



## 93334

## LINEAR INTEGRATED CIRCUIT

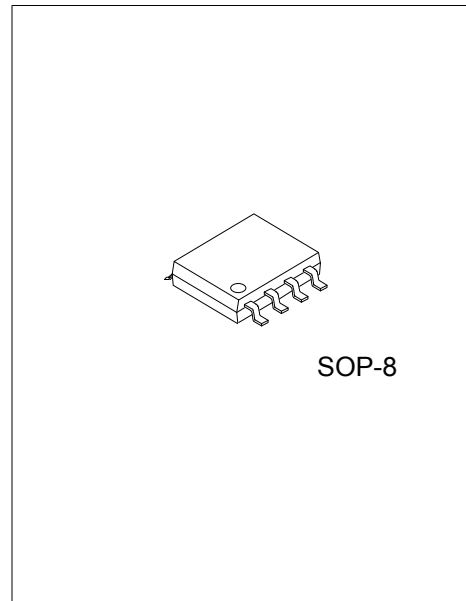
### HIGH ENERGY IGNITION CIRCUIT

#### DESCRIPTION

This device is designed to use the signal from a retractor type ignition pickup to produce a well controlled output from a power darlington output transistor.

#### FEATURES

- \* Very Low Peripheral Component Count
- \* No Critical System Resistors
- \* Wide Supply Voltage Operating Range (4.0V ~ 24V)
- \* Overvoltage Shutdown (30V)
- \* Dwell Automatically Adjusts to Produce Optimum Stored Energy without Waste
- \* Externally Adjustable Peak Current
- \* Transient Protected Inputs and Outputs



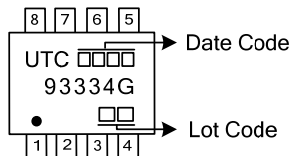
#### ORDERING INFORMATION

Ordering Number	Package	Packing
93334G-S08-R	SOP-8	Tape Reel

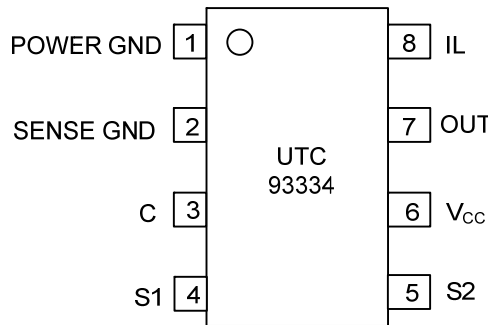
Note: Pin Assignment: G: Gate D: Drain S: Source

<p>93334G-S08-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free</p>
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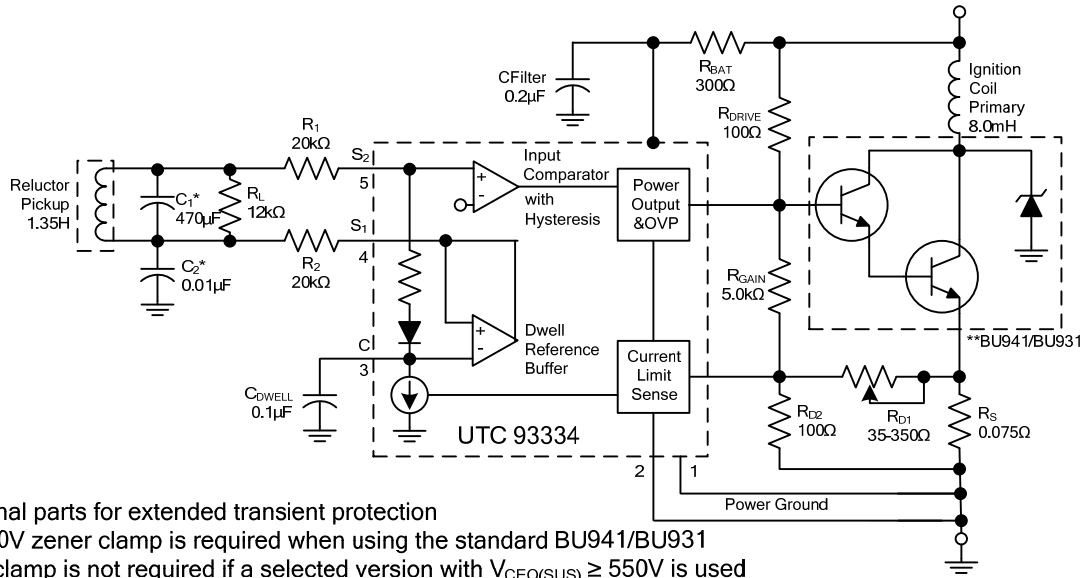
#### MARKING



