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LED Driver for Light Band Displays

UAA 180

Bipolar IC

Integrated circuit for driving 12 light emitting diodes. Corresponding to the input voltage, LEDs forming a light band are controlled similar to a thermometer scale.

By using an appropriate circuitry the brightness of the LEDs can be varied and the light passage between two adjacent LEDs can be set between "smooth" and "abrupt".

Type	Ordering Code	Package
UAA 180	Q67000-A1104	P-DIP-18

Absolute Maximum Ratings

Parameter	Symbol	Limit Values	Unit
Supply voltage	V_S	18	V
Input voltage	V_3	6	V
	V_{16}	6	V
	V_{17}	6	V
Storage temperature range	T_{stg}	- 40 to 125	°C
Junction temperature	T_j	150	°C
Thermal resistance (system-air)	$R_{th SA}$	78	K/W

Operating Range

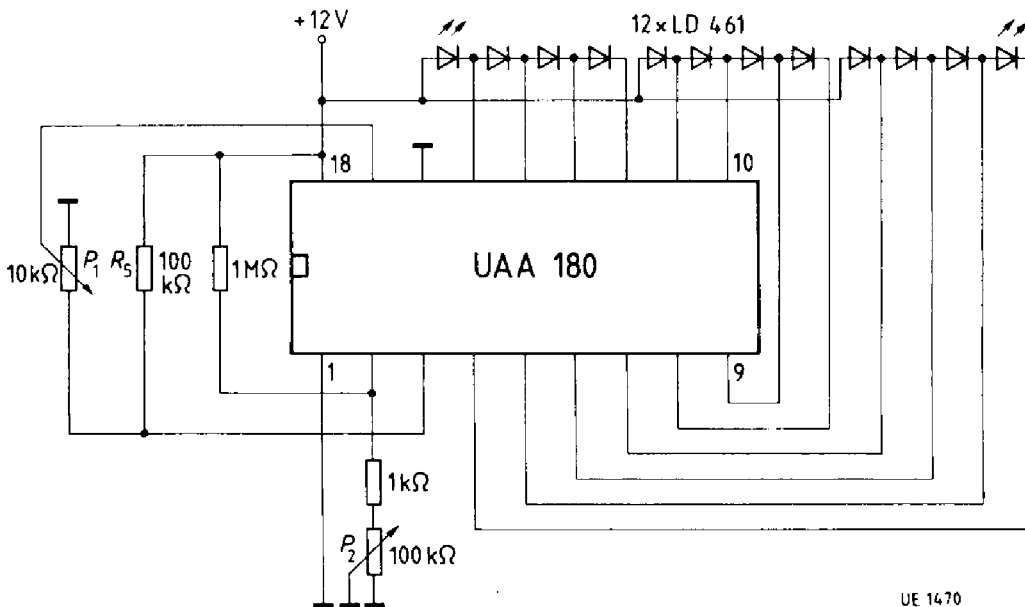
Supply voltage	V_S	10 to 18	V
Ambient temperature	T_A	- 25 to 85	°C

Characteristics

$V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Current consumption ($I_2 = 0$) (without LED current)	I_{18}		5.5	8.2	mA
Input currents $V_3 - V_{16} < 2\text{ V}$	I_3		0.3	1	μA
	I_{16}		0.3	1	μA
	I_{17}		0.3	1	μA
Voltage difference for smooth light transition	$\Delta V_{16/3}$	1.0			V
Voltage difference for abrupt light transition	$\Delta V_{16/3}$	4.0			V
Diode current per diode	I_D		10		mA
Tolerance of LED forward voltages	ΔV_D			1.0	V

Measurement Circuit



P 1 Light Band Test
P 2 Brightness Test



Scale Display with Light Emitting Diodes

Scale displays by means of a growing light band are particularly suitable for the measuring of approximate values. Applications of this kind are level sensors, VU meters, tachometers, field strength indicators etc. When applying the displays in measuring equipment, multicolored LEDs can be used as range limitation.

