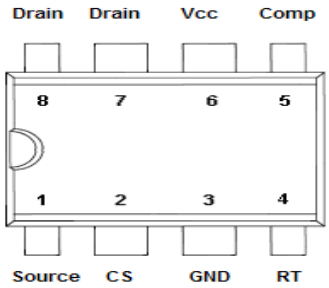
# SP6852
## Green-Mode Power Switch

### DESCRIPTION
The SP6852 is a low cost, low startup current, current mode PWM controller with green-mode power-saving operation. Built-in 700V 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 SP6852 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.
SP6852 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

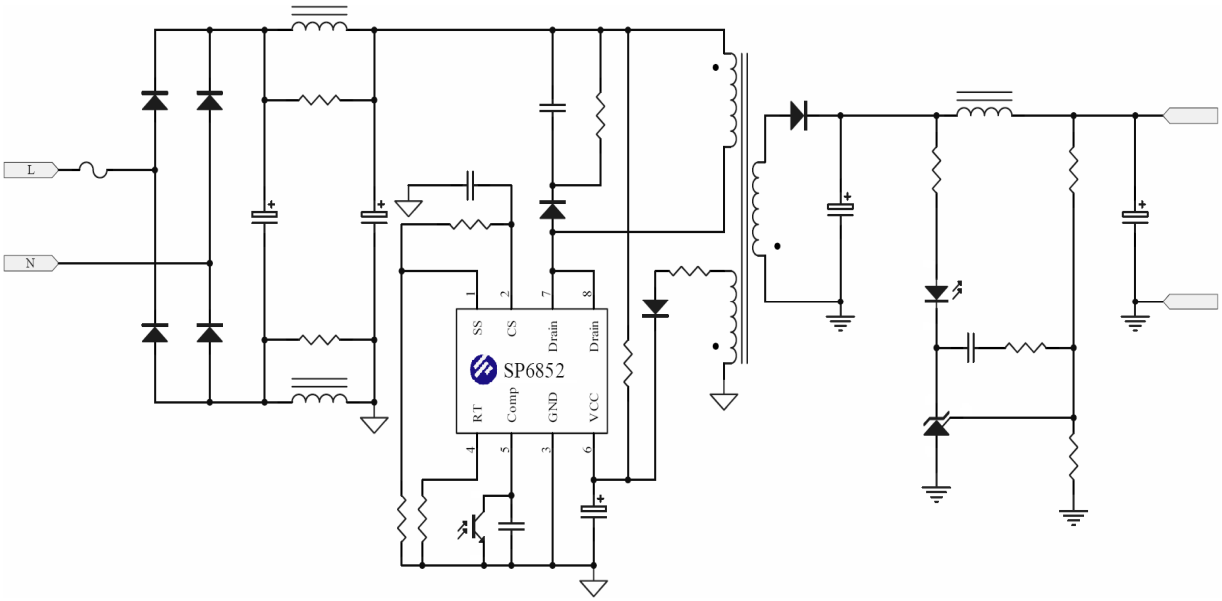
### PIN CONFIGURATION
**DIP-8P**



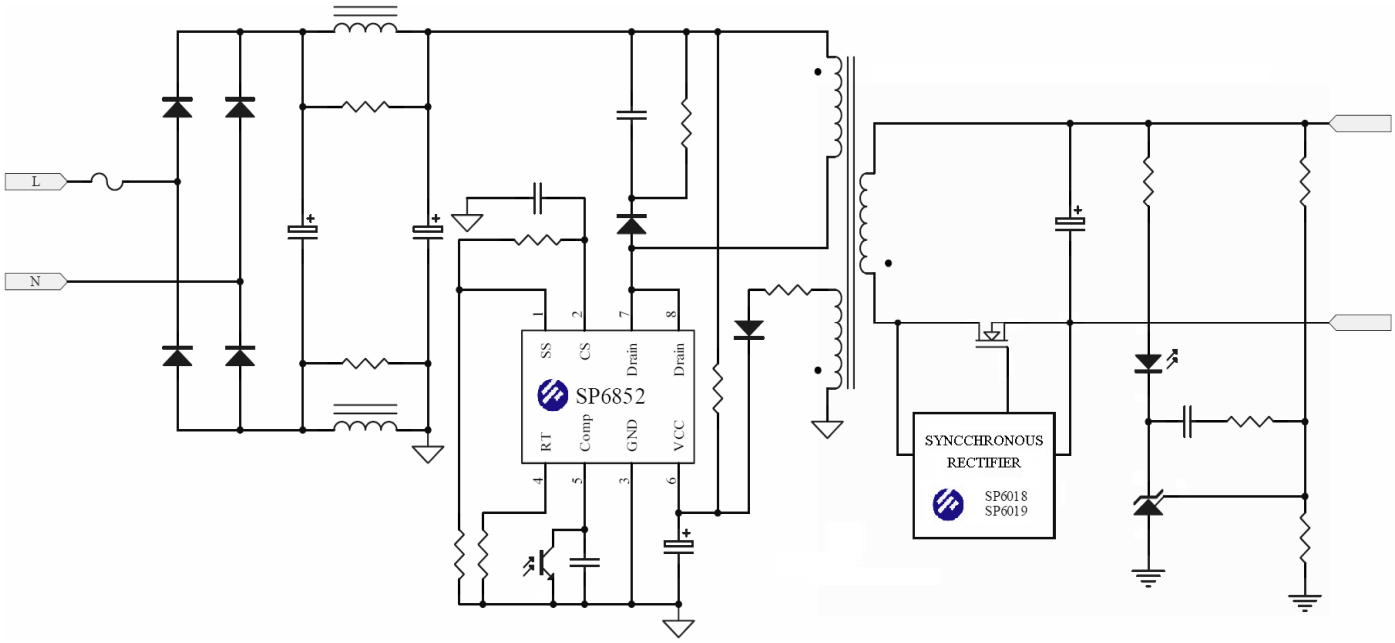

### PART MARKING
**DIP-8P**


A : Lot Code
B : Date Code

## TYPICAL APPLCATION CIRCUIT



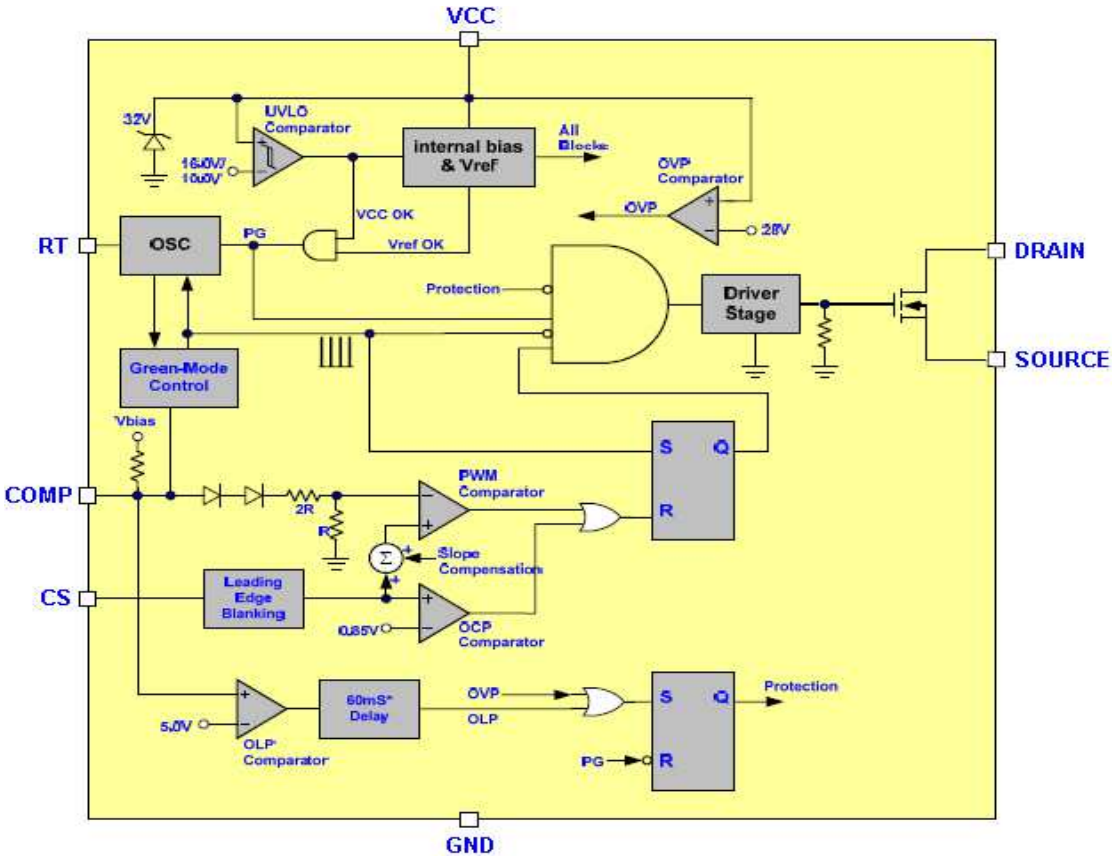

## TYPICAL APPLCATION CIRCUIT for HIGH EFFICIENCY SMPS



## 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 |
|---|---|---|
| SP6852D8TG | DIP-8P | SP6852I |

※ SP6852D8TG : Tube ; Pb – 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 | 700 | 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 | $V_{COMP}$ = 0V | | 2.7 | 4 | mA |
| | | $V_{COMP}$ = 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 |
| $V_{TH(GM)}$ | Green Mode Threshold VCOMP | | | 2.35 | | V |
| **Oscillator ( RT Pin )** | | | | | | |
| $F_{OSC}$ | Frequency | $R_T$=100KΩ | 60.0 | 68.0 | 70.0 | KHz |
