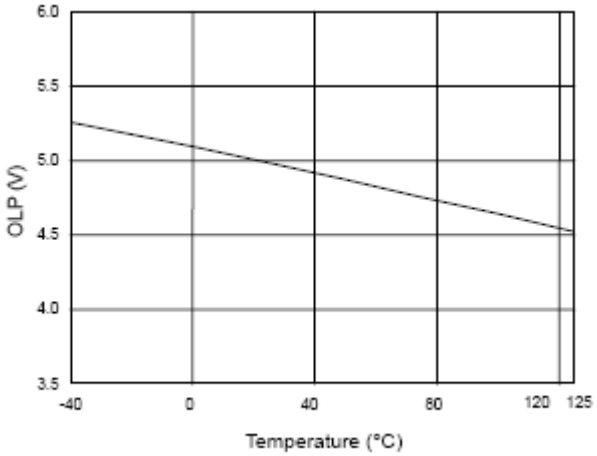
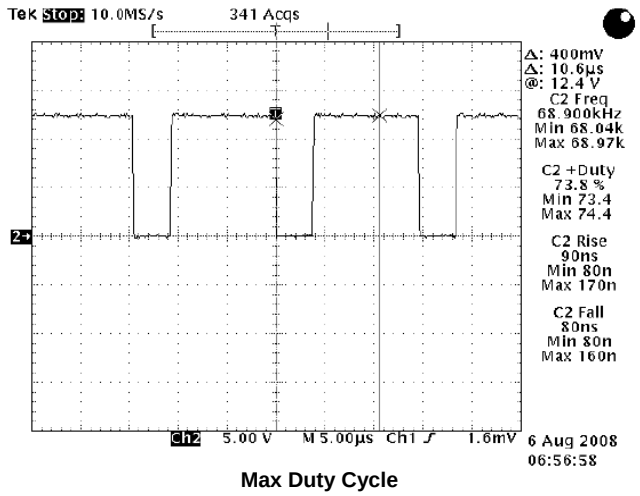
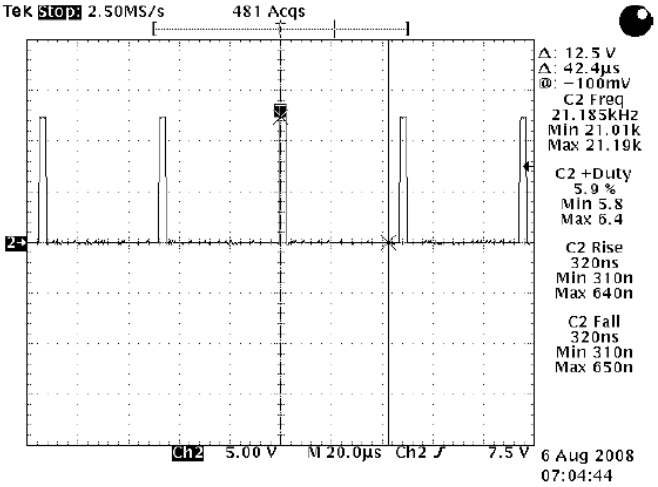


Fig. 12 OLP-Trip Level vs. Temperature

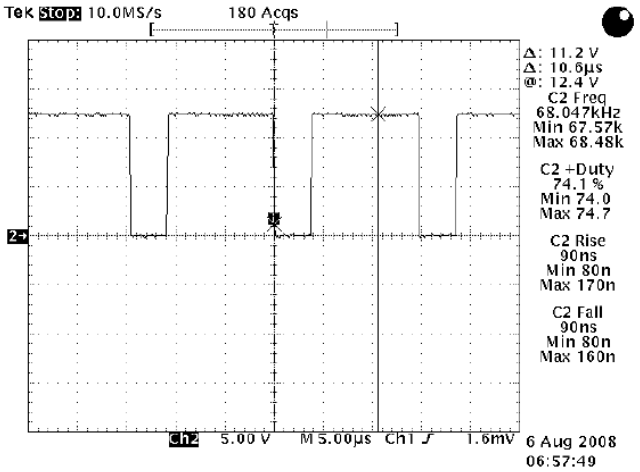
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