The voltage difference between pins 16 and 3 thereby corresponds to the possible indication range. $\Delta V_{16/3}$ defines at the same time the light passage between two diodes. With $\Delta V_{16/3} \geq 1 \text{ V}$, the light band glides smoothly along the scale. With increasing voltage difference, the passage becomes more abrupt. With $\Delta V_{16/3}$, approx. 4 V, the light band jumps from diode to diode.

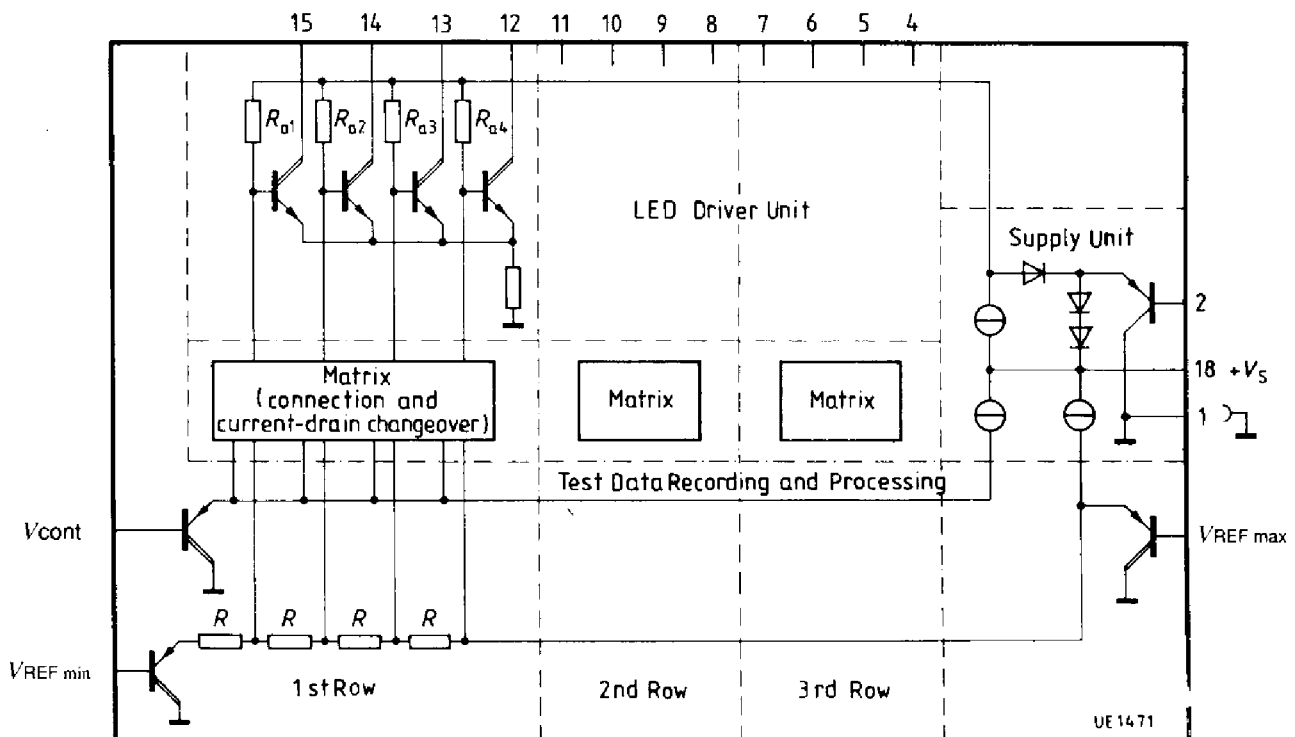
Each quartet must consist of identical diodes in order to maintain its functional characteristics.

It is therefore possible to design the first and third quartet as diodes emitting the color red and the second quartet as diodes emitting the color green to delineate a certain operational area.

