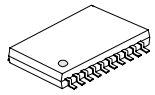
UAC3092A

LINEAR INTEGRATED CIRCUIT

ALTERNATOR VOLTAGE REGULATOR



SOP-20

*Pb-free plating product number: UAC3092AL

■ DESCRIPTION

The UTC **UAC3092A** is designed for Load Response Control and voltage regulation of diode rectified alternator charging systems for automotive applications.

■ FEATURES

* Forced load response control (LRC) with heavy load transitions at low RPM
* Voltage regulated to ± 0.1V @ 25°C
* External resistor adjustable operating frequency
* Regulation is effective with loads as high as 1.0A
* Load dump protection of lamp, field control devices, and loads
* Undervoltage, overvoltage , phase fault (broken belt) detection and duty cycle limited protections

■ ORDERING INFORMATION

Order Number		Package	Packing
Normal	Lead Free Plating		
UAC3092A-S20-R	UAC3092AL-S20-R	SOP-20	Tape Reel
UAC3092A-S20-T	UAC3092AL-S20-T	SOP-20	Tube

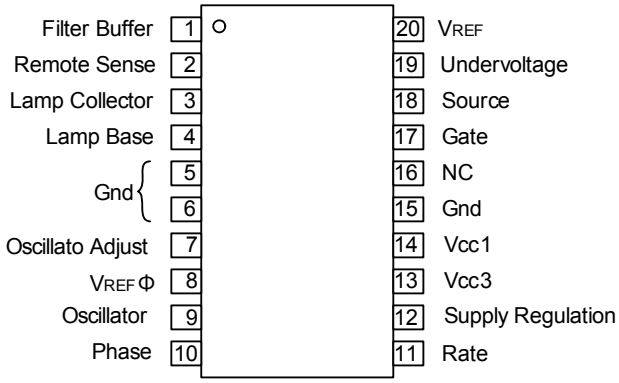
UAC3092AL-S20-R

(1)Packing Type — (1) R: Tape Reel, T: Tube

(2)Package Type — (2) S20: SOP-20

(3)Lead Plating — (3) L: Lead Free Plating, Blank: Pb/Sn

■ PIN CONFIGURATION

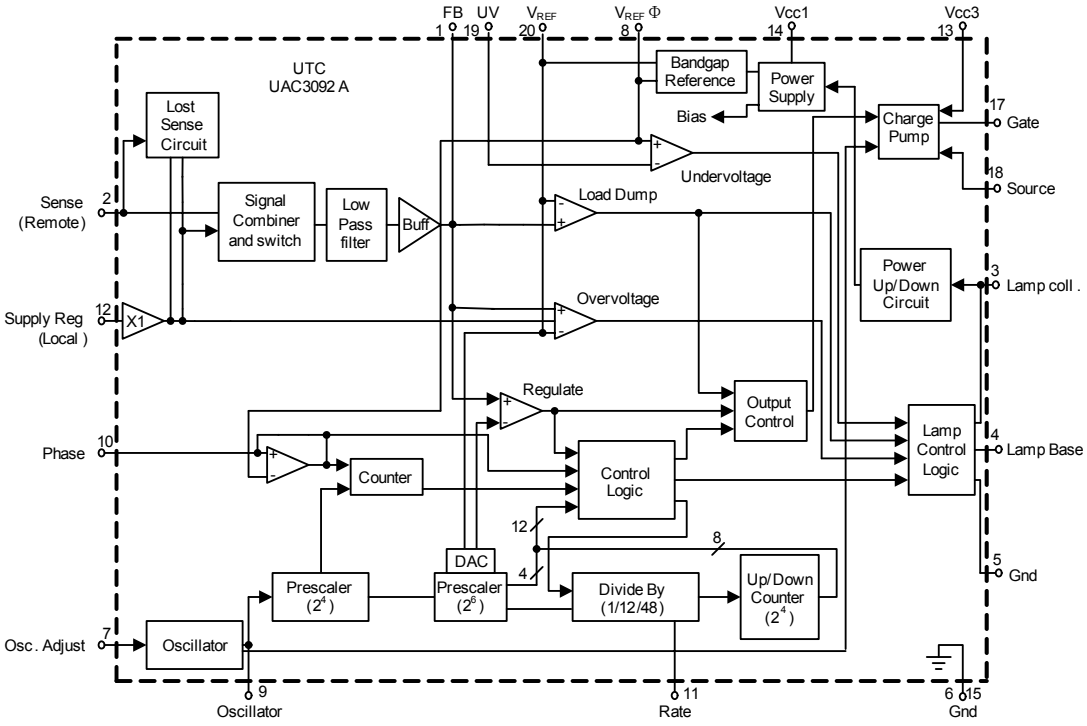


■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	FB	This pin provides Sense input or the Supply Regulation input.
2	Sense	The Sense input is input for the true battery voltage.
3	Lamp Collector and Power-Up/Down	This pin connects to drive the fault lamp. It is also used to sense a closed ignition switch (voltage sense).
4	Lamp Base	This pin provides base current to the fault lamp drive transistor (Q2).
5	Ground	This pin is for Ground return for the fault lamp control logic circuit.
6	Ground	IC ground
7	Oscillator Adjust	Connected to a resistor to ground that adjusts the internal oscillator frequency
8	$V_{REF}\Phi$	This is a pin for the 1.1 V ~ 1.4 V reference voltage test.
9	Oscillator	This is a pin for checking the operation of the internal oscillator.
10	Phase	The Phase input detects the existence of a magnetic field rotating within the alternator.
11	Rate	The Rate pin is Load Response Control recovery rate selector pin used to select a slow mode (floating) or fast mode (ground).
12	Supply Regulation	The Supply Regulation pin is used as a representation of the alternator output voltage. This input also used to monitor overvoltage or load dump conditions.
13	Vcc3	Voltage supply for the internal Charge Pump.
14	Vcc1	Voltage supply for the entire IC except for the Charge Pump.
15	Ground	Ground for the IC.
16	N/C	No connection.
17	Gate	The Gate Controls of the MOSFET used to energize the field winding.
18	Source	MOSFET source reference for Field winding control.
19	Undervoltage	If this pin have voltage goes below 1.0 V, the fault lamp is turn on. The IC will continue to function, but with limited performance.