| $F_{OSC(GM)}$ | Green Mode Frequency | Fs=65.0KHz | | 22 | | KHz |
| Fdt | Frequency Variation versus Temp. Deviation | (-40°C ~105°C) | | | 3 | % |
| Fdv | Frequency Variation versus $V_{CC}$ Deviation | ($V_{CC}$=11V-22V) | | | 1 | % |
| **Current Sensing ( CS Pin )** | | | | | | |
| Vcs(off) | Maximum Input Voltage | | 0.8 | 0.85 | 0.9 | V |
| $T_{LEDD}$ | Leading Edge Blanking Time | | | 280 | | nS |
| Zcs | Input impedance | | 1 | | | MΩ |
| $T_{PD}$ | Delay to Output | | | 100 | | nS |
| **MOSFET** | | | | | | |
| DC (Max) | Maximum Duty Cycle | | 70 | 75 | 80 | % |
| DC (Min) | Minimum Duty Cycle | | | 0 | | % |
| $V_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | 700 | | | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{GS}$=0V, $V_{DS}$=600V | | | 10 | uA |
| $R_{DS(ON)}$ | On-State Resistance | $V_{GS}$=10V, $I_D$=0.6A | | | 8 | Ω |
| $V_{SD}$ | Forward On Voltage | $V_{GS}$=0V, $I_S$=1.4A | | | 1.5 | V |
| Co | Output capacitance | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz | | 27 | | pF |
| Tr | Rising Time | | | 50 | 200 | nS |
| Tf | Falling Time | | | 30 | 120 | nS |
| **OLP ( Over Load Protection )** | | | | | | |
| $TL_{OLP}$ | OLP Trip Level | | | 5.0 | | V |
| $TD_{OLP}$ | 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.)