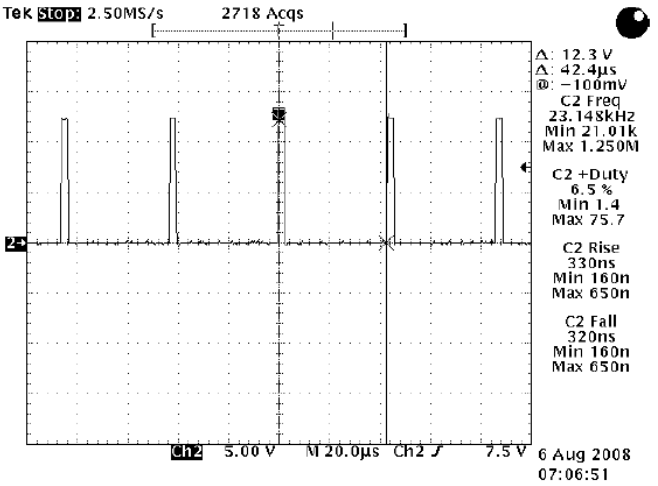
Max Duty Cycle



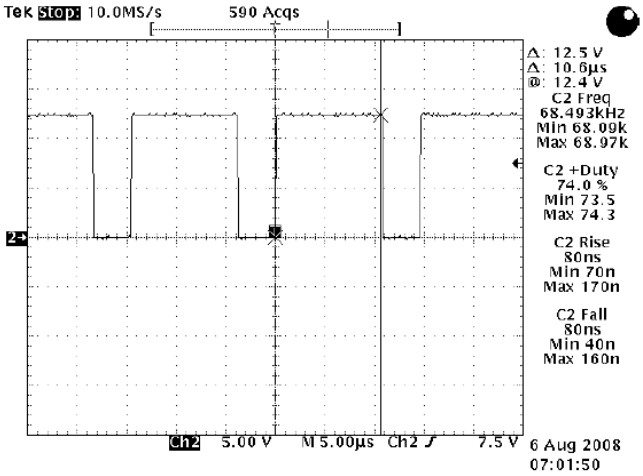
Min Duty Cycle



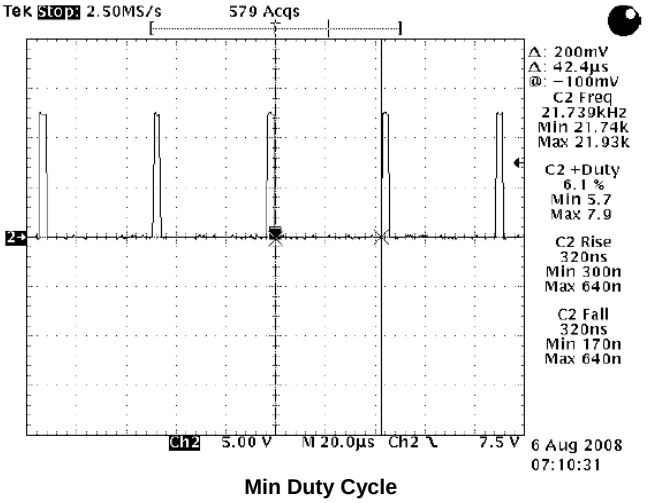
Max Duty Cycle



Min Duty Cycle

