View Single Post **Thread**: simple high current balancer

Sep 15, 2004, 10:45 AM #76

Larry3215
Look out for that tree!

Join Date: Sep 2003
Location: Bremerton, Washington, United States
Posts: 1,773

Here is the parts list from the order. I will look and eyeball them when I get home.

9 652-MFR185 9 0.580 5.22
1.85A 30V
Bourns Radial Lead Resettable Fuses

9 567-290-1AB 9 0.380 3.42
TO-220 VERT/HORZ BLK
Wakefield Heatsink

9 512-KSP2907ACTA 9 0.090 0.81
.
Fairchild Small Signal Transistors

9 511-TL431ACZ 9 0.280 2.52
2.5-36V Prog Adjust
ST Voltage References

9 604-L934SGC 9 0.180 1.62
GREEN WATER CLEAR
Kingbright LED Super Bright

9 531-PT10MH-1K 9 0.400 3.60
10MM RND 1K OHM
Piher Trimmer Potentiometers

9 511-TIP137 9 0.680 6.12
PNP Power Darlington
ST Power Bipolar Transistors

18 71-RN60D-F-330K 18 0.210 3.78
1% 330K OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 71-RN60D-F-45.3 9 0.210 1.89
1/4W 1% 45.3 OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 71-RN60D-F-75 9 0.210 1.89
1/4W 1% 75 OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 71-RN60D-F-1.0K 9 0.210 1.89
1/4W 1% 1K OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 71-RN60D-F-15K 9 0.210 1.89
1/4W 1% 15K OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 71-RN60D-F-10K 9 0.210 1.89
1/4W 1% 10K OHM
Vishay/Dale 1/4W 1% Metal Film Resistors

9 280-CR5-1.0 9 0.390 3.51

PWR 5W 1.0
Xicon 5W 5% Cement Power Resistors

9 539-CK06104K 9 0.600 5.40
100V 0.1uF 10%
Mallory Monolithic Ceramic Capacitors

Larry

Quote

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Sep 16, 2004, 11:32 PM #105

DNA
Registered User

Join Date: Jun 2001
Location: NE Ohio
Posts: 3,169

Correct digikey part number for the LED transistor is . . . .

2N3906FS-ND

Larry, are your Suzanne balancers still working ok?

Quote

Close this window

PN2907A

SMALL SIGNAL PNP TRANSISTOR

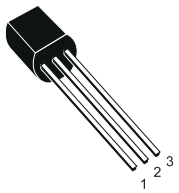
PRELIMINARY DATA

Ordering Code	Marking	Package / Shipment
PN2907A	PN2907A	TO-92 / Bulk
PN2907A-AP	PN2907A	TO-92 / Ammopack

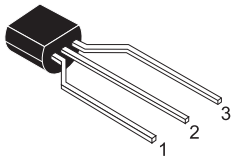
- SILICON EPITAXIAL PLANAR PNP TRANSISTOR
- TO-92 PACKAGE SUITABLE FOR THROUGH-HOLE PCB ASSEMBLY
- THE NPN COMPLEMENTARY TYPE IS PN2222A

APPLICATIONS

- WELL SUITABLE FOR TV AND HOME APPLIANCE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE

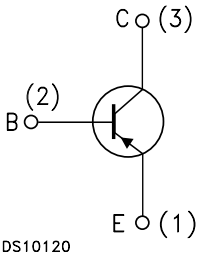


TO-92
Bulk



TO-92
Ammopack

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Emitter Voltage (I_E = 0)	-60	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	-60	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	-5	V
I_C	Collector Current	-0.6	A
I_{CM}	Collector Peak Current (t_p < 5 ms)	-0.8	A
P_{tot}	Total Dissipation at T_{amb} = 25 ^oC	500	mW
T_{stg}	Storage Temperature	-65 to 150	^oC
T_j	Max. Operating Junction Temperature	150	^oC

THERMAL DATA

$R_{thj\text{-}amb}$ •	Thermal Resistance Junction-Ambient	Max	250	$^oC/W$
$R_{thj\text{-}case}$ •	Thermal Resistance Junction-Case	Max	83.3	$^oC/W$

