

# Electro Workshop 5

## Dekorácia s LED diódami

Ing. Gabriel Války, PhD.



EURÓPSKA ÚNIA

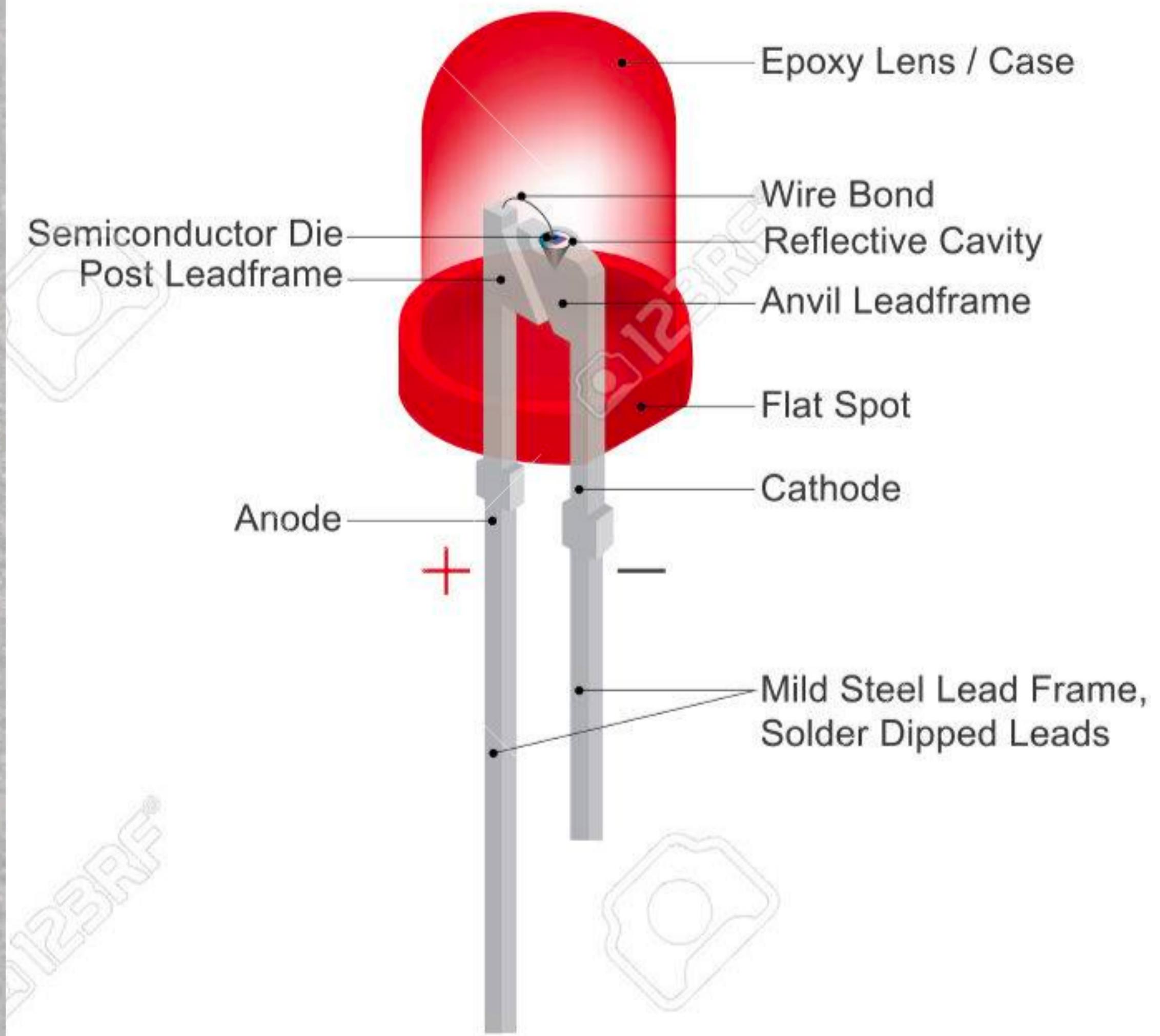
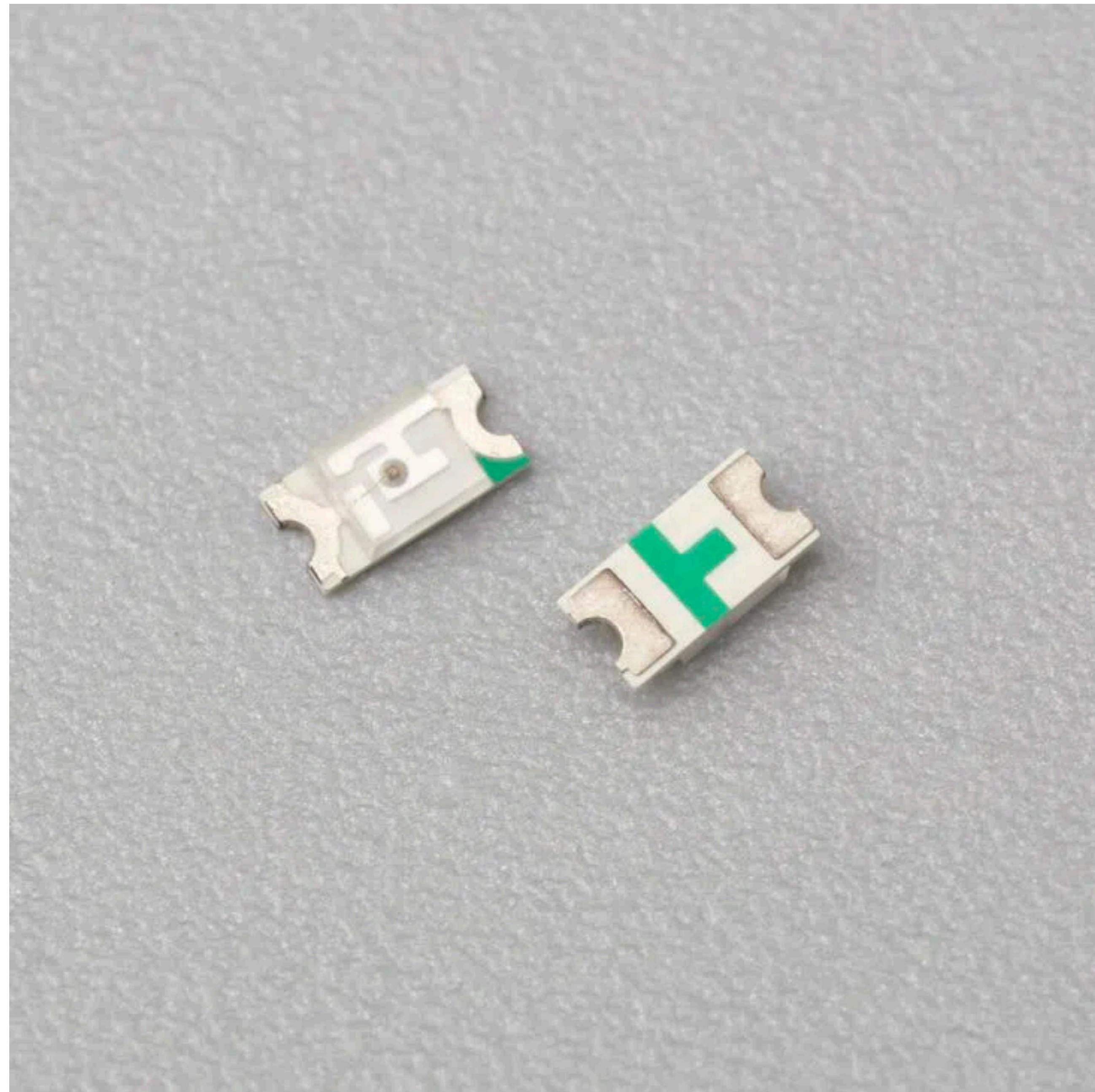
Európsky fond regionálneho rozvoja  
OP Integrovaná infraštruktúra 2014 – 2020