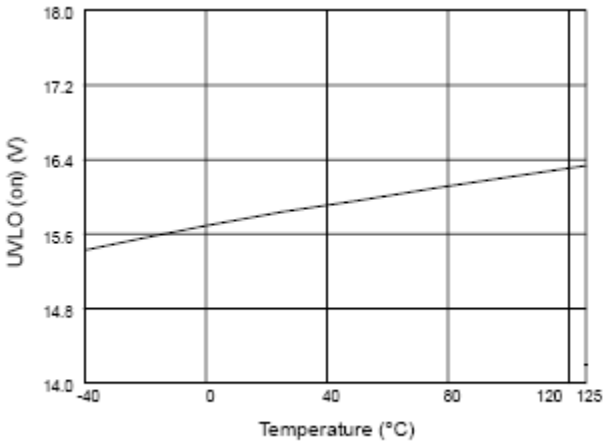



Fig. 1 UVLO (on) vs. Temperature

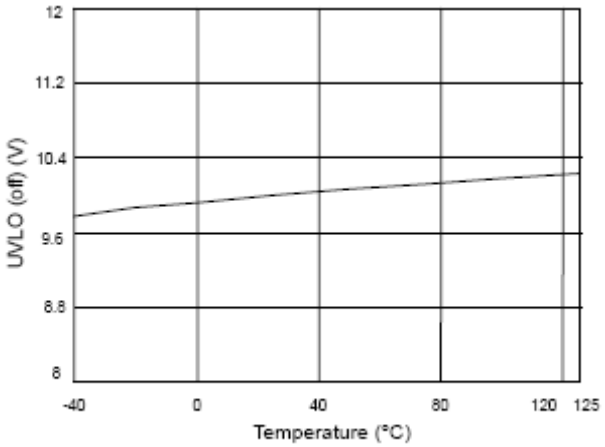



Fig. 2 UVLO (off ) vs. Temperature

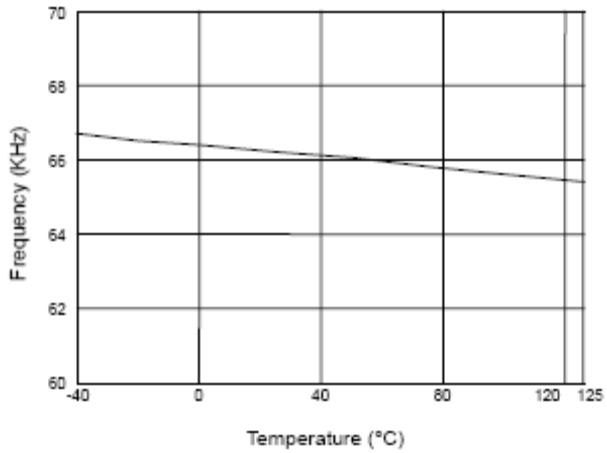



Fig. 3 Frequency vs. Temperature

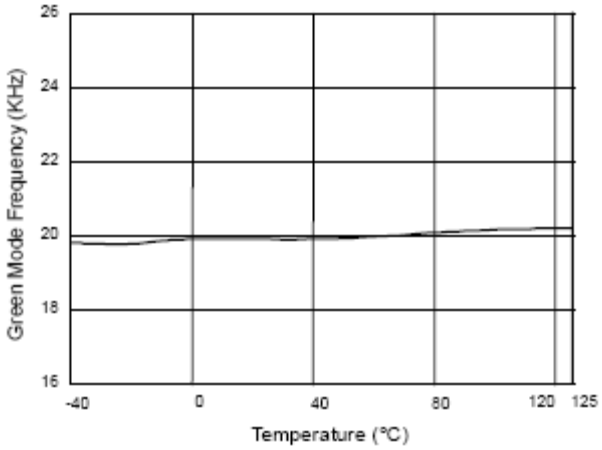



Fig. 4 Green Mode Frequency vs. Temperature

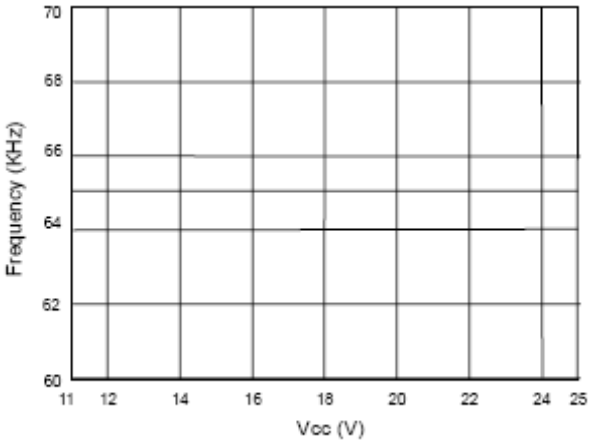



Fig. 5 Frequency vs. Vcc