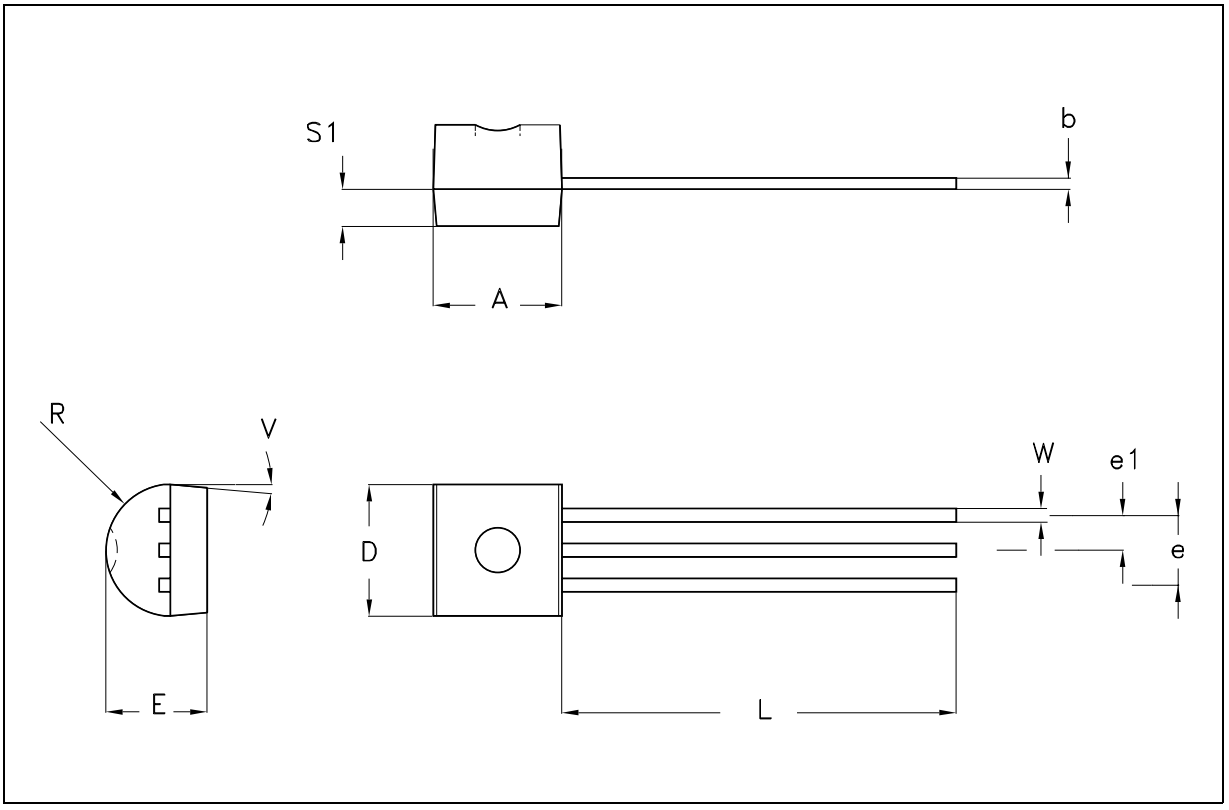
ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEX}	Collector Cut-off Current (V_{BE} = -3 V)	V_{CE} = -30 V			-50	nA
I_{BEX}	Base Cut-off Current (V_{BE} = -3 V)	V_{CE} = -30 V			-50	nA
I_{CBO}	Collector Cut-off Current (I_E = 0)	V_{CB} = -50 V			-10	nA
$V_{(BR)CEO}$*	Collector-Emitter Breakdown Voltage (I_B = 0)	I_C = -10 mA	-60			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage (I_E = 0)	I_C = -10 µA	-60			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_E = -10 µA	-5			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = -150 mA I_B = -15 mA I_C = -500 mA I_B = -50 mA			-0.4 -1.6	V V
$V_{BE(sat)}$*	Collector-Base Saturation Voltage	I_C = -150 mA I_B = -15 mA I_C = -500 mA I_B = -50 mA			-1.3 -2.6	V V
h_{FE}*	DC Current Gain	I_C = -0.1 mA V_{CE} = -10 V I_C = -1 mA V_{CE} = -10 V I_C = -10 mA V_{CE} = -10 V I_C = -150 mA V_{CE} = -10 V I_C = -500 mA V_{CE} = -10 V	75 100 100 100 50		 300 	
f_T	Transition Frequency	I_C = -50 mA V_{CE} = -20V f = 100MHz	200			MHz
C_{CBO}	Collector-Base Capacitance	I_E = 0 V_{CB} = -10 V f = 1 MHz			8	pF
C_{EBO}	Emitter-Base Capacitance	I_C = 0 V_{EB} = -2 V f = 1 MHz			30	pF
t_d	Delay Time	I_C = -150 mA I_B = -15 mA V_{CC} = -30V			10	ns
t_r	Rise Time				40	ns
t_{on}	Switching On Time				45	ns
t_s	Storage Time	I_C = -150 mA I_{B1} = -I_{B2} = -15mA V_{CC} = -30V		190		ns
t_f	Fall Time				30	ns
t_{off}	Switching Off Time			220		ns