MINISTERSTVO  
DOPRAVY A VÝSTAVBY  
SLOVENSKEJ REPUBLIKY

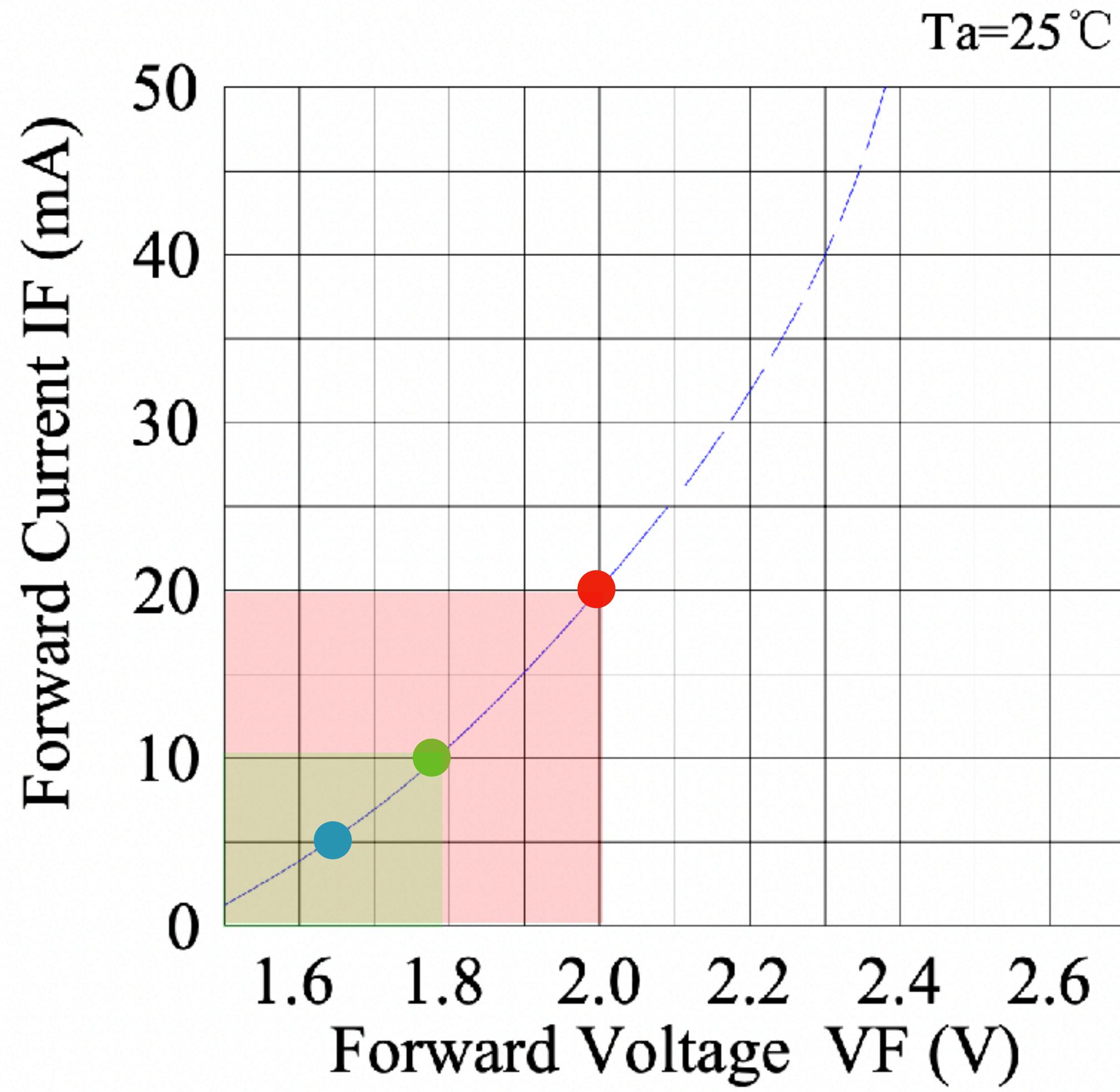


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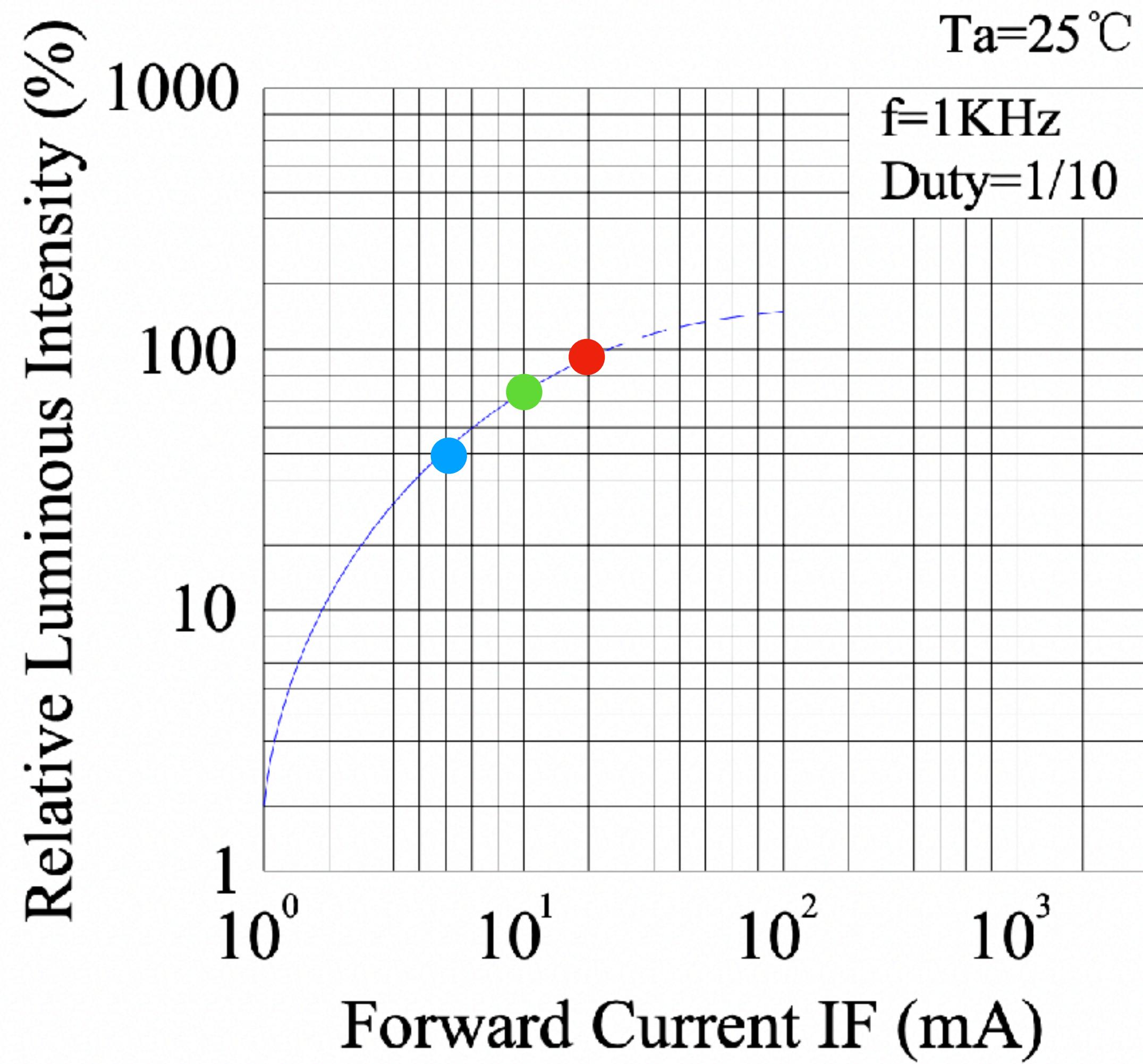


