

# ZXSC440EV1

## ZXSC440EV1 USER GUIDE

### DESCRIPTION

The ZXSC440EV1 is a dedicated photoflash charger, charging an 80 $\mu$ F photoflash capacitor to 300V in 3.5 seconds from a 5V supply.

The Charge pin enables the circuit to be initiated from the camera's microprocessor, using negligible current when flash is not being used.

The flyback conversion efficiency is typically 75%, much higher than the commonly used discrete charging circuits.

The Ready pin signals the microprocessor when the flash is charged and ready to be fired.

### FEATURES

- Charges a 80 $\mu$ F photoflash capacitor to 300V in 3.5 seconds from 5V
- Charges various value photoflash capacitors
- Over 75% flyback efficiency
- Charge and Ready pins
- Consumes only 4.5 $\mu$ A when not charging
- Small MSOP8 Low profile package

### APPLICATIONS

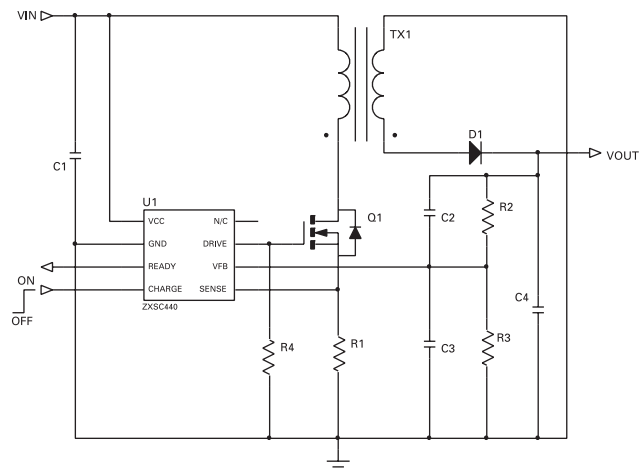
- Digital camera flash unit
- Film camera flash unit
- Camera-phone flash unit

### ORDER NUMBER

ZXSC440EV1

Please note evaluation boards are subject to availability and qualified leads.

### TYPICAL APPLICATION CIRCUIT



# ZXSC440EV1

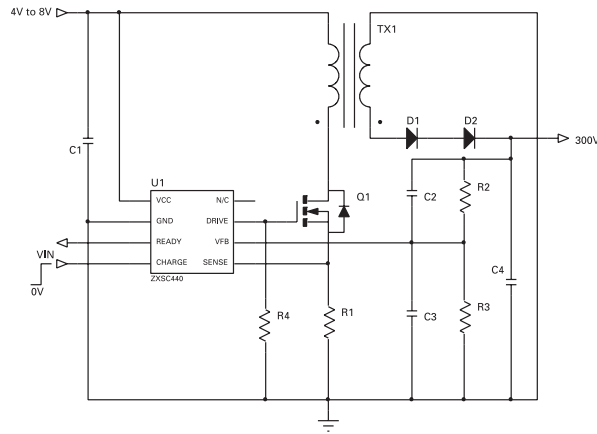
## REFERENCE DESIGN

ZXSC440EV1 is configured to the reference design below. The target application is a photoflash charger for a Xenon strobe typically used in SLR, DSC and Camera-phone flash units.

For other reference designs or further applications information please refer to the ZXSC440 datasheet.

The input voltage is typically 5V for the ZXSC440EV1 with a minimum of 4V and a maximum of 8V.