* Pulsed: Pulse duration = 300 µs, duty cycle ≤ 2 %

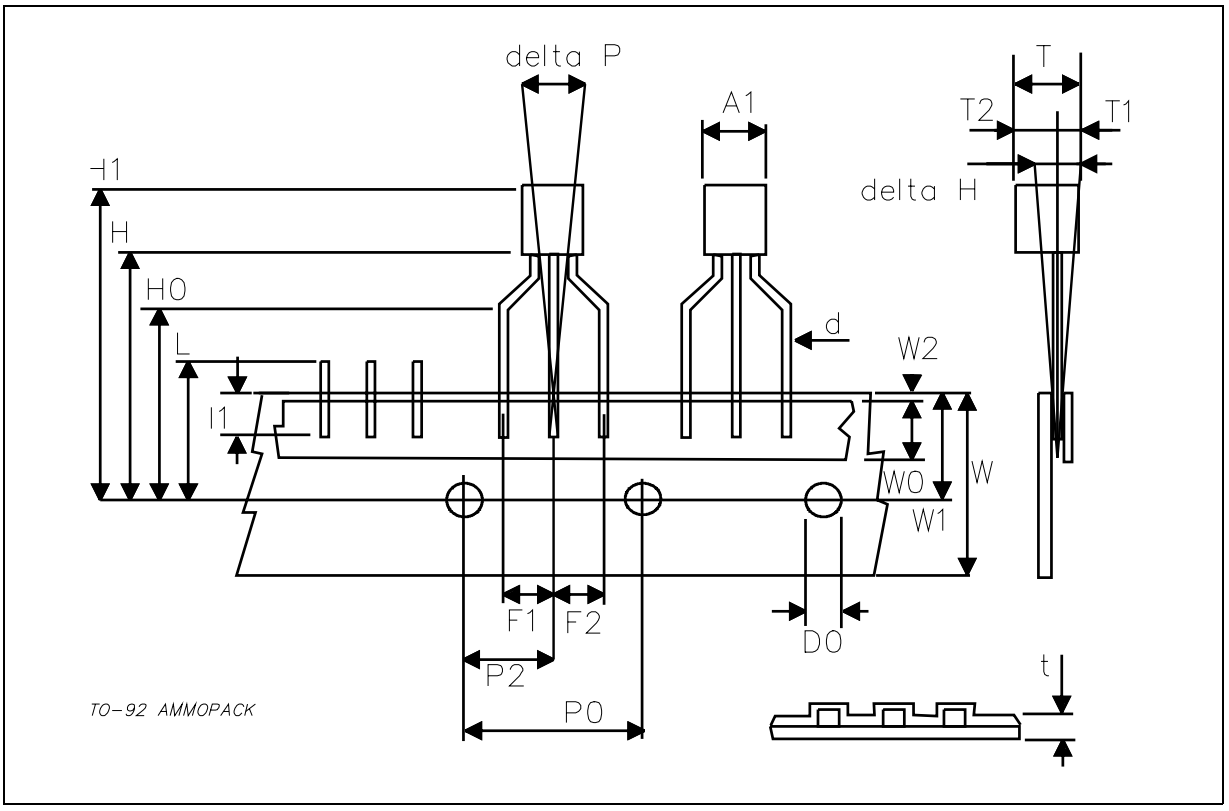
TO-92 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.32		4.95	0.170		0.195
b	0.36		0.51	0.014		0.020
D	4.45		4.95	0.175		0.194
E	3.30		3.94	0.130		0.155
e	2.41		2.67	0.095		0.105
e1	1.14		1.40	0.045		0.055
L	12.70		15.49	0.500		0.609
R	2.16		2.41	0.085		0.094
S1	1.14		1.52	0.045		0.059
W	0.41		0.56	0.016		0.022
V	4 degree		6 degree	4 degree		6 degree