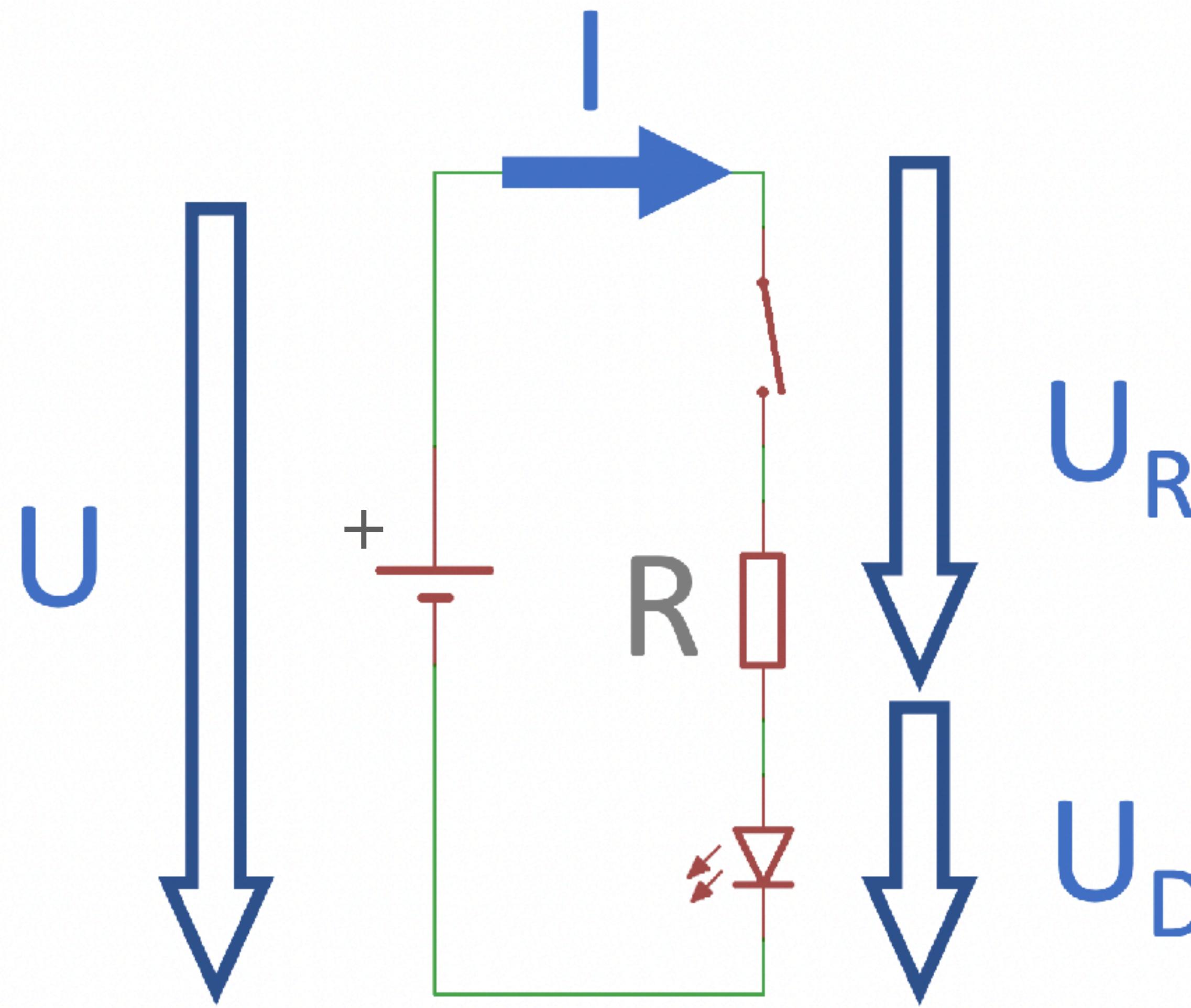
<i>comparison</i>	Metric code	Imperial code	<i>comparison</i>
0.1x0.1 mm	0402	01005	0.01x0.01 in
	0603	0201	(10x10 mils)
	1005	0402	
	1608	0603	
1x1mm	2012	0805	■ 0.1x0.1 in
	2520	1008	(100x100 mils)
	3216	1206	
	3225	1210	
	4516	1806	
	4532	1812	
	5025	2010	
1x1 cm	6332	2512	■ 0.5x0.5in (500x500 mils)
		Actual size	