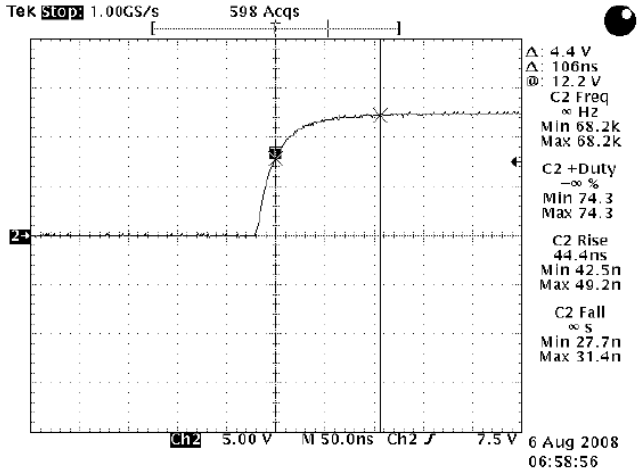


Max Duty Cycle

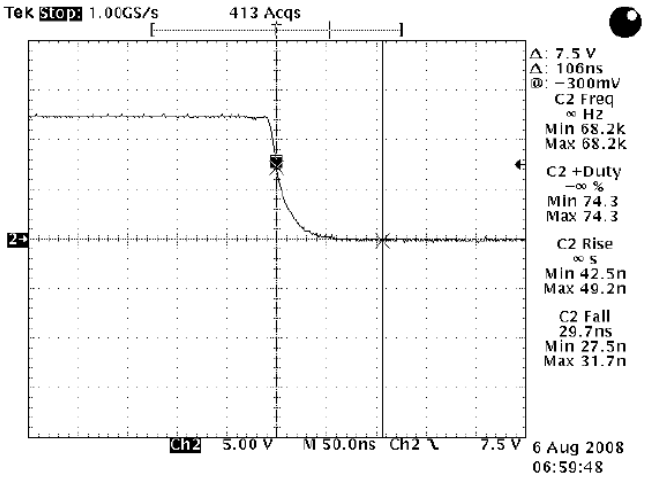


Min Duty Cycle

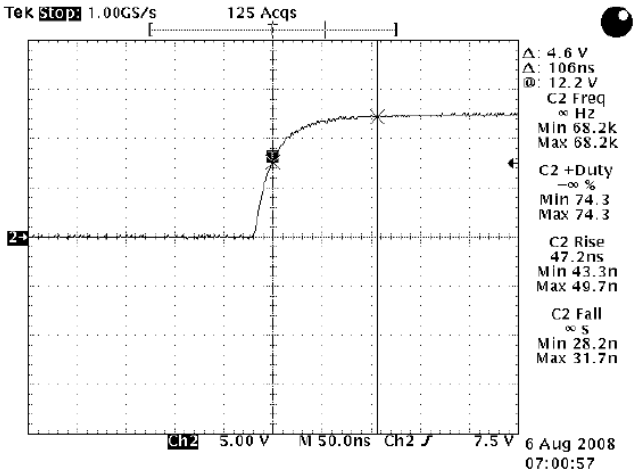
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