TO-92 AMMOPACK SHIPMENT (Suffix"-AP") MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A1			4.80			0.189
T			3.80			0.150
T1			1.60			0.063
T2			2.30			0.091
d			0.48			0.019
P0	12.50	12.70	12.90	0.492	0.500	0.508
P2	5.65	6.35	7.05	0.222	0.250	0.278
F1,F2	2.44	2.54	2.94	0.096	0.100	0.116
delta H	-2.00		2.00	-0.079		0.079
W	17.50	18.00	19.00	0.689	0.709	0.748
W0	5.70	6.00	6.30	0.224	0.236	0.248
W1	8.50	9.00	9.25	0.335	0.354	0.364
W2			0.50			0.020
H	18.50		20.50	0.728		0.807
H0	15.50	16.00	16.50	0.610	0.630	0.650
H1			25.00			0.984
D0	3.80	4.00	4.20	0.150	0.157	0.165
t			0.90			0.035
L			11.00			0.433
l1	3.00			0.118		
delta P	-1.00		1.00	-0.039		0.039



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Sep 15, 2004, 12:59 AM

Larry3215
Look out for that tree!

Join Date: Sep 2003
Location: Bremerton, Washington, United States
Posts: 1,773

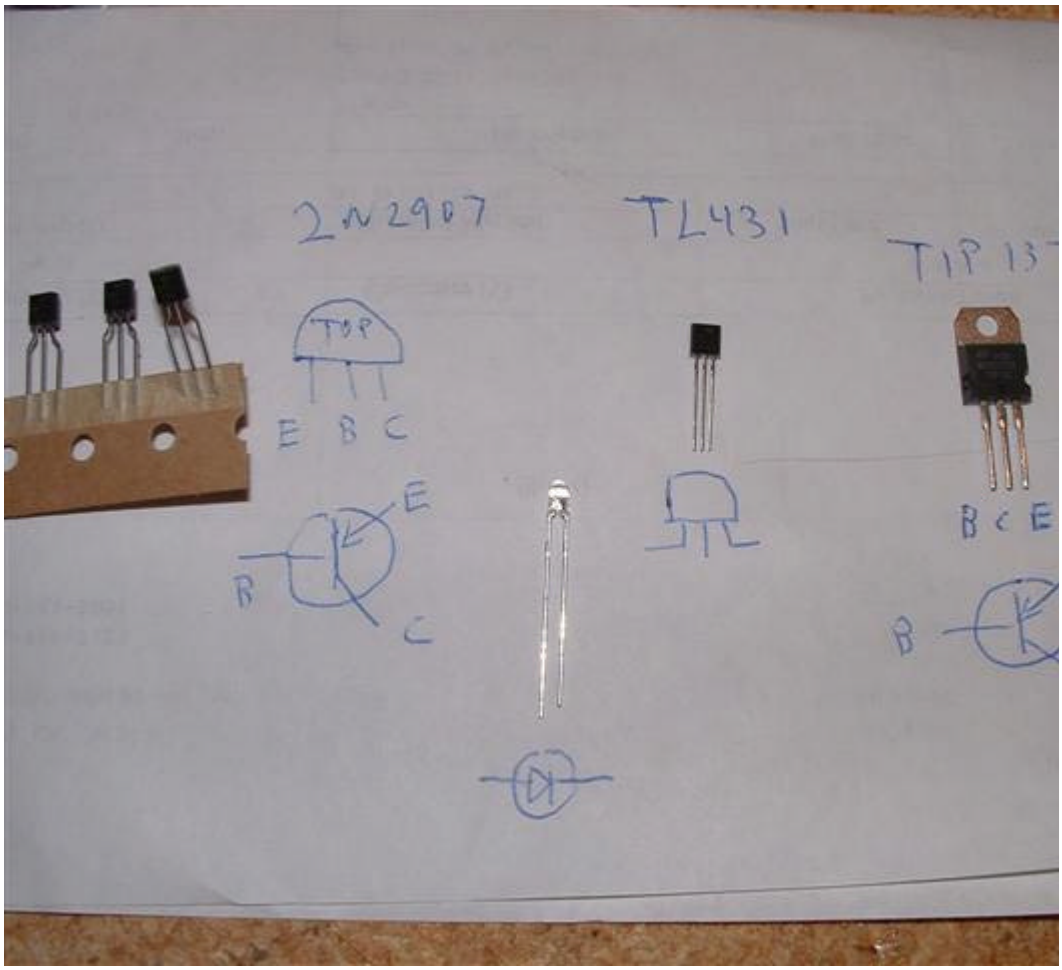
More pics - here is how I am doing the pinouts.