## SCHEMATIC DIAGRAM



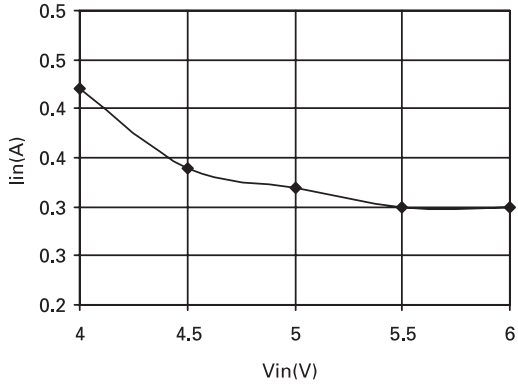
## MATERIALS LIST

REF	VALUE	PACKAGE	PART NUMBER	MANUFACTURER	NOTES
U1		MSOP8	ZXSC440X8	Zetex	
Q1		SOT-23	ZXMN6A07F	Zetex	60V N-channel MOSFET
D1 <sup>(1)</sup>	200V/200mA	SOT23	BAS21	Philips	200V fast rectifier diodes connected in series
D2 <sup>(1)</sup>	200V/200mA	SOT23	BAS21	Philips	200V fast rectifier diodes connected in series
Tx1			T-16-024A	Tokyo Coil Eng	
R1	22mΩ	0805	Generic	Various	
R2	10MΩ/2kV	2010	HVC201010MFI	Welwyn	10ΩW/2kV 1% tolerance
R3	9.1kΩ	1206	Generic	Various	1% tolerance
R4	100kΩ	0603	Generic	Various	5% tolerance
C1	100μF/6V3	2220	GRM43SR60J107ME20L	Murata	X5R dielectric, ceramic capacitor
C2	10pF/500V	1206	Generic	Various	Output voltage seen across capacitor
C3	10nF/6V3	1206	Generic	Various	Y5V dielectric, ceramic capacitor
C4	80μF/330V	Radial	FW Series	Rubycon	Photoflash capacitor

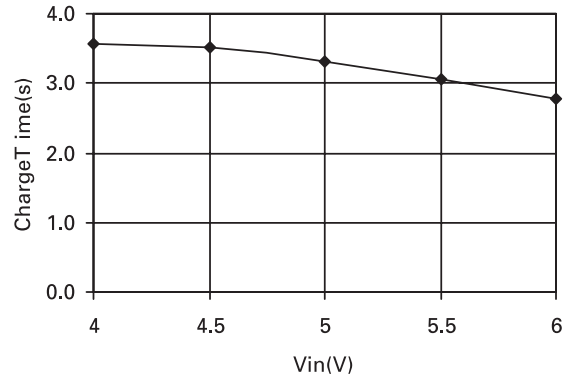
<sup>(1)</sup> Two 200V BAS21 fast rectifier diodes are connected in series for improved switching and higher efficiency.