Rising Time Load



Falling Time Load



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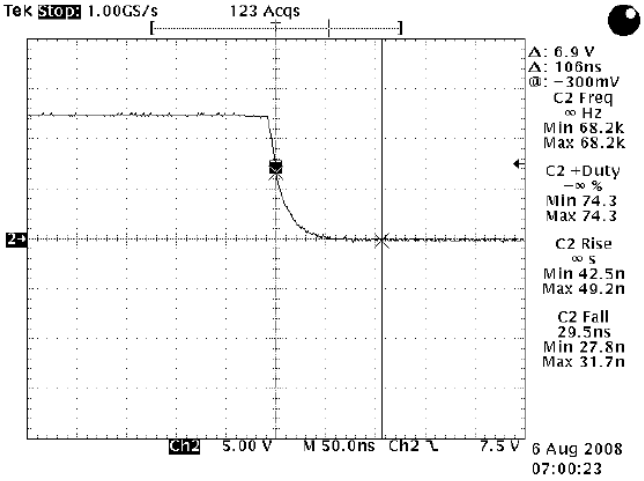
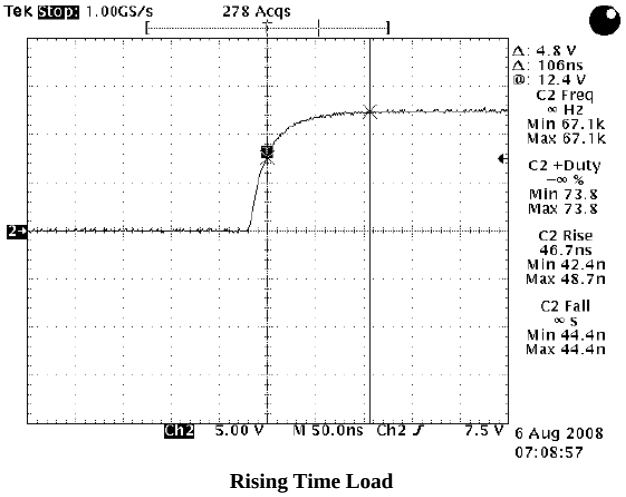


Falling Time Load



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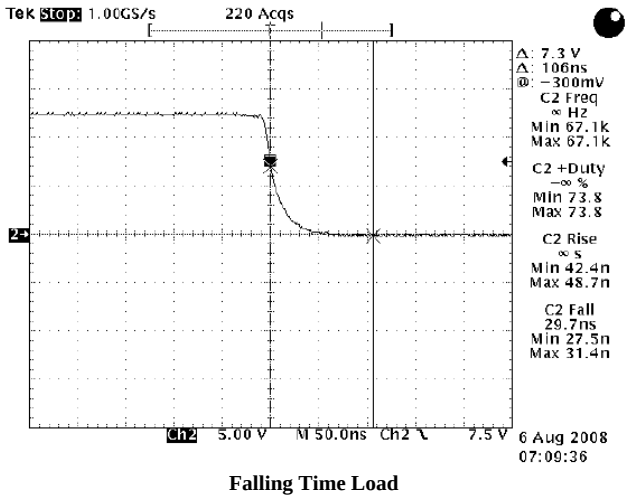
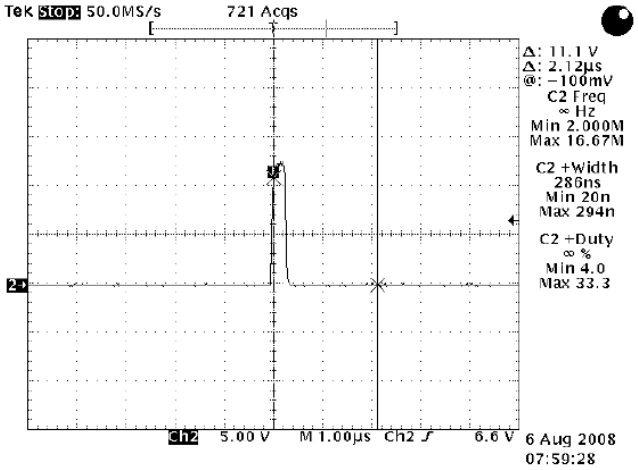
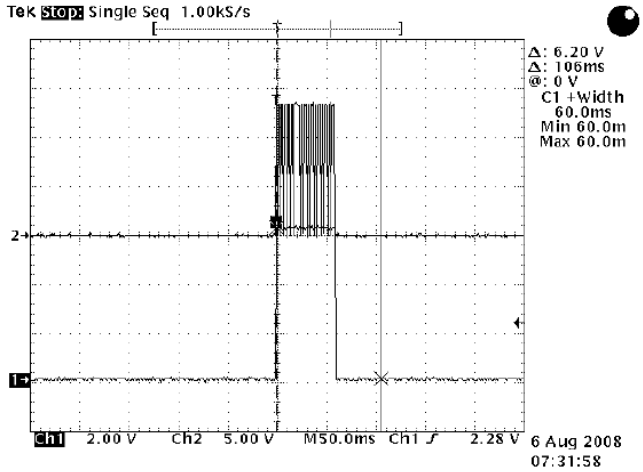