## Forward Current & Forward Voltage



## Luminous Intensity & Forward Current





$$U = U_R + U_D$$

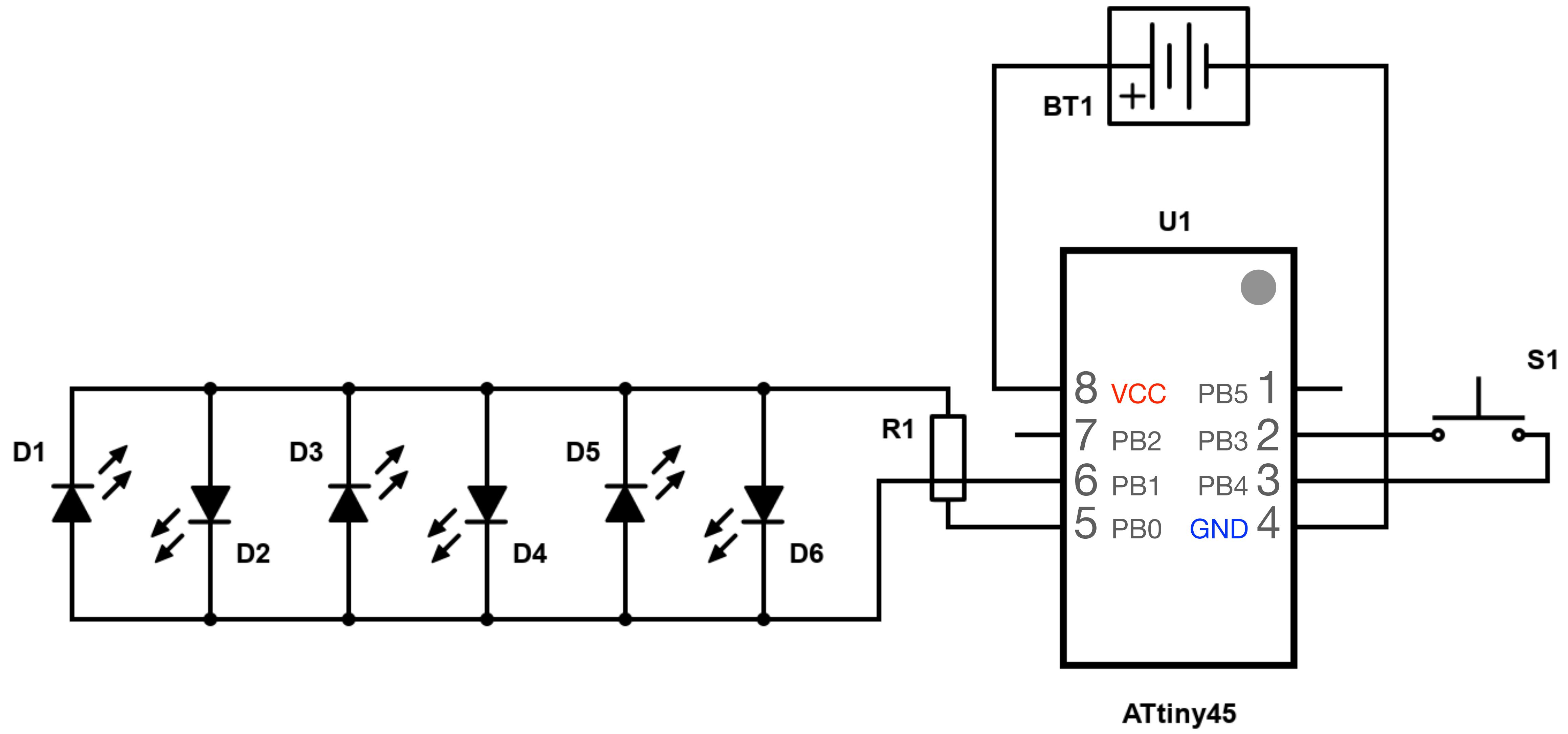