The 431 is viewed from the top as well.

The LED has one short leg and thats how I orient it.

Larry

Attached Images



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View Single Post **Thread**: simple high current balancer

Sep 12, 2004, 11:54 PM #51

dowd
Registered User

Join Date: Aug 2004
Posts: 74

You mentioned using your battery to test this circuit. Be VERY CAREFUL attaching a battery until this circuit is checked out and adjusted. This circuit is designed to provide basically a short circuit to the input if the input is above the set voltage. If your battery happens to be above the set voltage then the circuit will put a short on the battery causing a high discharge current. Fortunately there is a resettable fuse in the circuit to address this. But don't tempt fate.

If you are going to hook up a battery to the circuit before it is all set up, then put a small resister in series with the battery to protect the battery. Do you have a resister in the range of 0.1 to 100 ohms? Hmm, I guess you could even use a larger resister and it would work OK. The main thing is to protect your battery from a short while adjusting this circuit.

But the fact that you can set the voltage between 4.05 and 4.35 volts is excellent. This is the exact range of voltage you would expect based on the resister values Dan specified for the 431. So it seems that your circuit is basically working properly. By that I mean that the 431 is turning on the darlington transistor at the right voltage so everything except the LED circuit is doing what it should. Since you used a different transistor to drive the LED than Dan did, it is likely you just need a slightly different bias circuit than Dan had on the transistor driving the LED. So this is probably not a big problem.

First understand what the circuit is doing. The 431 acts like an adjustable zener diode. The voltage divider formed by the two fixed resisters and the pot control the "zener" voltage. If the input of the 431 coming from the pot goes above 2.5 volts, the 431 will turn on and turn on both the LED transistor and the darlington transistor. The darlington just provides the ability to handle more current and makes sure you keep a nice sharp knee. The other transistor is just there to turn on the LED at the right voltage.

The fact that the LED is on while you have the power supply and resister hooked up is fine. The circuit is conducting all of the time so that the LED should be on. But the fact that you connected the 3.3 volt battery to it and the LED was still on seems to indicate that the LED driving the transister is never turning off. If you hooked up the LED circuit per the diagram, you may need to add a pullup resister from the base of that 2N2907 up to the battery input to get the LED to come on and off when you want it to.

Here is what you might do to get your LED working right:
-First set the voltage on the circuit. Maybe start with a setting of 4.25 volts. (but deciding on the exact right voltage could be a whole thread all by itself)
-Then you need to provide an input voltage just below this set point to test your LED driver. Maybe provide a voltage of about 4.15 or 4.2V. Maybe you could use a voltage divider off of your power supply to get the proper voltage, or better yet maybe your power supply is adjustable. If you want to use your battery as the test voltage then remember what I said about protecting it.
-Now you need to play with the biasing of the transistor for the

LED, Maybe adding the pullup resister or changing the value of the base resister. Start with maybe adding a 10kohm pullup and go up or down in resister value as necessary to get the LED just barely lit up. As you put a smaller value pullup resister (like maybe a 5K instead of the 10K I suggested) it will pull the base of the 2N2907 up towards the emitter and turn it off, which would tend to turn off the LED.