Falling Time Load

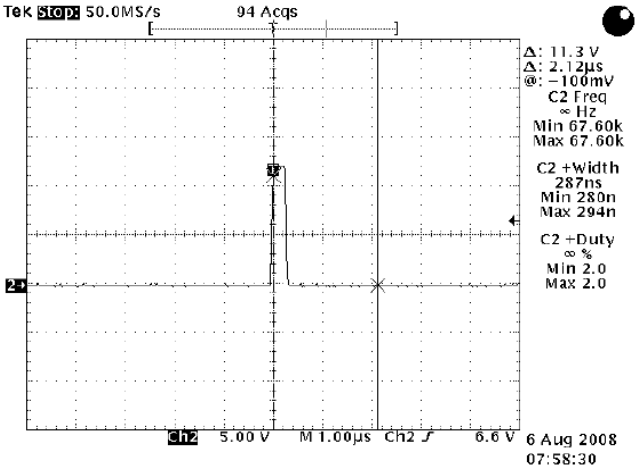
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



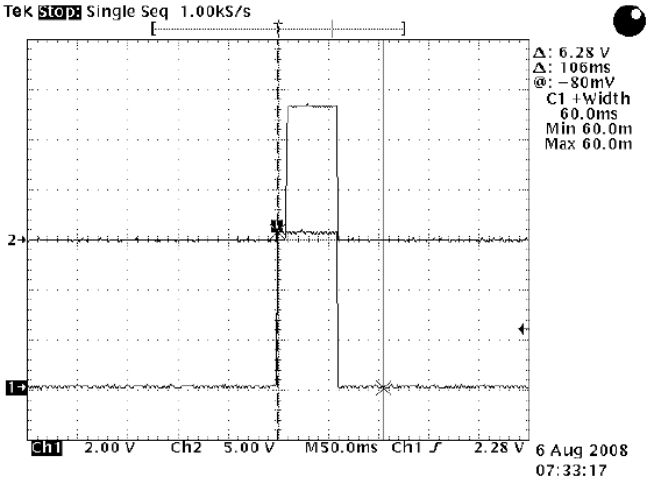
Leading Edge Blanking Time



OLP Delay Time