■ PIN CONFIGURATION



■ BLOCK DIAGRAM AND TYPICAL APPLICATION



\* Optional parts for extended transient protection  
 \*\* A 350V zener clamp is required when using the standard BU941/BU931  
 This clamp is not required if a selected version with  $V_{CE0(SUS)} \geq 550V$  is used

Figure 1

Component Values

Pickup	Series resistance = $800\Omega \pm 10\%$ @ $25^\circ C$ , inductance = $1.35H$ @ $1.0kHz$ @ $15Vrms$
Coil	Leakage $L=0.6mH$ , primary $R=0.43\Omega \pm 5\%$ @ $25^\circ C$ , primary $L=7.5mH \sim 8.5mH$ @ $5.0A$
$R_L$	Load resistor for pickup = $12K\Omega \pm 20\%$
$R_1, R_2$	Input buffer resistors provide additional transient protection to the already clamped inputs = $20k \pm 20\%$
$C_1, C_2$	For reduction of high frequency noise and spark transients induced in pick-up and leads; optional and non-critical
$R_{BAT}$	Provides load dump protection (but small enough to allow operation at $V_{BAT} = 4.0V$ ) = $300\Omega \pm 20\%$
CFilter	Transient filter on $V_{CC}$ , non-critical
$C_{DWELL}$	Stores reference, circuit designed for $0.1\mu F \pm 20\%$
$R_{GAIN}$	$R_{GAIN}/R_{D1}$ sets the DC gain of the current regulator = $5.0k \pm 20\%$
$R_{D2}$	$R_{D2}/R_{D1}$ set up voltage feedback from $R_S$
$R_S$	Sense resistor ( $P_{DAG}$ in thick film techniques) = $0.075\Omega \pm 30\%$
$R_{DRIVE}$	Low enough to supply drive to the output Darlington, high enough to keep $V_{CE(SAT)}$ of the $I_C$ below Darlington turn-on during load dump = $100\Omega \pm 20\%$ , $5.0W$
$R_{D1}$	Starting with $35\Omega$ assures less than $5.5A$ , increasing as required to set $5.5A$ $R_{D1} = (I_{O(PEAK)} R_S - V_{REF}) / ((V_{REF}/R_{D2}) - (1.4/R_{GAIN})) \approx 100\Omega$