$$U = I \cdot R + U_D$$

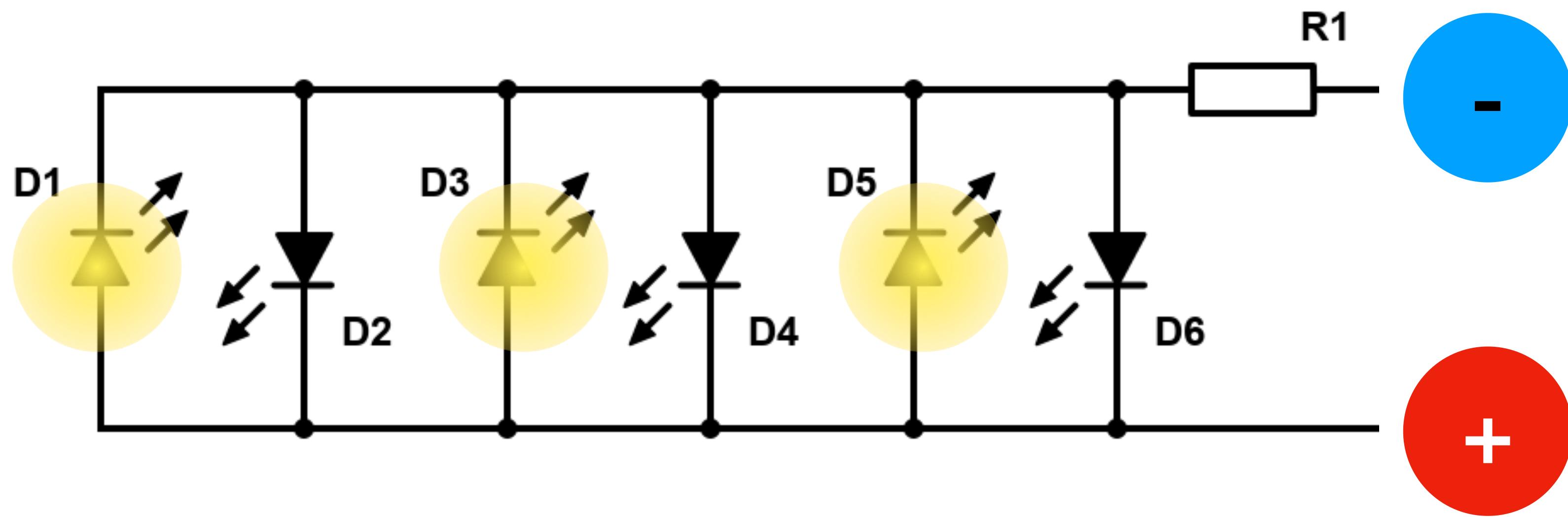
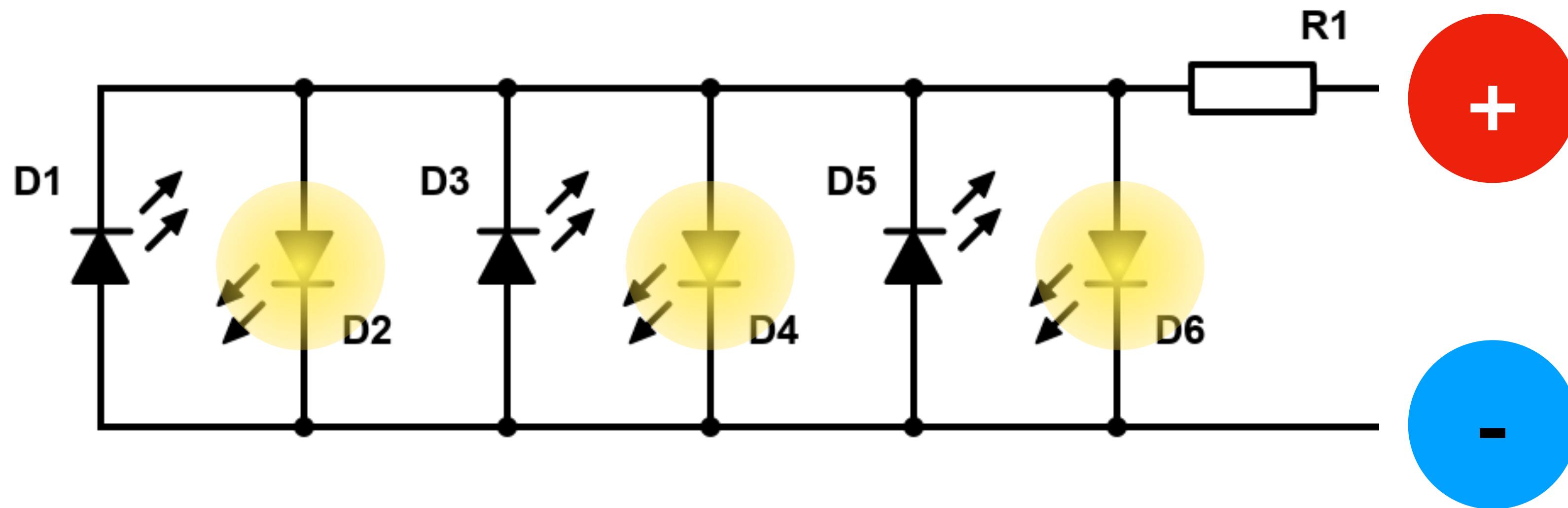
$$4.5V = 20mA \cdot R + 2V$$