Leading Edge Blanking Time



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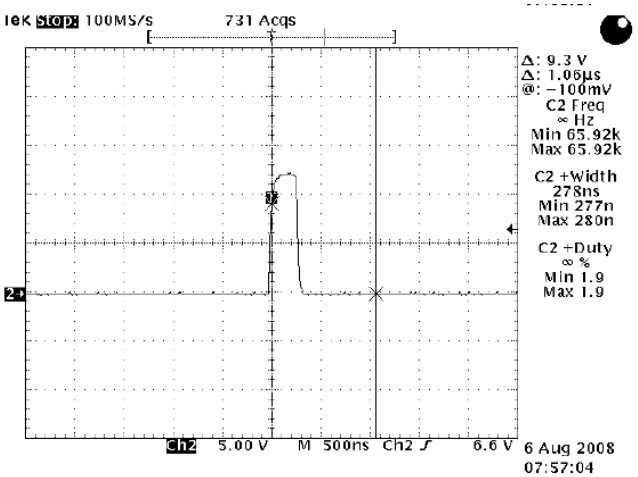
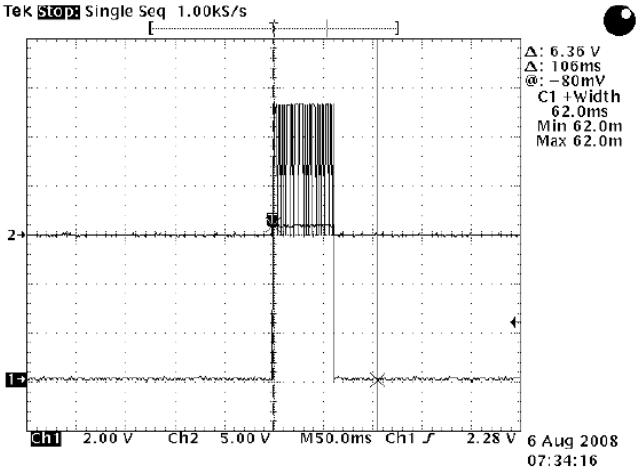
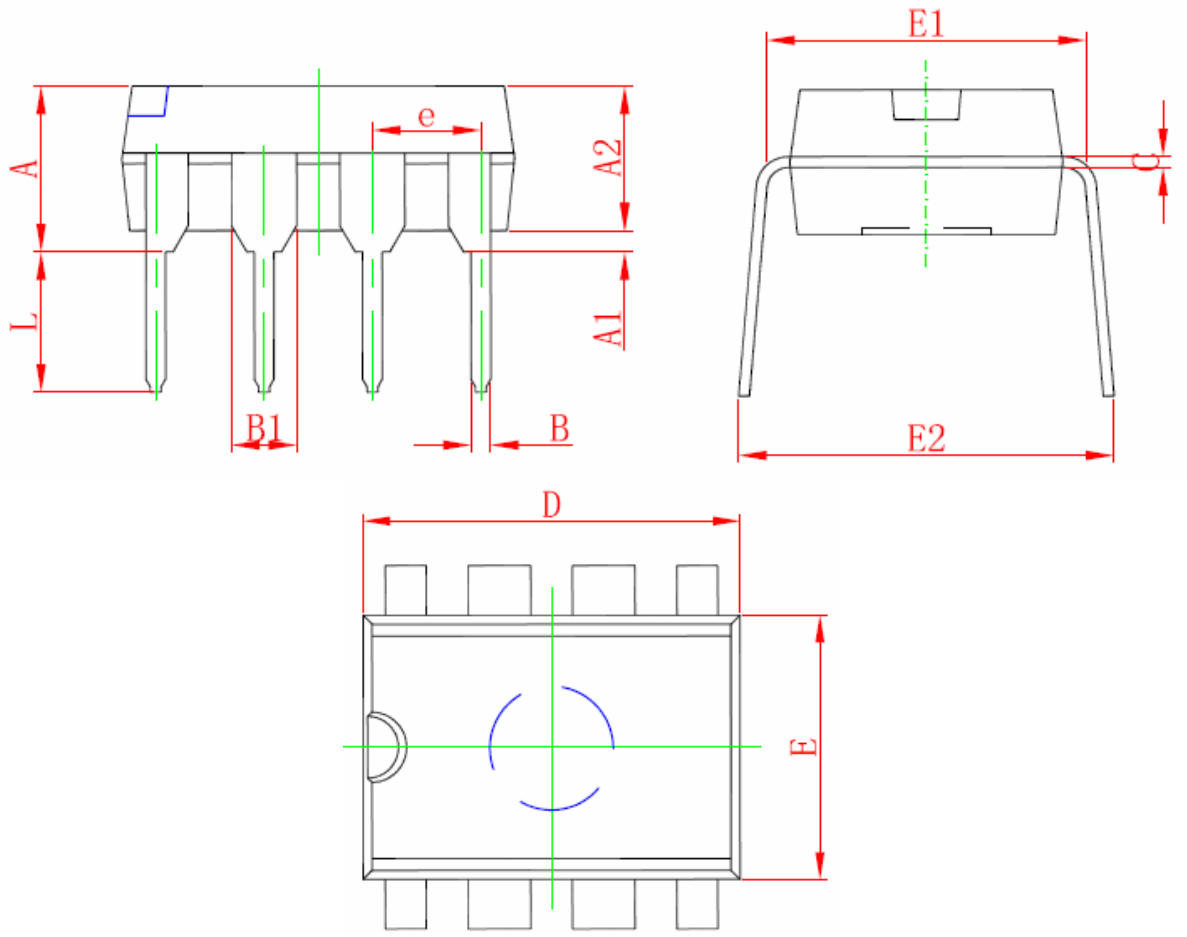