### ■ ABSOLUTE MAXIMUM RATINGS

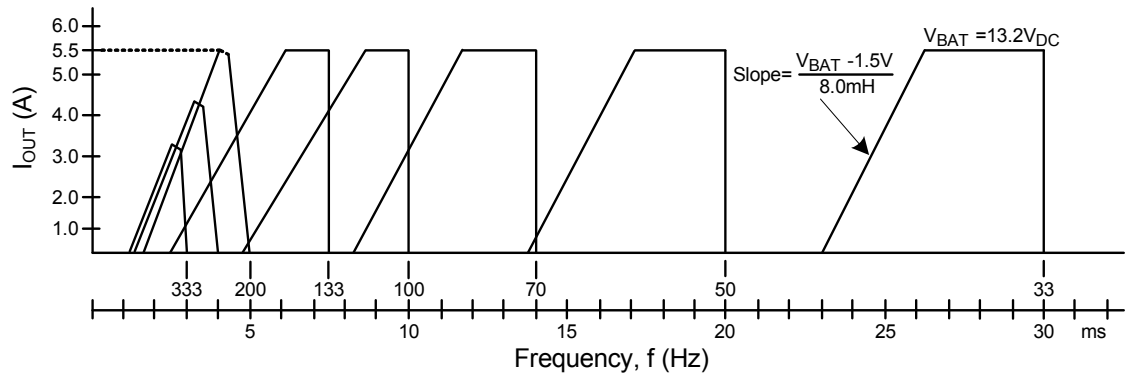
PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply Voltage-Steady State Transient 300ms or less	$V_{CC}$	24	V
		90	
Output Sink Current-Steady State Transient 300ms or less	$I_{OUT(SINK)}$	300	mA
		1.0	A
Power Dissipation Derate above 25°C	$P_D$	1.05	W
		12	mW/°C
Junction Temperature	$T_J$	+125	°C
Operating Temperature	$T_{OPR}$	-40~+125	°C
Storage Temperature	$T_{STG}$	-40 ~ 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ ELECTRICAL CHARACTERISTICS ( $V_{CC} = 13.2V_{DC}$ , circuit of Figure 3, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Internal Supply Voltage, Pin 6	$V_{CC}$	$V_{BAT} = 4.0V_{DC}$		3.5		$V_{DC}$
		$V_{BAT} = 8.0V_{DC}$		7.2		
		$V_{BAT} = 12.0V_{DC}$		10.4		
		$V_{BAT} = 14.0V_{DC}$		11.8		
Ignition Coil Current Peak, Cranking RPM 2.0Hz ~ 27Hz	$I_{PEAK}$	$V_{BAT} = 4.0V_{DC}$	3.0	3.4		$A_{PEAK}$
		$V_{BAT} = 6.0V_{DC}$	4.0	5.2		
		$V_{BAT} = 8.0V_{DC}$	4.6	5.3		
		$V_{BAT} = 10.0V_{DC}$	5.1	5.4		
Ignition Coil Current Peak, Normal RPM	$I_{PEAK}$	F=33Hz	5.1	5.5		$A_{PEAK}$
		F=133Hz	5.1	5.5		
		F=200Hz	4.2	5.4		
		F=267Hz	3.4	4.4		
		F=333Hz	2.7	3.4		
Ignition Coil On-Time, Normal RPM Range	$T_{ON}$	F=33Hz		7.5	14.0	ms
		F=133Hz		5.0	5.9	
		F=200Hz		4.0	4.6	
		F=267Hz		3.0	3.6	
		F=333Hz		2.3	2.8	
Shutdown Voltage	$V_{BAT}$		25	30	35	$V_{DC}$
Input Threshold (Static Test)	$V_{THR}$	Turn-on		360		mV <sub>DC</sub>
		Turn-off		90		
Input Threshold Hysteresis	$V_{HYS}$		75			mV <sub>DC</sub>
Input Threshold (Active Operation)	$V_{THR}$	Turn-on		1.8		$V_{DC}$
		Turn-off		1.5		
Total Circuit Lag from $t_s$ (Figure 1) until Ignition Coil Current Falls to 10%				60	120	$\mu s$
Ignition Coil Current Fall Time (90% ~ 10%)				4.0		$\mu s$
Saturation Voltage IC Output (Pin 7) ( $R_{DRIVE} = 100\Omega$ )	$V_{CE(SAT)}$	$V_{BAT} = 10V_{DC}$		120		mV <sub>DC</sub>
		$V_{BAT} = 30V_{DC}$		280		
		$V_{BAT} = 50V_{DC}$		540		
Current Limit Reference, Pin 8	$V_{REF}$		120	160	190	mV <sub>DC</sub>

■ IGNITION COIL CURRENT VS. FREQUENCY / PERIOD



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