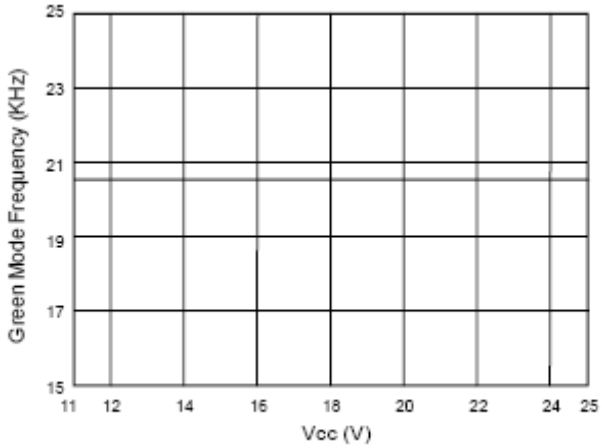



Fig. 6 Green Mode Frequency vs. Vcc

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

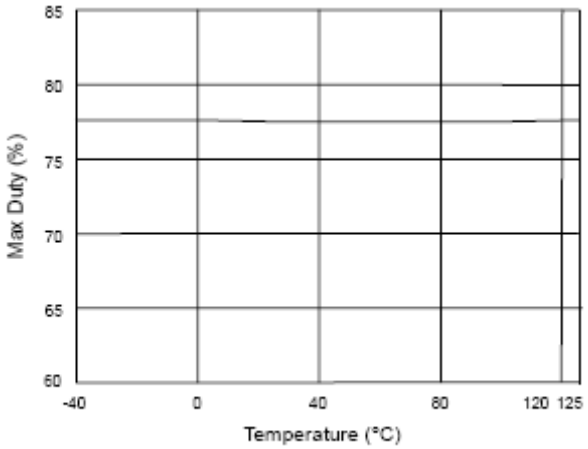



Fig. 7 Max Duty vs. Temperature

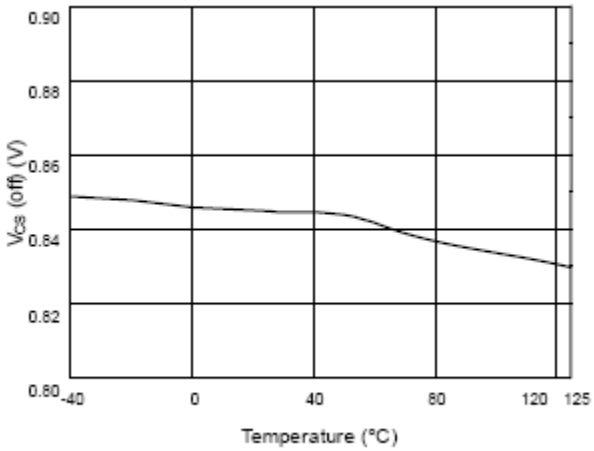



Fig. 8 $V_{CS}$ (off) vs. Temperature

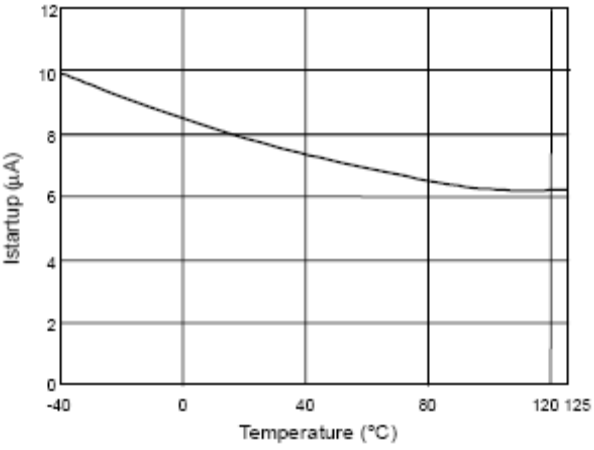



Fig. 9 Startup Current (Istartup) vs. Temperature

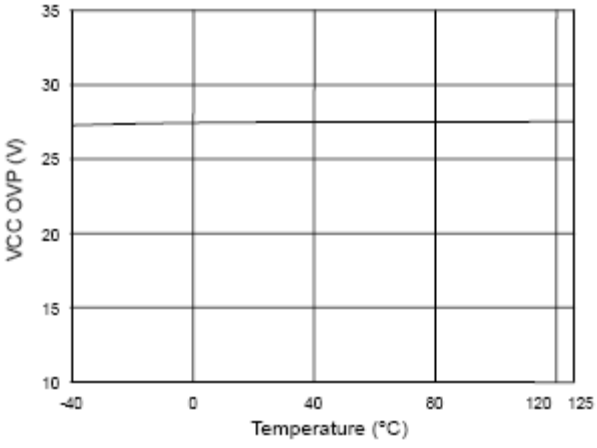