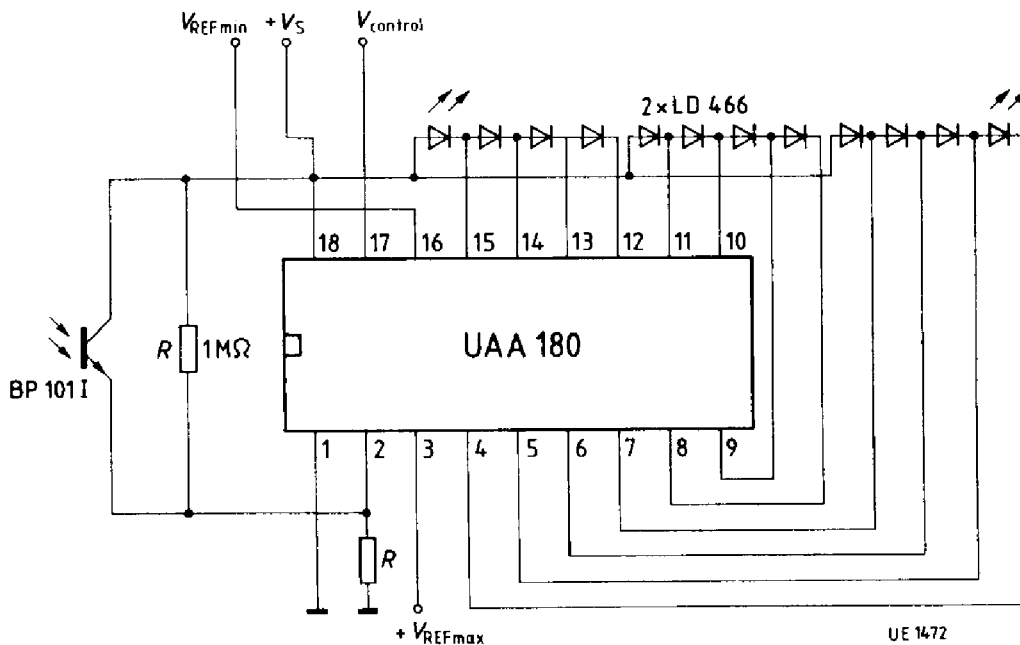
Pin 2 serves to determine the diode current. Corresponding to the desired light intensity, the forward current of the diodes is variably linear in the range I_f approx. 0 to 10 mA.

Application circuit 1 shows the possibility of designing this resistance to be adjustable by means of a phototransistor BP 101, in order to adapt the light intensity to changing ambient brightness. The adjusting range of the diode current lies between I_f approx. 5 mA (BP 101 not lit) and I_f approx. 10 mA (BP 101 fully lit). If pin 2 is open the diode current is 10 mA.

