ZSCT1555

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	9V
Input Voltages (Cont, Reset, Thres, Trig)	9V
Output Current	100mA
Operating Temperature	-20 to 100°C
Storage Temperature	-55 to 150°C

Power Dissipation (T_{amb}=25°C)

DIL8	625mW
SO8	625mW

Recommended Operating Conditions

Supply Voltage	0.9V(min)	6V(max)
Input Voltages (Cont, Reset, Thres, Trig)		6V(max)
Output Current	Sink	100mA(max)
	Source	150µA(max)

ELECTRICAL CHARACTERISTICS
TEST CONDITIONS (Unless otherwise stated):T_{amb}= 25°C,V_{CC}= 1.5V

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN.	TYP.	MAX.	
V_{CC}	Supply Voltage		0.9		6	V
I_{CC}	Supply Current	no load V_{CC}= 5V, no load		74 150	120 200	µA
V_{TH}	Threshold Voltage	 V_{CC}= 5V	1.195 3.9	1.22 4	1.245 4.1	V
I_{TH}	Threshold Current (Note 1)		0	20	100	nA
V_{TR}	Trigger Voltage	 V_{CC}= 5V	0.2 0.57	0.25 0.62	0.3 0.67	V
I_{TR}	Trigger Current		0	-35	-100	nA
t_{PD}	Trigger Propagation delay	Delay from trigger to output		2		µs
V_{RS}	Reset Voltage		0.1	0.2	0.4	V
I_{RS}	Reset Current	Reset @ 0V	0	-5	-10	µA
I_{DS}	Discharge switch Off-state current		0	10	100	nA
V_{DS}	Discharge switch On-state voltage	I_{DS}= 0.2mA V_{CC}= 5V, I_{DS}= 0.3mA	0 0	180 240	225 350	mV
V_{CT}	Control Voltage (Open Circuit)	 V_{CC}= 5V	1.195 3.9	1.22 4	1.245 4.1	V
V_{OL}	Output Voltage (Low)	I_{OL}=10mA I_{OL}=50mA V_{CC}=5V, I_{OL}=10mA V_{CC}=5V, I_{OL}=100mA	0 0 0 0	0.15 0.45 0.13 0.65	0.3 0.65 0.3 1	V
V_{OH}	Output Voltage (High)	I_{OH}= 100µA V_{CC}= 5V, I_{OH}= 150µA	1 4.5	1.1 4.6	1.5 5	V

ELECTRICAL CHARACTERISTICS (Continued)
TEST CONDITIONS (Unless otherwise stated):T_{amb}=25°C,V_{CC}=1.5V

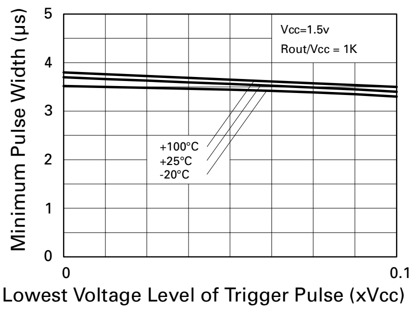
SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN.	TYP.	MAX.	
t_R	Output pulse rise time	C_L= 10pF V_{CC}=5V, C_L=10pF		1.6 1.2		µs
t_F	Output pulse fall time	C_L= 10pF V_{CC}=5V, C_L=10pF		240 24		ns
 $\Delta t_{IA}(m)$ $\Delta t_V(m)$ $\Delta t_T(m)$	Timing error, Monostable Initial accuracy (Note 2) Drift with supply voltage Drift with temperature	 RA= 10 to 50 kΩ RB= 10 to 50 kΩ C_T = 68nF		 1.6 0.262 100		 % %/V ppm/°C
 $\Delta t_{IA}(a)$ $\Delta t_V(a)$ $\Delta t_T(a)$	Timing error, Astable Initial accuracy (Note 2) Drift with supply voltage Drift with temperature	 RA= 10 to 50 kΩ RB= 10 to 50 kΩ C_T = 68nF		 4.8 0.662 150		 % %/V ppm/°C
f_A	Astable maximum frequency	RA=20 kΩ RB= 10 kΩ C_T =47pF			330	kHz

Note 1: This will influence the maximum values of RA and RB (RA_{MAX}=10MΩ,RB_{MAX}=1.5MΩ)