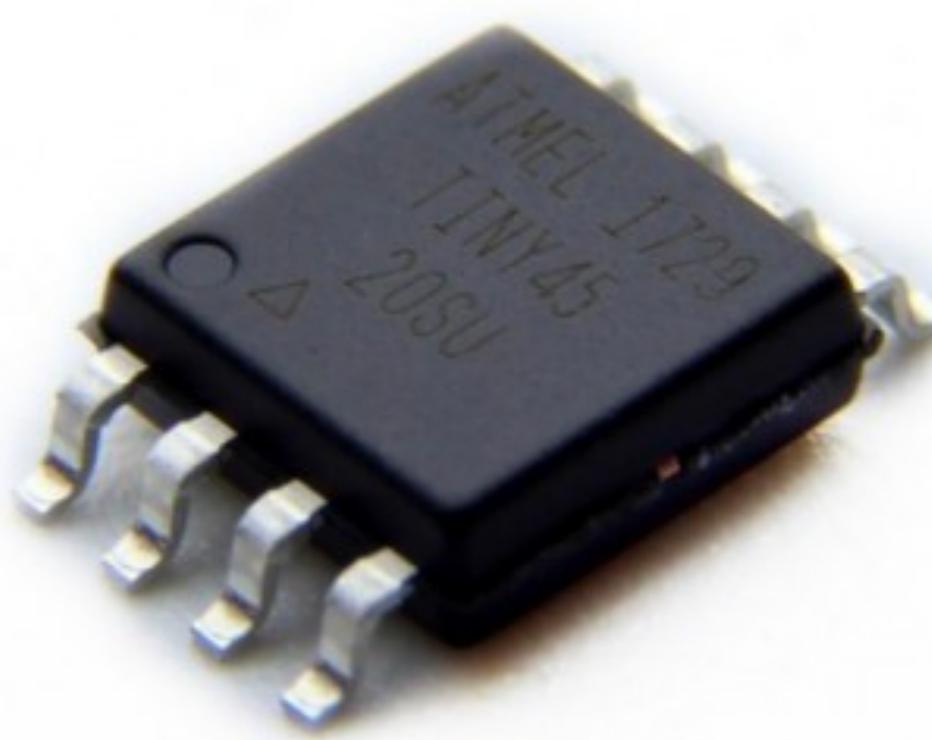
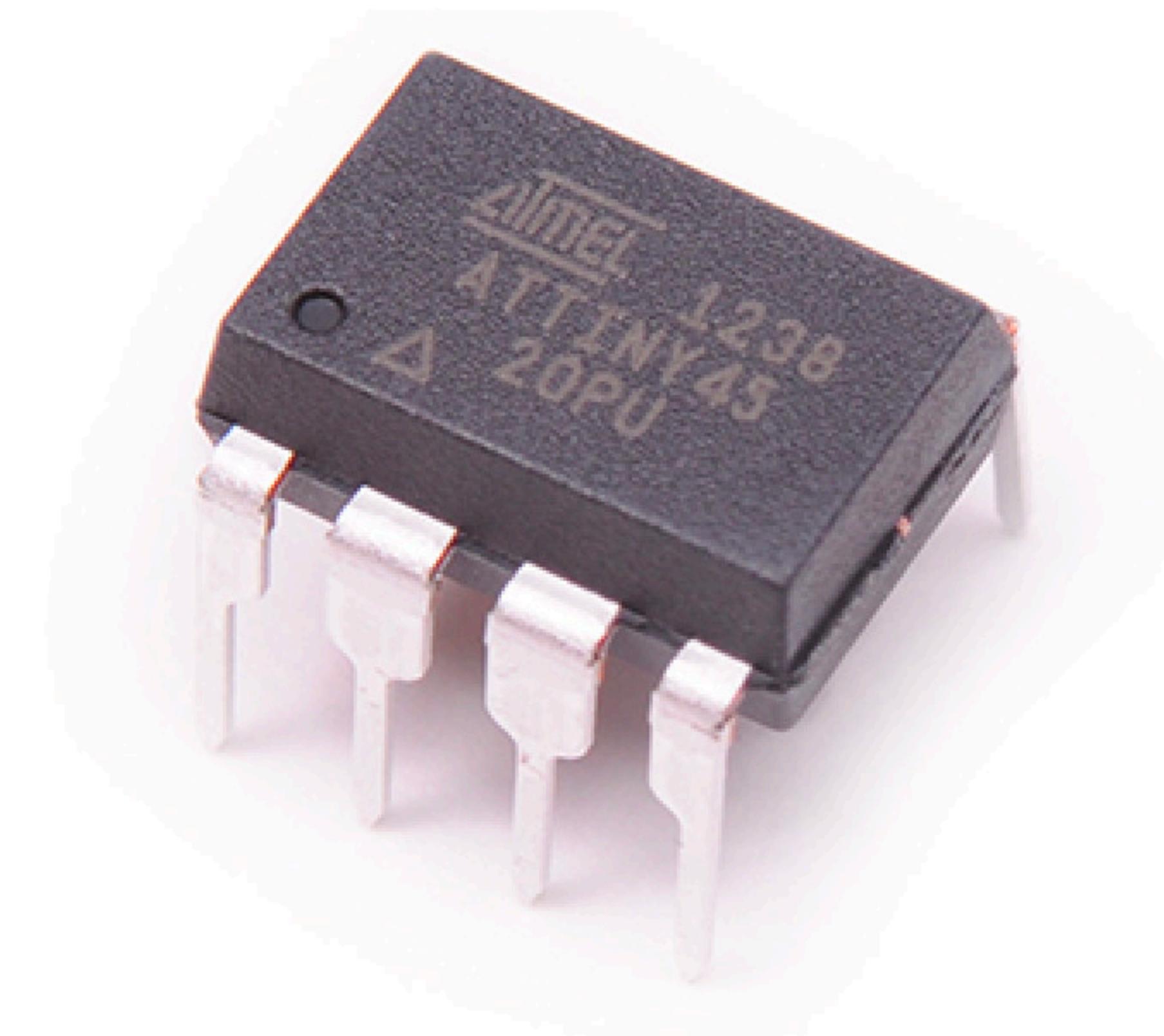
$$R = (4.5V - 2V) / 20mA$$