Block Diagram

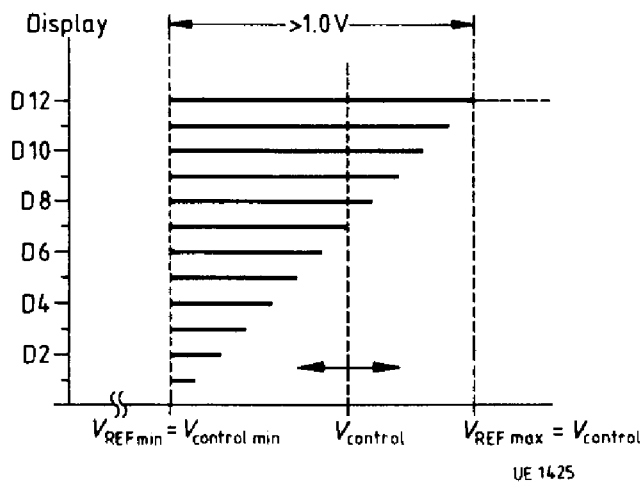


Application Circuit 1



$R = 2.2 \text{ k}\Omega \dots 100 \text{ k}\Omega$

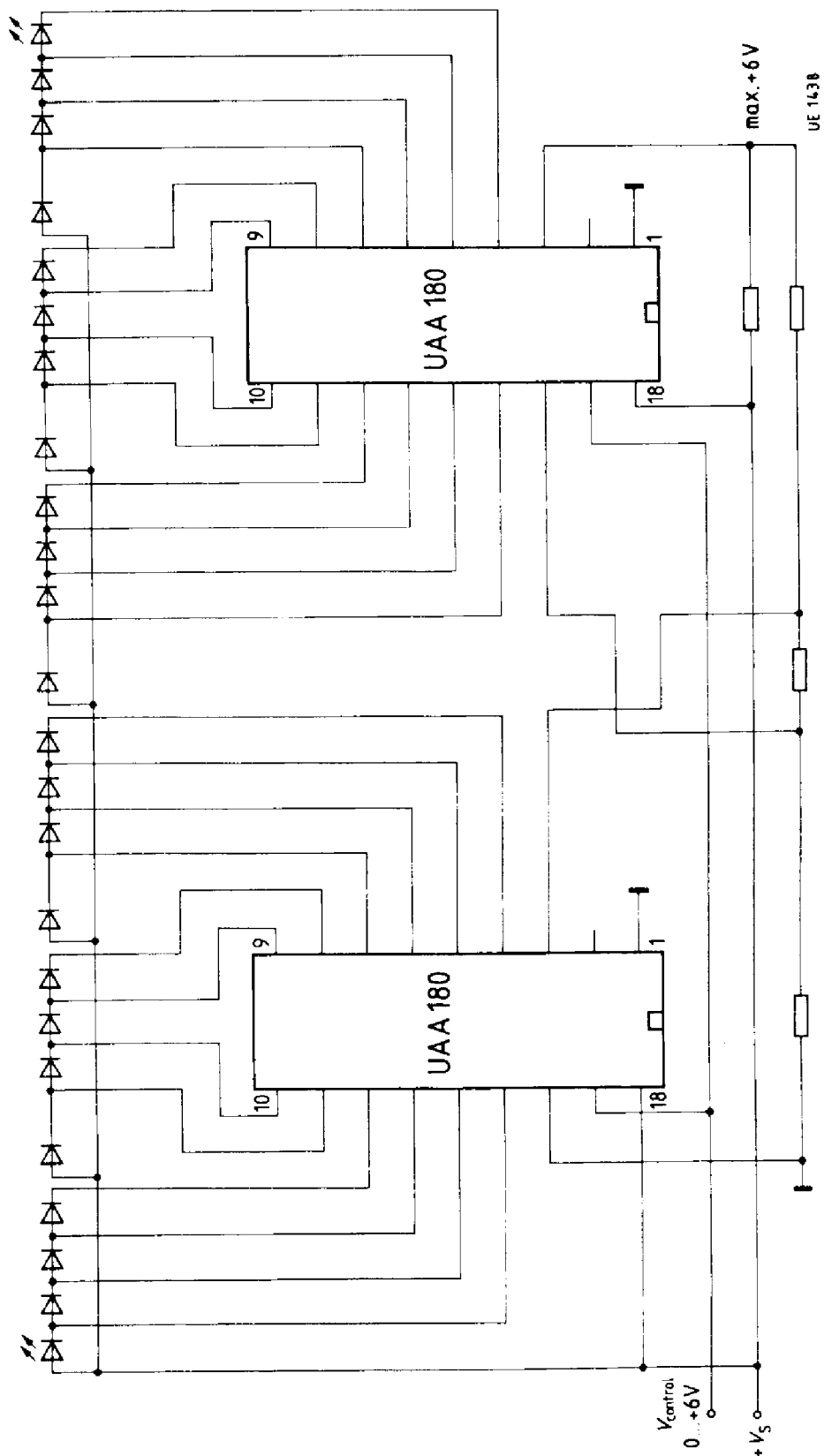
LED display versus control current



If a quartet does not need the full number of display diodes and if the first connected diodes shall be left luminous at full driving, bridges have to be inserted replacing the missing LEDs. Otherwise the first diodes of the quartet switch off when their display range is exceeded.



Application Circuit 2
for cascading several UAA 180 ICs (up to 7)



Application Circuit 3
for field strength indication