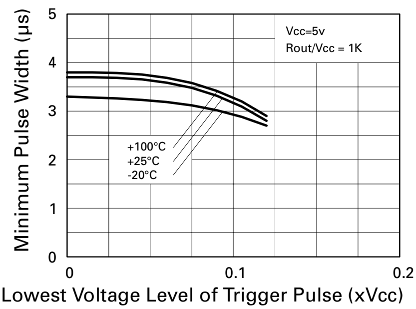
Note 2: Is defined as the difference between the measured value and the average value of a random sample taken on a batch basis

ZSCT1555

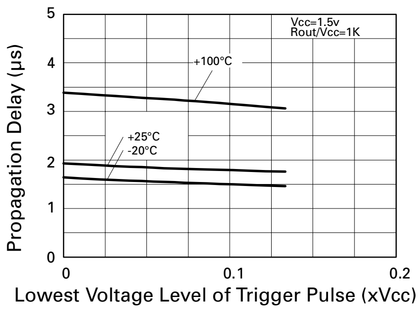
TYPICAL CHARACTERISTICS



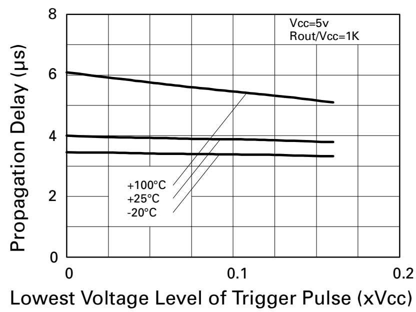
Minimum Pulse Width Required for Triggering



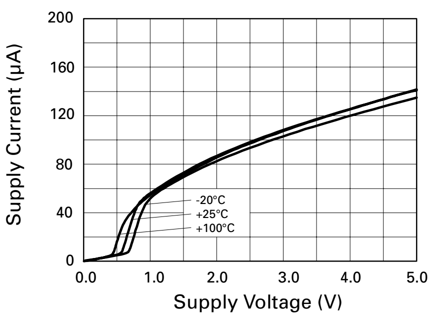
Minimum Pulse Width Required for Triggering



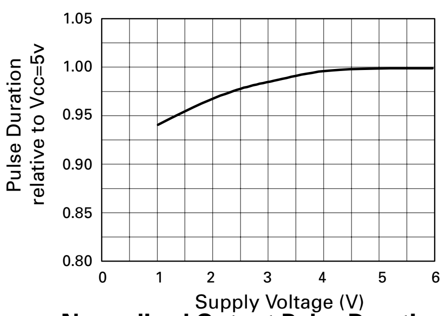
Output Propagation Delay



Output Propagation Delay

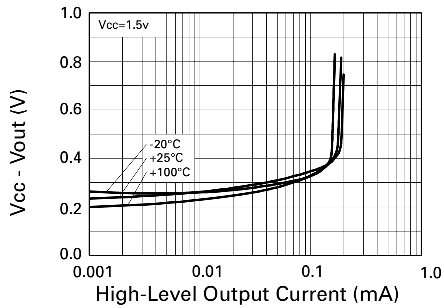


Supply Current v Supply Voltage

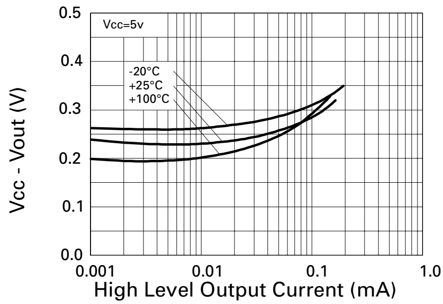


Normalized Output Pulse Duration v Supply Voltage

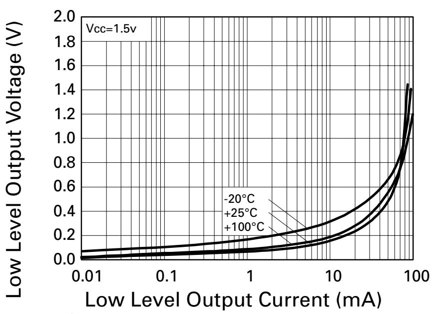
TYPICAL CHARACTERISTICS



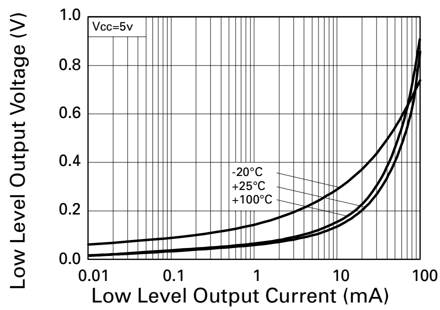
Output High Voltage Drop v Output Current