Fig. 10 VCC OVP vs. Temperature

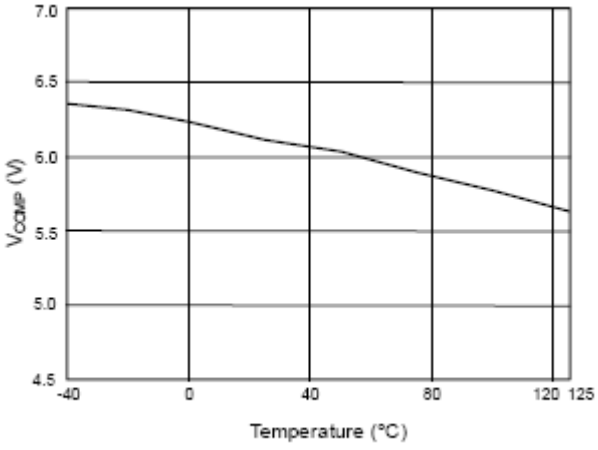



Fig. 11 $V_{COMP}$ open loop voltage vs. Temperature

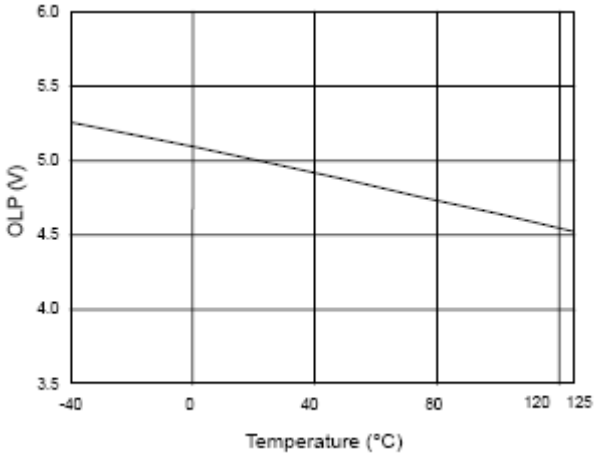
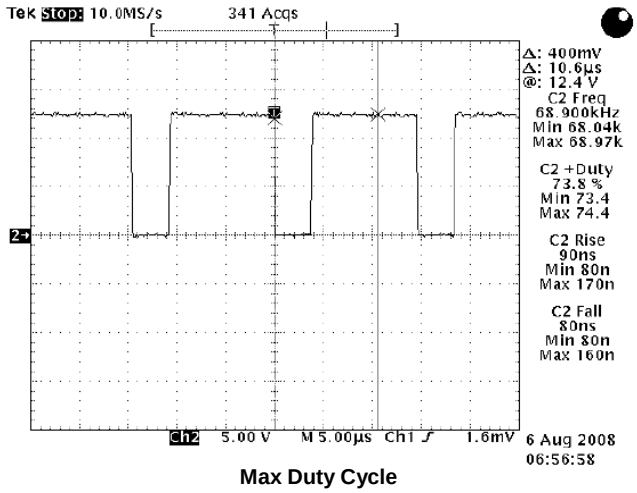
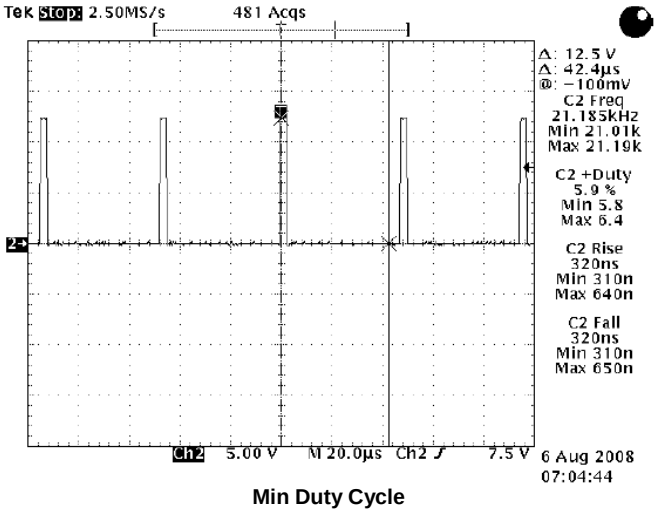



Fig. 12 OLP-Trip Level vs. Temperature

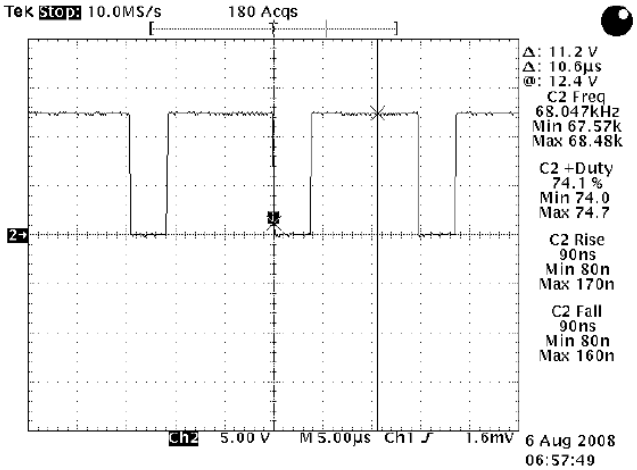
**PERFORMANCE CHARACTERISTICS** ($T_A$=25℃, unless otherwise specified.)