Two important things to remember:
1.Protect the battery with a resister(Yeah, I'm a broken record-sorry about that)
2.I said "maybe" a lot because I'm just sitting at my computer with no components around me and haven't breadboarded anything. So take everything I say with a grain of salt and see what dan has to say about this.

Dowd

Quote

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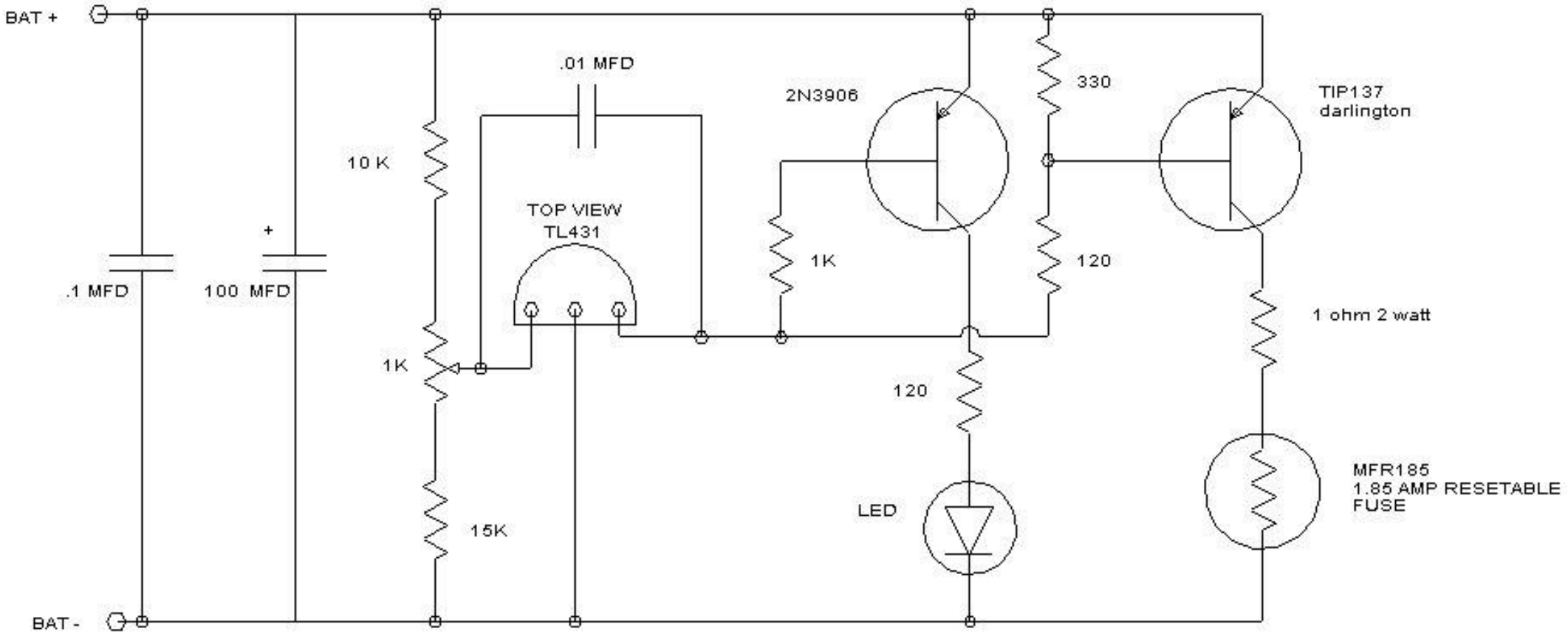
BAT +
.1 MFD
+
100 MFD
10 K
.01 MFD
TOP VIEW
TL431
1K
15K
2N3906
1K
330
120
120
LED
TIP137
darlington
1 ohm 2 watt
MFR185
1.85 AMP RESETABLE
FUSE
BAT -