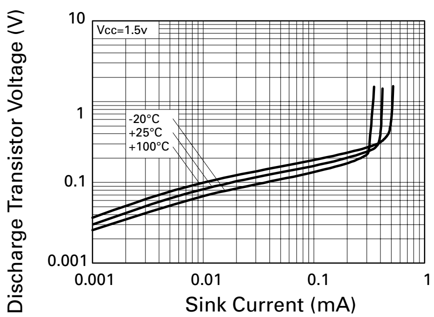
Output High Voltage Drop v Output Current



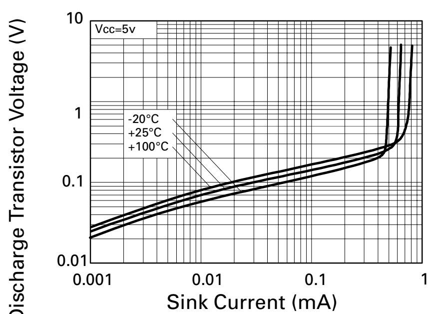
Output Low Voltage Drop v Output Current



Output Low Voltage Drop v Output Current

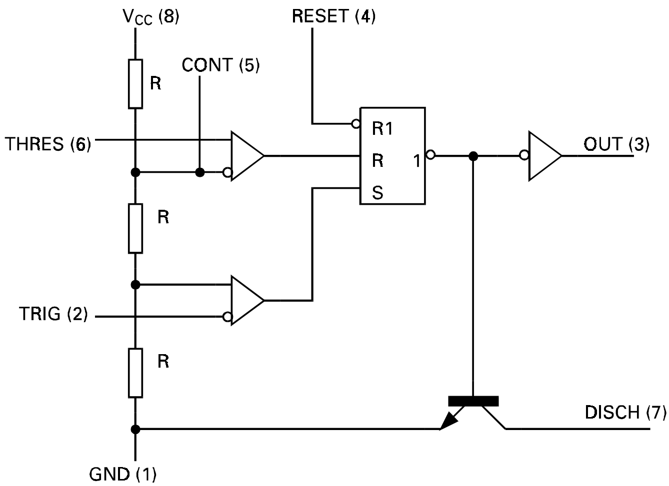


Discharge Transistor Voltage v Sink Current



Discharge Transistor Voltage v Sink Current

FUNCTIONAL DIAGRAM



FUNCTIONAL TABLE

RESET	TRIGGER VALUE	THRESHOLD VOLTAGE	OUTPUT	DISCHARGE SWITCH
Low	N/A	N/A	Low	On
High	$<V_{CC}/5$	N/A	High	Off
High	$>V_{CC}/5$	$>4V_{CC}/5$	Low	On
High	$>V_{CC}/5$	$<4V_{CC}/5$	As Previously established	

POWER DERATING TABLE

Package	TA≤25°C Power Rating	Derating Factor Above TA=25°C	T_A=70°C Power Rating	T_A=85°C Power Rating
N8	625mW	6.25mW/°C	330mW	250mW
D8	625mW	6.25mW/°C	330mW	250mW

APPLICATIONS INFORMATION

Many configurations of the ZSCT1555 are possible. The following gives a selection of a few of these using the most basic monostable and astable connections. The final application example in astable mode shows the device optimum use for low voltage and power economy in a single cell boost converter.

Monostable Operation

Figure 1 shows connection of the timer as a one-shot whose pulse period is independent of supply voltage. Initially the capacitor is held discharged. The application of a negative going trigger pulse sets an internal flip flop which allows the capacitor to start to charge up via RA and forces the output high. The voltage on the capacitor increases for time t, where t = $1.63RAC_T$, at the end of this period the voltage on the capacitor is 0.8 V_{CC}. At this point the flip flop resets, the capacitor is discharged and the output is driven low.

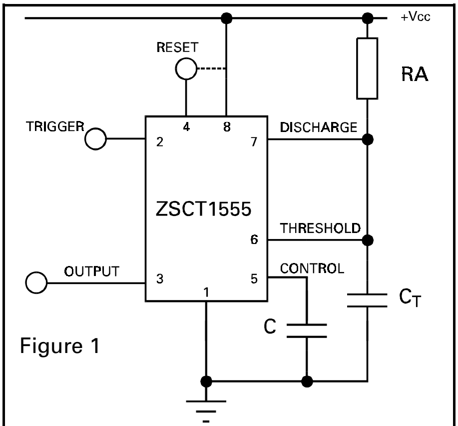


Figure 1

Figure 2 shows the timing diagram for this function. During the output high period further trigger pulses are locked out however the circuit can be reset by application of a negative going pulse on the reset pin. Once the output is driven low it remains in this state until the application of the next trigger pulse. If the reset function is not used then it is recommended to connect to V_{CC} to eliminate any possibility of false triggering.