# ZXSC440EV1

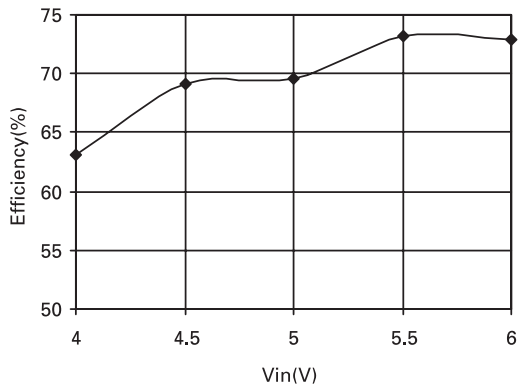
## PERFORMANCE GRAPHS



$V_{in}$  vs  $I_{in}$



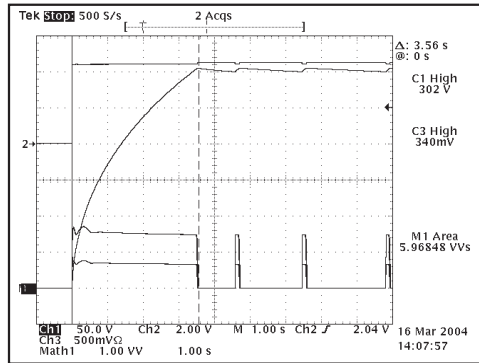
$V_{in}$  vs Charge Time



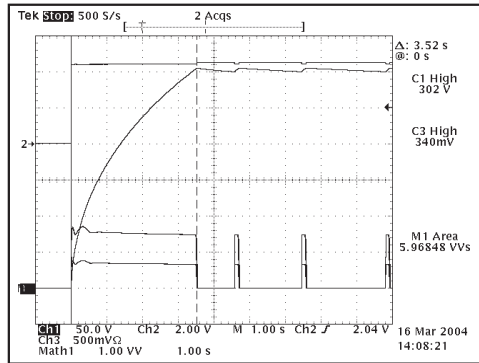
$V_{in}$  vs Efficiency

# ZXSC440EV1

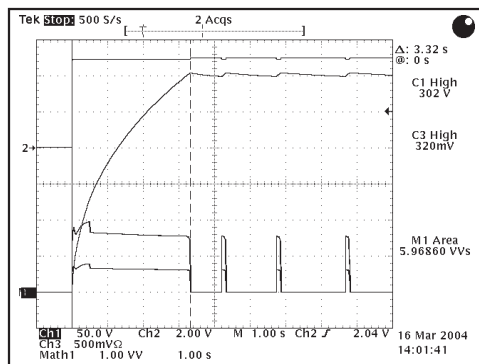
## WAVEFORMS



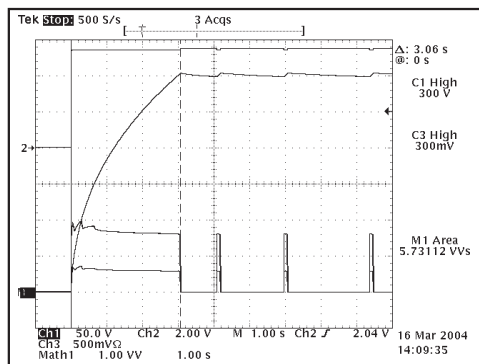
$V_{IN} = 4V$



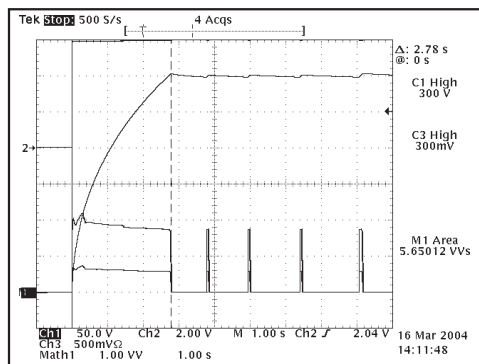
$V_{IN} = 4.5V$



$V_{IN} = 5V$



$V_{IN} = 5.5V$

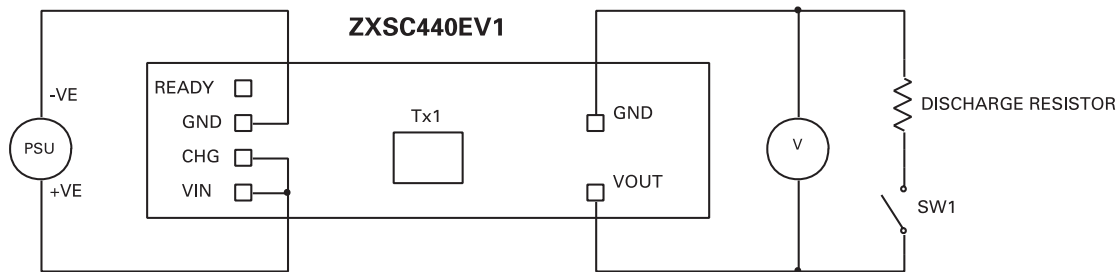


$V_{IN} = 6V$

# ZXSC440EV1

## ZXSC440EV1 OPERATION

### Connection Diagram



### ZXSC440EV1 Set-up and test

1. Connect  $V_{IN}$  and GND to positive and zero volts of the power supply respectively.
2. Connect CHG pin to positive of power supply.  
If CHG pin is left floating start up cannot be guaranteed.
3. Connect DVM to  $C_{OUT}$  positive and GND terminals.
4. Connect discharge resistor <sup>(2)</sup> to DVM ensuring that the discharge resistor, SW1, is in the open position.
5. Set the power supply to 5V.
6. Turn on power supply.
7. The output voltage should charge up to  $300V \pm 15V$  - THIS IS A FUNCTIONAL EVAL BOARD.
8. Turn PSU off.
9. Switch the discharge resistor to the close position.
10. The output voltage should read 0V.

### CAUTION: HIGH VOLTAGES ARE PRESENT

DO NOT TOUCH AND/OR SHORT CIRCUIT  $C_{OUT}$  LEADS WHEN PSU IS ON AND  $C_{OUT}$  IS CHARGED i.e. DISCHARGE RESISTOR SET TO OPEN POSITION AND/OR IS DISCONNECTED.

#### Discharge Resistor and SW1. <sup>(2)</sup>

The discharge resistor should be rated at  $1\Omega / 10Watts / 500V$  and placed in series with a Single Pole Single Throw Switch (SPST) of similar rating. Attach insulated leads with 4mm plugs for connection to DVM.