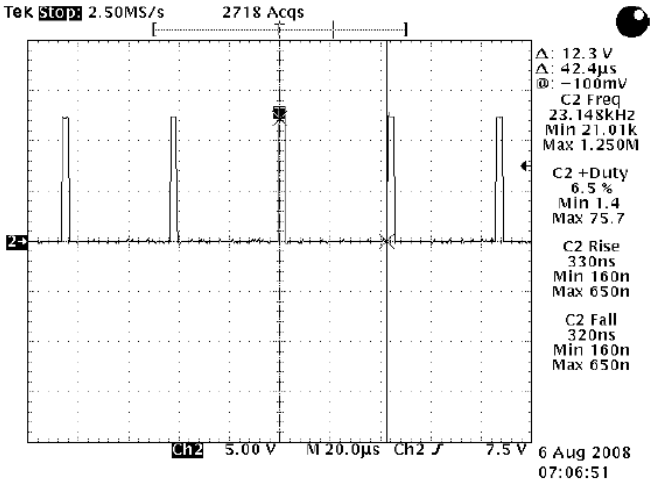

**Max Duty Cycle**



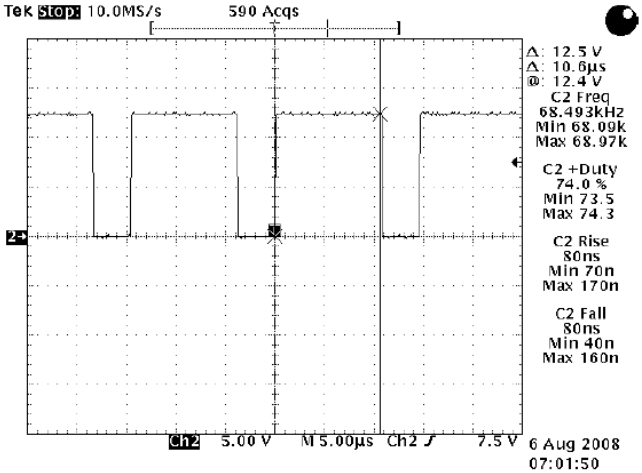

**Min Duty Cycle**



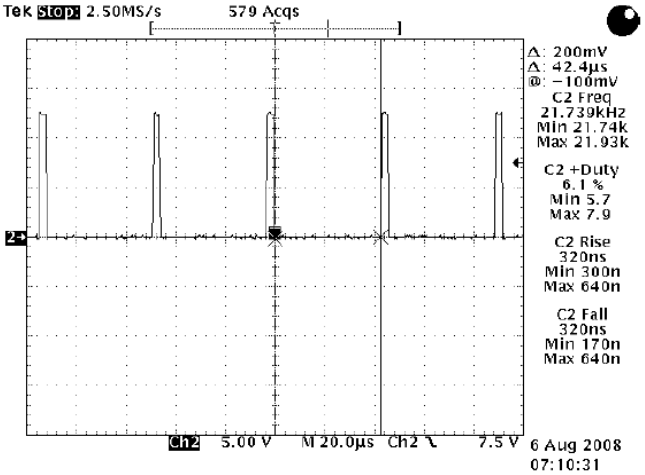

**Max Duty Cycle**




**Min Duty Cycle**




**Max Duty Cycle**




**Min Duty Cycle**

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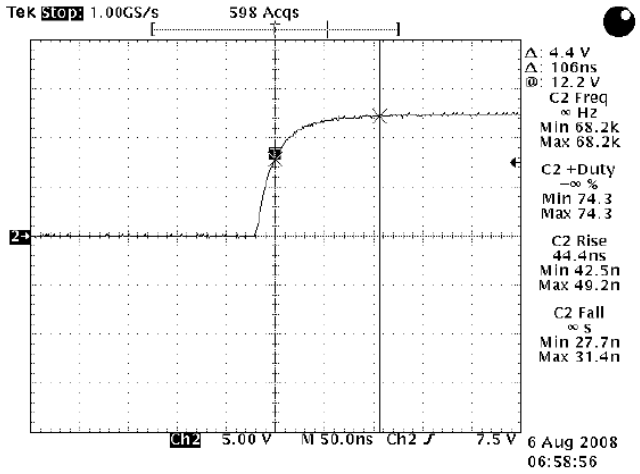
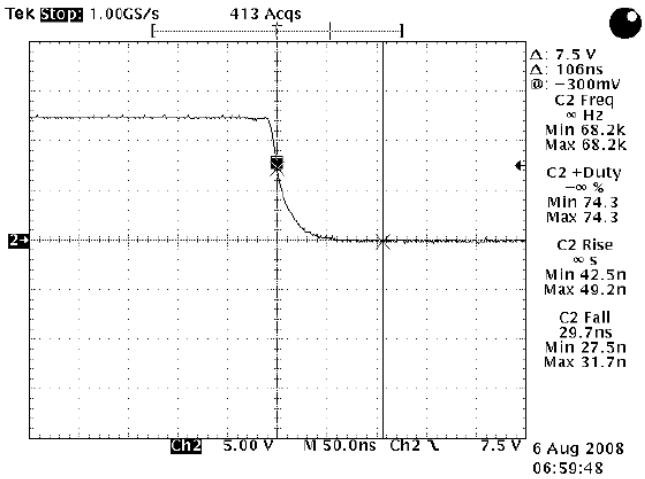
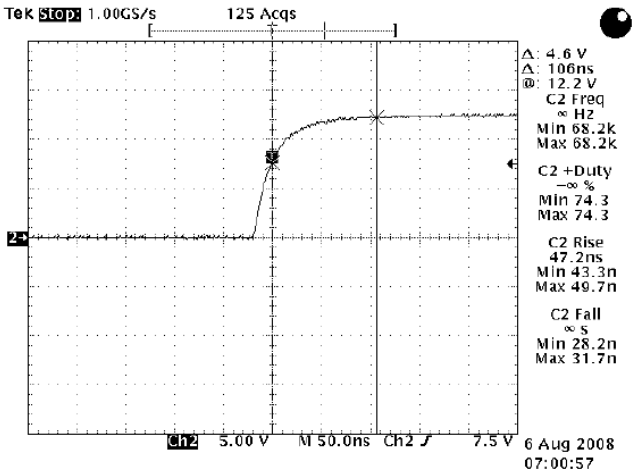