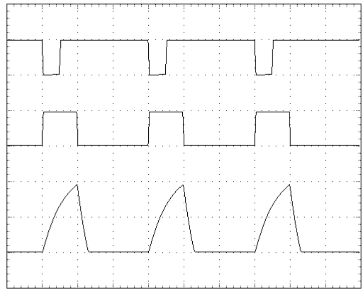


Figure 2

Figure 3 gives an easy selection of RA and C_T values for various time delays.

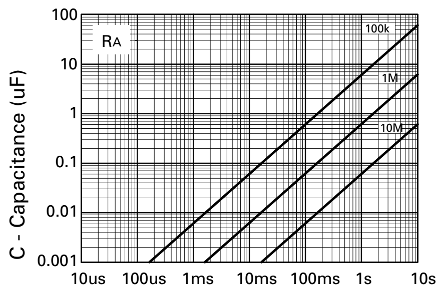


Figure 3

This configuration of circuit can be used as a frequency divider by adjusting the timing period. Figure 4 indicates a divide by three.

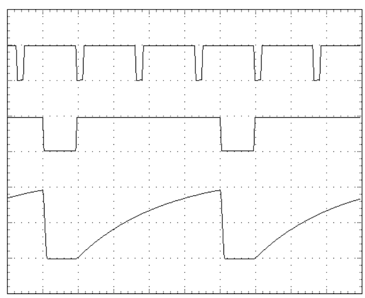


Figure 4

Figure 5 shows the monostable mode used as a pulse width modulator. Here the trigger pin is supplied with a continuous pulse train, the resulting output pulse width is modulated by a signal applied to the control pin.

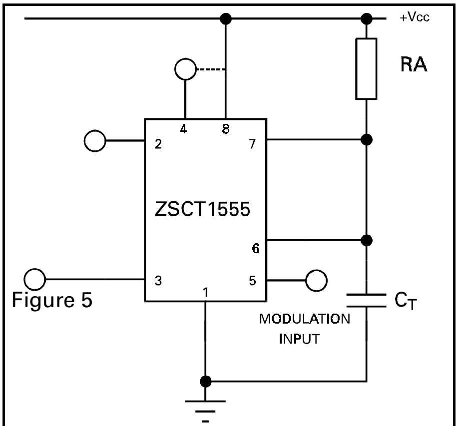


Figure 5

Figure 6 shows typical waveform examples.

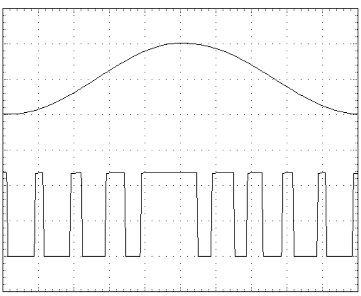


Figure 6

Astable operation

The configuration of Figure 7 produces a free running multivibrator circuit whose frequency is independent of supply voltage. The ratio of resistors RA and RB precisely sets the circuit duty cycle. The capacitor is charged and discharged between thresholds at $0.2V_{CC}$ and $0.8V_{CC}$. Oscillation frequency (f) and duty cycle (d) can be calculated using the following equations:-

$f = 0.62/(RA + 2RB)C_T$

$d = RB/(RA + 2RB)$

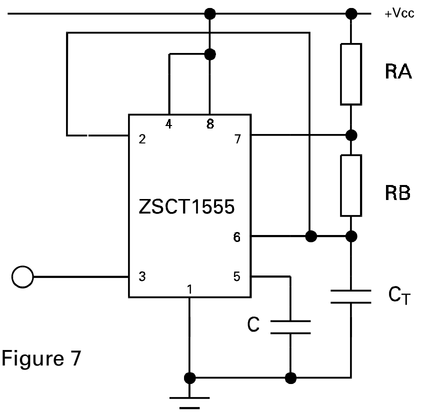


Figure 7

Figure 8 shows the waveforms generated in this mode of operation.

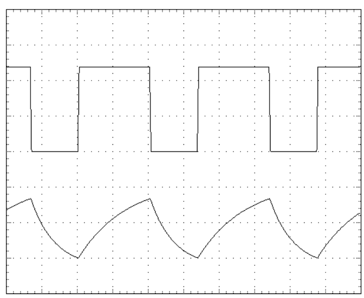


Figure 8

Figure 9 gives an easy selection for RA, RB and C_T values.