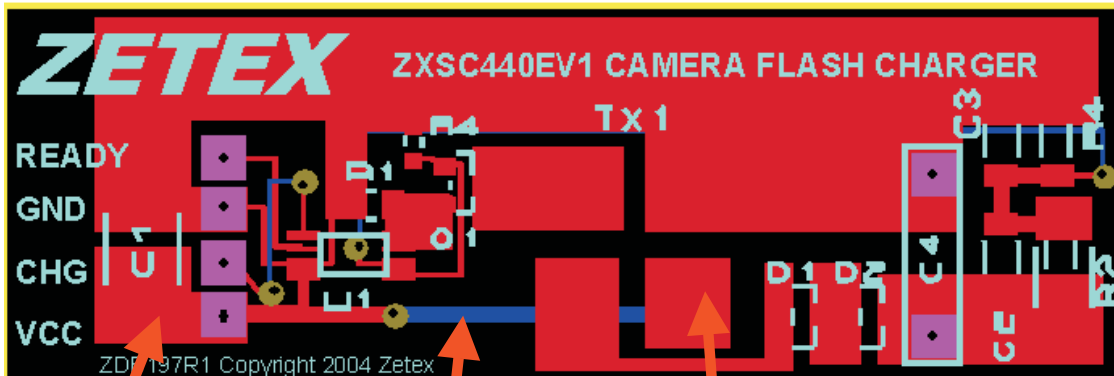
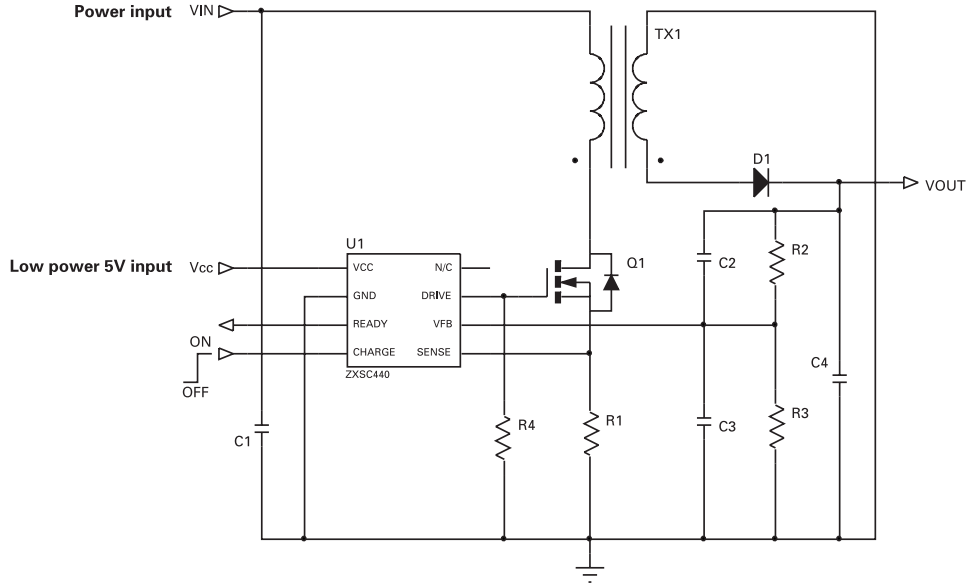
<sup>(2)</sup> If connecting directly to a Xenon tube with discharge circuit the discharge resistor is not needed.

Please ensure all exposed areas of this test set-up are fully insulated from the person testing, as potentially lethal voltages are present.

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## Low voltage operation

For operation at lower input voltages, say a Lithium-Ion battery, rated at 4.2V to 3.3V, it is possible to split the inputs so that the power line of the primary winding can be connected to VIN with the low power line Vcc of the ZXSC440 connected to a separate 5V supply. To implement this cut the bottom track from Vcc to the transformer primary winding. Connect the low voltage input directly to the transformer primary winding and the low power 5V supply to the Vcc input of the ZXSC440EV1.



Connect low power 5V supply

Cut track on underside of PCB

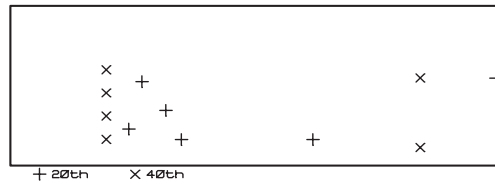
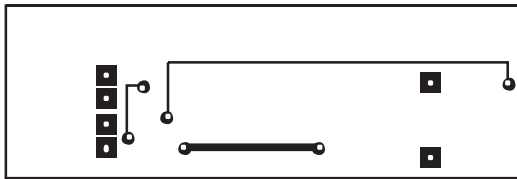
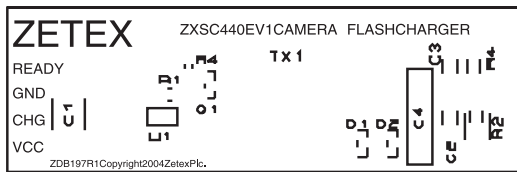
Connect low voltage supply

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## Layout considerations

PCB tracks should be kept as short as possible to minimise ground bounce, and the ground pin of the device should be soldered directly to the ground plane. It is particularly important to mount the coil and the input/output capacitors close to the device to minimise parasitic resistance and inductance, which will degrade efficiency. The FB pin is a high impedance input, so PCB track lengths to this should also be kept as short as possible to reduce noise pickup. Excess capacitance from the FB pin to ground should be avoided.

Below is the recommended layout of the ZXSC440EV1.



# ZXSC440EV1

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