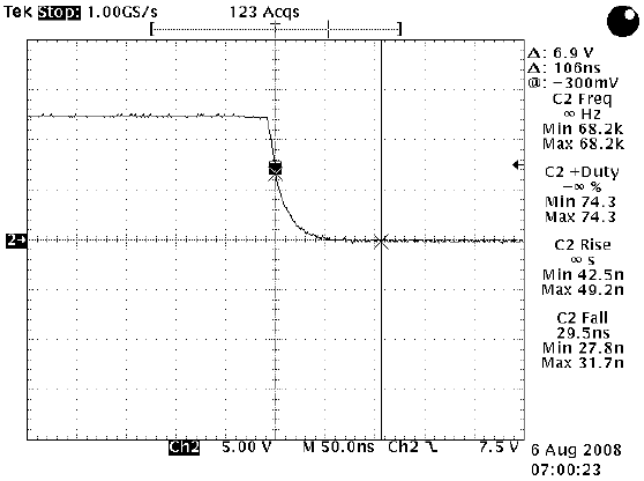

**Rising Time Load**



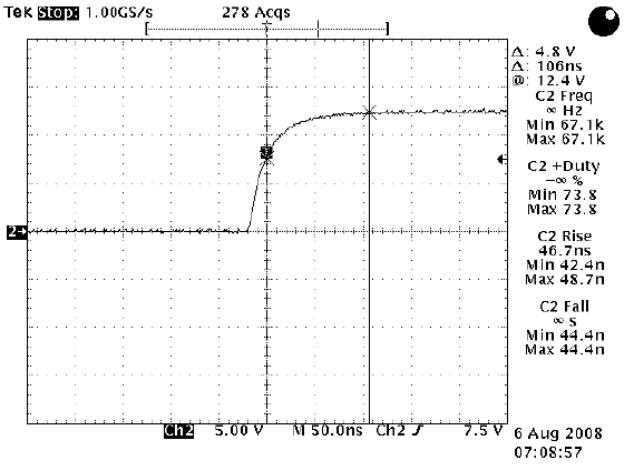

**Falling Time Load**



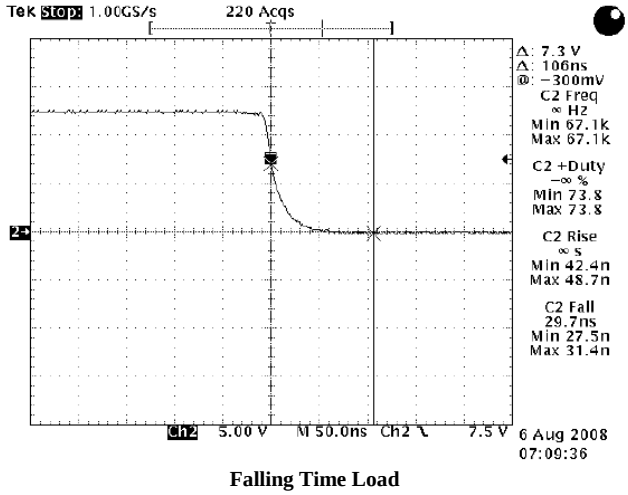

**Rising Time Load**




**Falling Time Load**

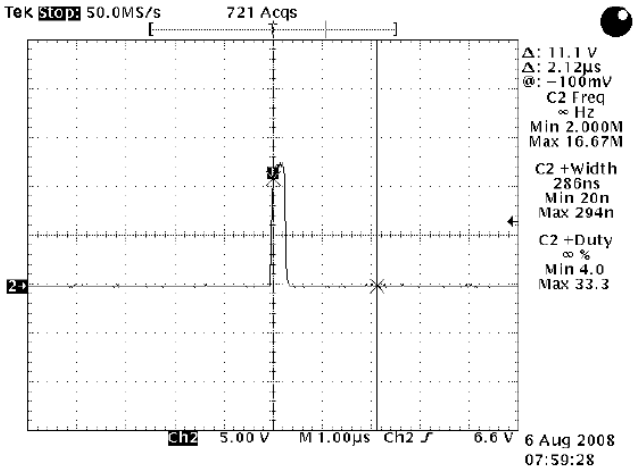



**Rising Time Load**

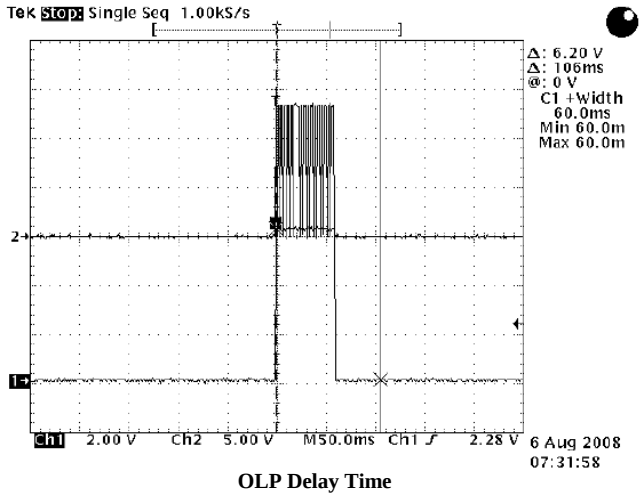



**Falling Time Load**

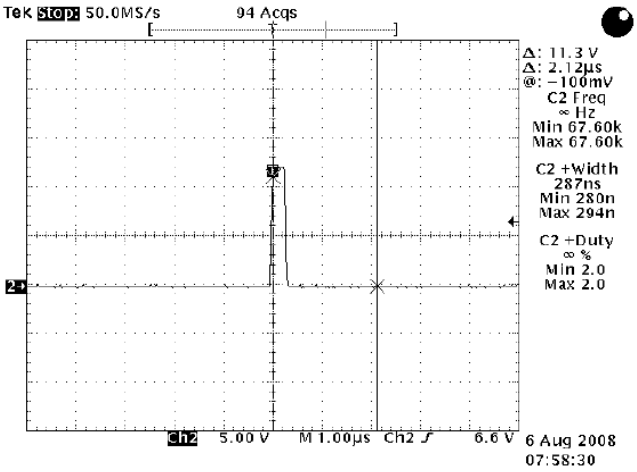
**PERFORMANCE CHARACTERISTICS** ($T_A$=25℃, unless otherwise specified.)