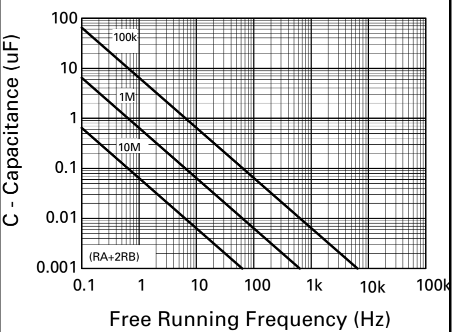


Figure 9

Similar to the PWM circuit of Figure 5 the astable circuit can be configured with modulation of the control input as shown in Figure 10. The result is a pulse position modulated, PPM, circuit where the pulse position is altered by the control input voltage.

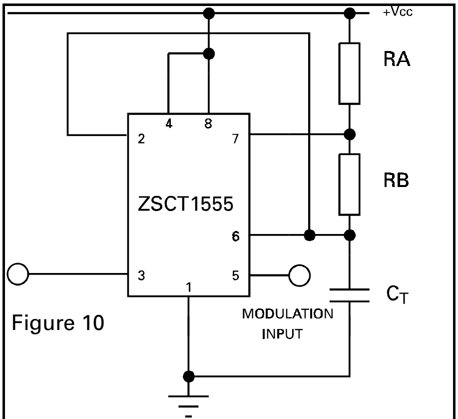


Figure 10

Figure 11 shows the result of modulation with a triangle wave input to the control pin.

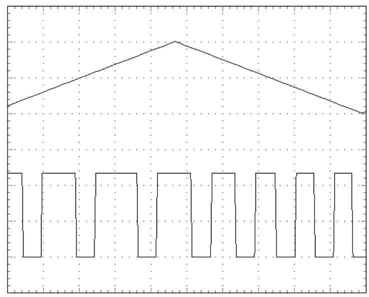
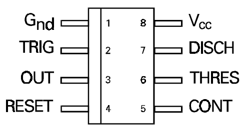


Figure 11

ZSCT1555

The circuit of Figure 12 shows the device in astable mode operating as part of a single cell boost converter. This circuit generates a 5 volt supply from a single battery cell. The circuit output voltage is maintained down to 0.9 volts input and power economy is optimised for extended battery life.



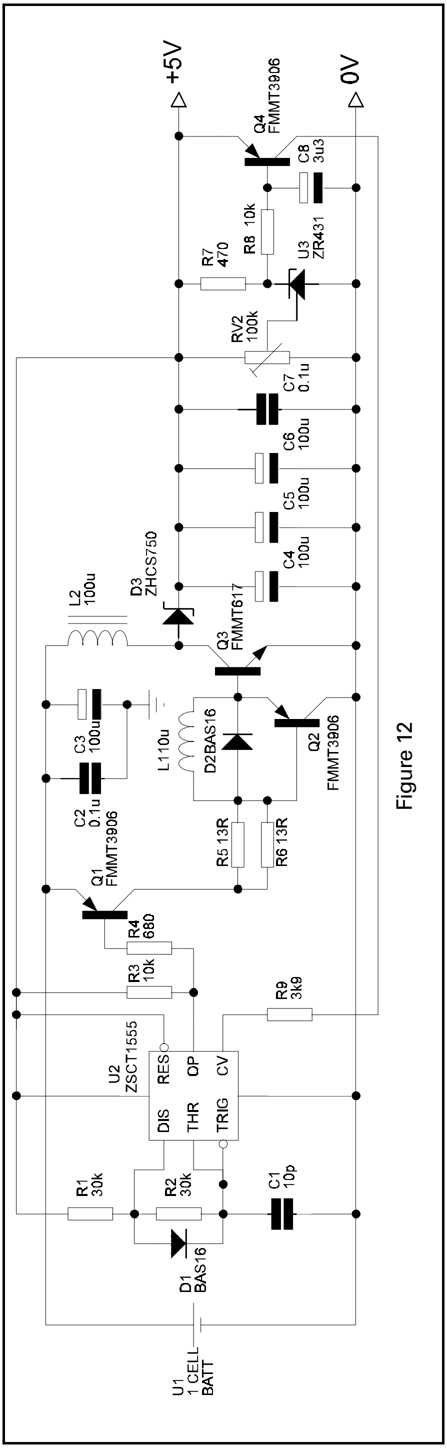


Figure 12

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