20	V_{REF}	Pin for the Band gap reference voltage 1.7 V ~ 2.3 V.

Note: Pin 8, and 20 are test points only

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply Voltage Load Dump Transient Voltage (Note 1) Negative Voltage (Note 2)	V_{BAT} $+V_{MAX}$ $-V_{MIN}$	24 40 -2.5	V
Power Dissipation (Ta=125℃)	P_D	867	m/W
Operating Junction Temperature	T_J	+150	℃
Operating Ambient Temperature Range	T_{OPR}	-35 ~ +125	℃
Storage Temperature Range	T_{STG}	-45 ~ +150	℃

Note: 1. 125 ms wide square wave pulse.
2. Maximum time = 2 minutes.
3. 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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance, Junction to Ambient	θ_{JA}	75	°C/W

■ ELECTRICAL CHARACTERISTICS

(External components per Figure 1,Ta=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DC CHARACTERISTICS						
Regulation Voltage	V_{REG}	Determined by external resistor divider		14.85		V
Regulation Voltage Temperature Coefficient	T_C		-13	-11	-9.0	mV/℃
Suggested Battery Voltage Operating Range	V_{BAT}		11.5	14.85	16.5	V
Power Up/Down Threshold Voltage (Pin 3)	V_{PWR}		0.5	1.2	2.0	V
Standby Current	I_{Q1} I_{Q2}	V_{BAT}=12.8V, Ignition off, Ta=25℃ V_{BAT}=12.8V, Ignition off, -35℃≤Ta≤125℃		1.3	2.0 3.0	mA
Zero Temperature Coefficient Reference Voltage, (Pin 8)	$V_{REF\varphi}$		1.1	1.25	1.4	V
Band Gap Reference Voltage (Pin 20)	V_{REF}		1.7	2.0	2.3	V
Band Gap Reference Temperature coefficient	TC		-13	-11	-9.0	mV/℃
Sense Loss Threshold (Pin 2)	$S_{LOSS\ (TH)}$			0.6	1.0	V
Phase Detection Threshold Voltage (Pin 10)	P_{TH}		1.0	1.25	1.5	V
Phase Rotation Detection Frequency (Pin 10)	P_{ROT}			36		Hz
Undervoltage Threshold (Pin 19)	U_{UV}		1.0	1.25	1.5	V
Overvoltage Threshold	V_{OV}	Pin 2, or Pin 12 if Pin 2 is not used	$1.09(V_{REF})$	$1.12(V_{REF})$	$1.16(V_{REF})$	V
Load Dump Threshold	V_{LD}	Pin 2, or Pin 12 if Pin 2 is not used	$1.33(V_{REF})$	$1.4(V_{REF})$	$1.48(V_{REF})$	V

■ ELECTRICAL CHARACTERISTIC(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Fundamental Regulation Output Frequency. (Pin 17)	f	Clock oscillator frequency divided by 4096		68		Hz
Suggested Clock Oscillator Frequency Range, (Pin 9)	f_{osc}	Determined by external resistor, R_T	205	280	350	kHz
Duty Cycle (Pin 17) At Start-up During Overvoltage Condition	 StartDC OV_{DC}		 27 3.5	 29 4.7	 31 5.5	 % %
Low/High RPM Transition Frequency (Pin 10)	LRC_{Freq}		247	273	309	Hz
LRC Duty Cycle Increase Rate	LRC_S LRC_F LRC_H	Low RPM Mode(LRCFreq<247Hz) Pin 11 =Open (Slow Rate) Low RPM Mode(LRCFreq<247Hz) Pin 11 =Grounded (Fast Rate) High R PMMode(LRCFreq>309Hz) Pin 11 = Don't Care (LRC Mode is disabled)	8.5 34 409	9.5 38 455	10.5 42 501	%/sec