Leading Edge Blanking Time



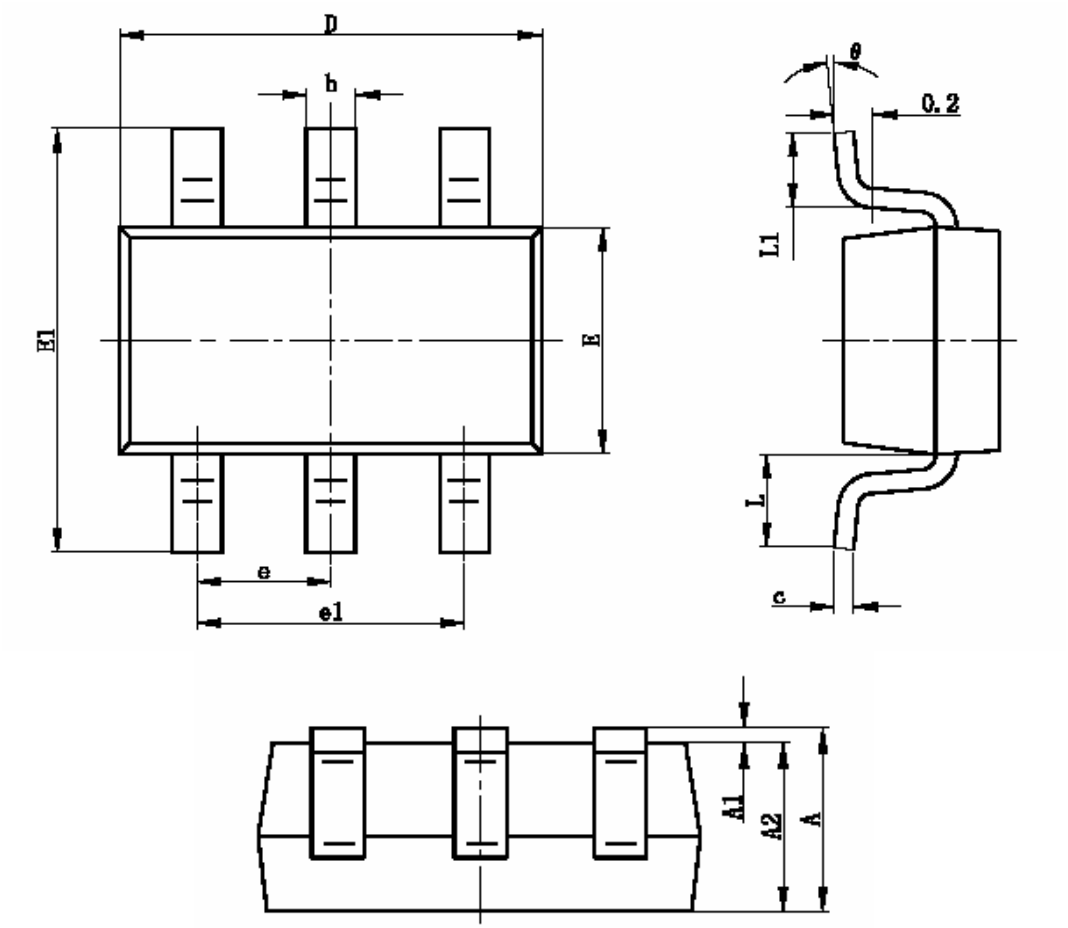
OLP Delay Time

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

SOT-23-6L PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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http://www.syncpower.com