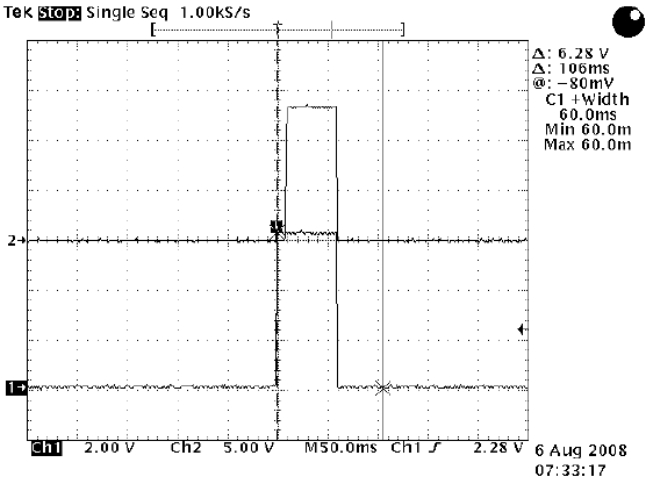

**Leading Edge Blanking Time**



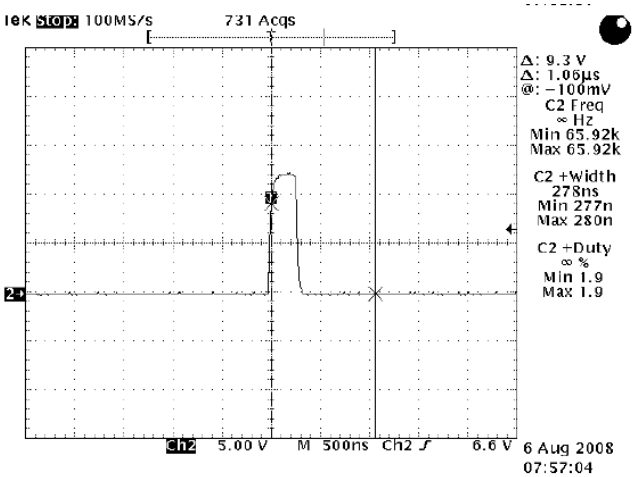

**OLP Delay Time**



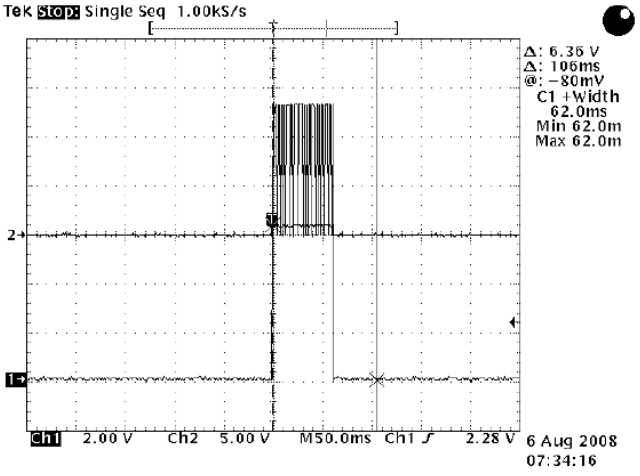

**Leading Edge Blanking Time**




**OLP Delay Time**

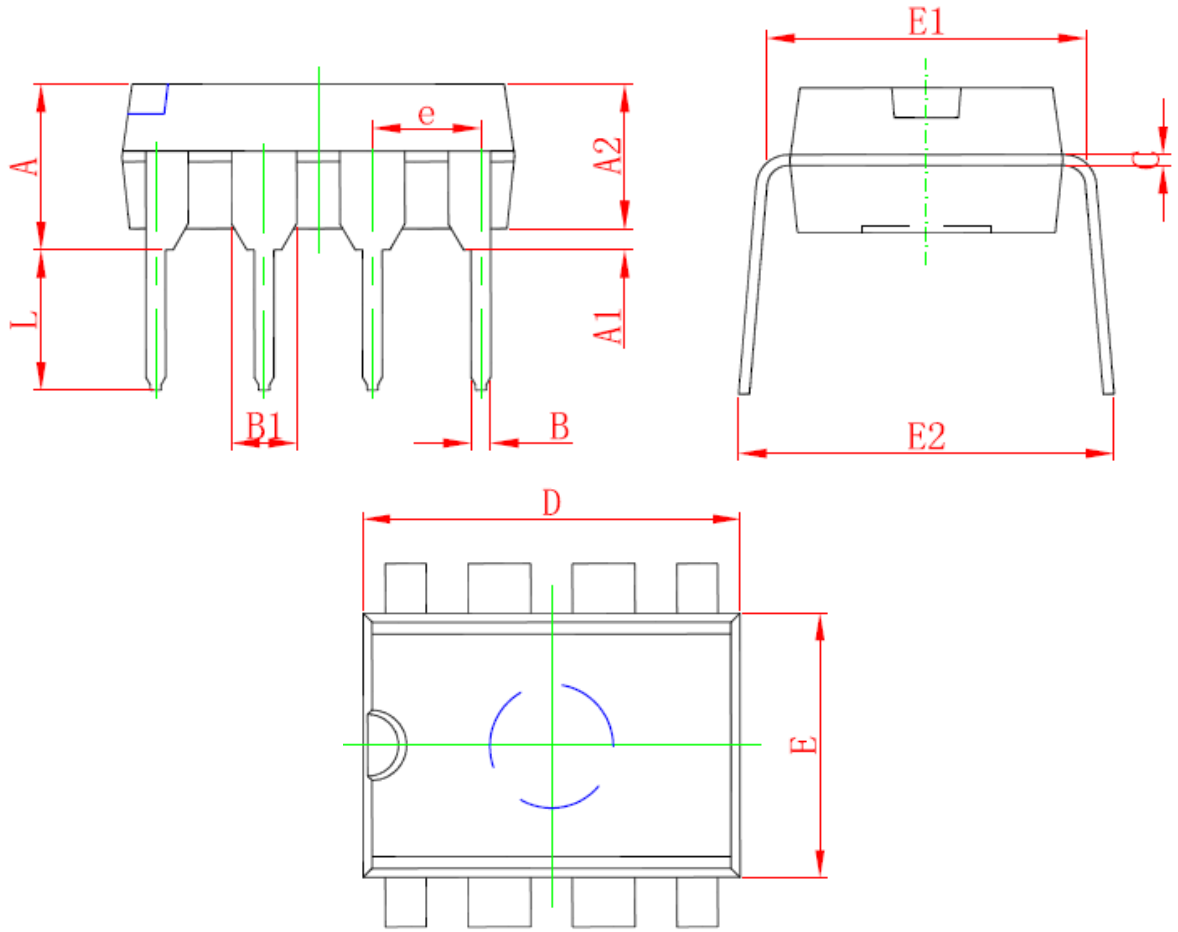



**Leading Edge Blanking Time**




**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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