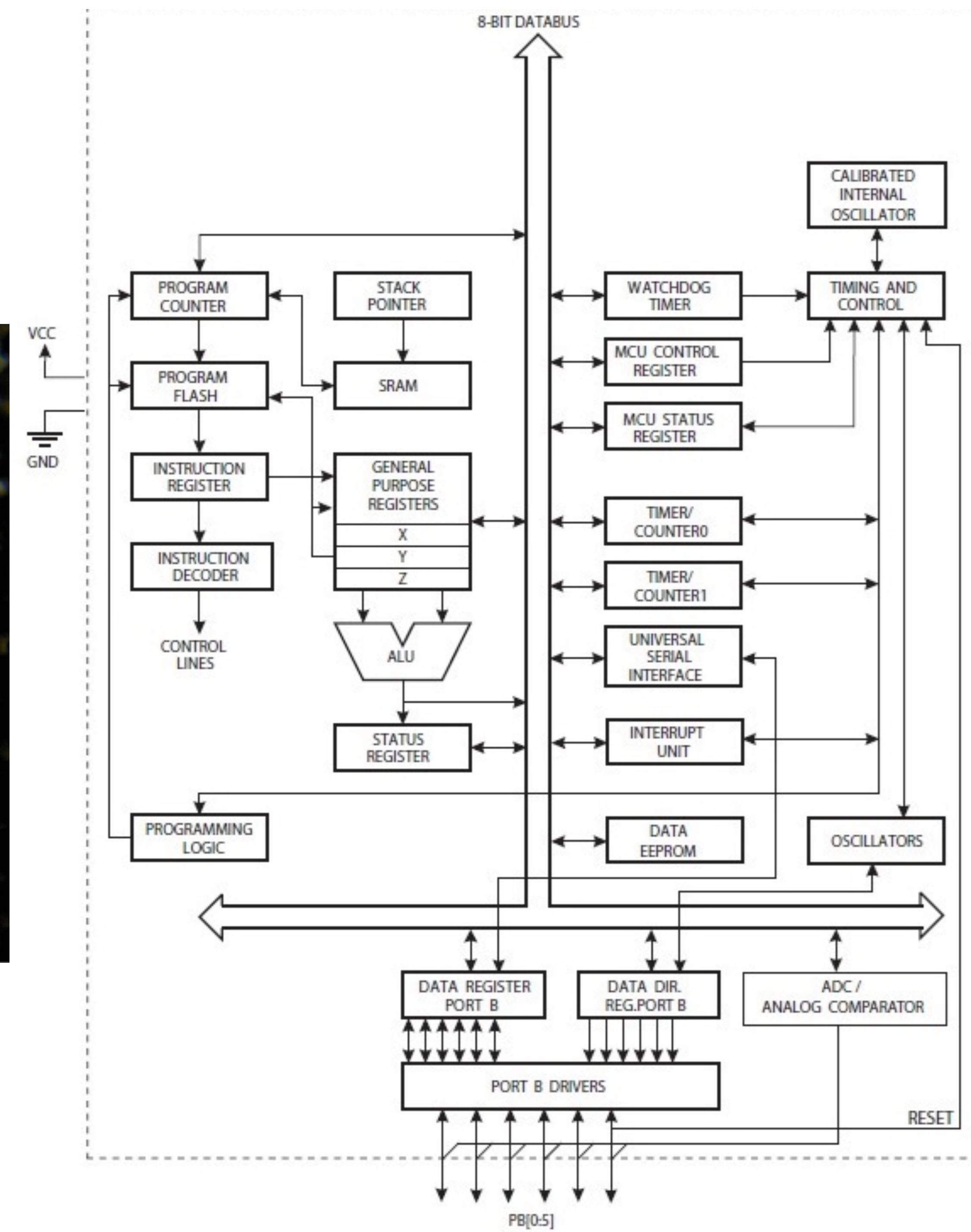
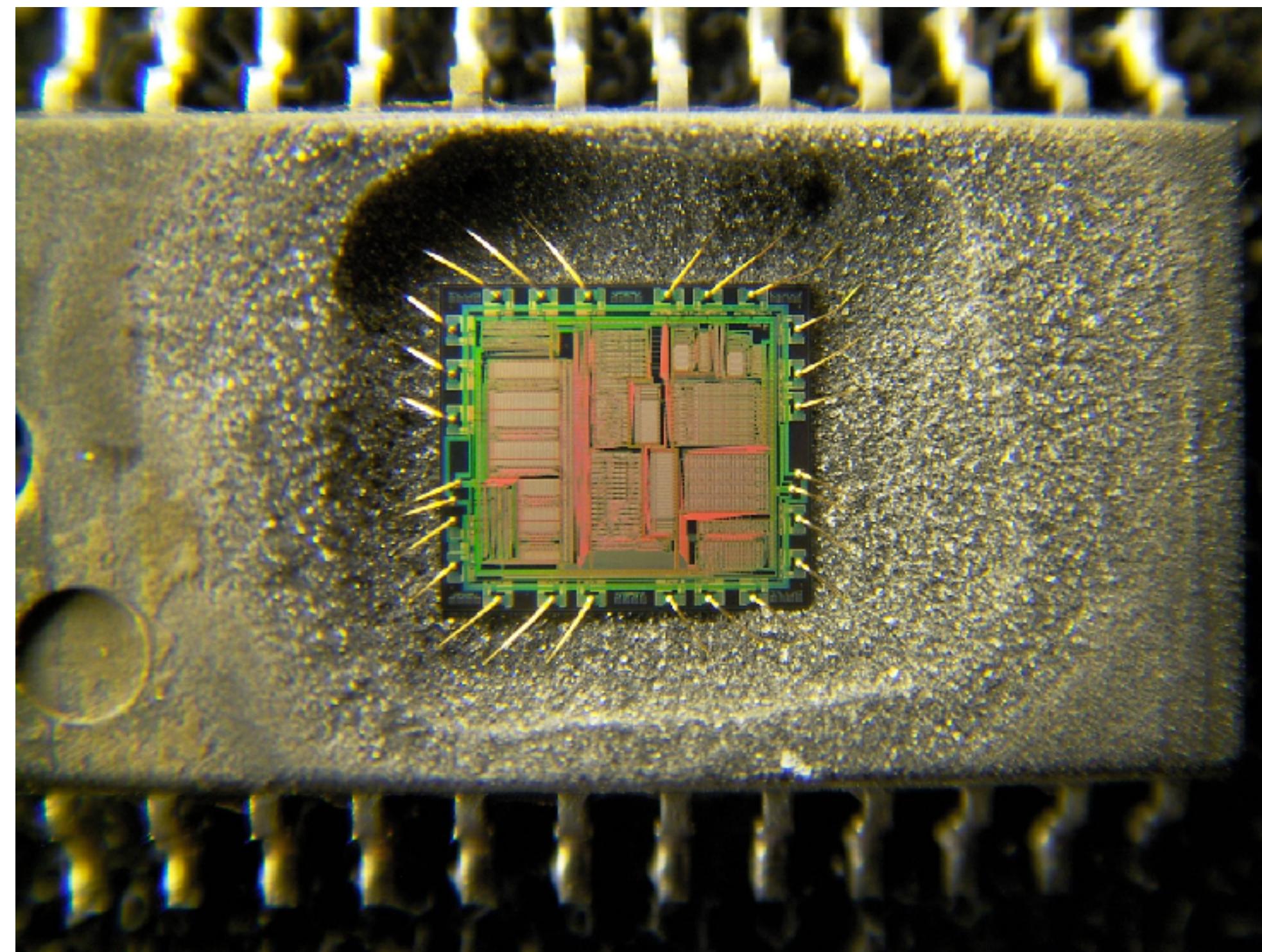
$$R = 2.5 / 0.02$$

$$R = 125 \Omega$$









sketch\_mar01a | Arduino 1.8.15

```
void loop()
{
    counter++;

    // triangle
    temp += dir;
    if (temp == 1023)
        dir = -1;
    if (temp == 0)
        dir = 1;

    // mode switch
    switch(mode)
    {
        case 0: levela = 255; levelb = 255; break;
        case 1: levela = 63; levelb = 63; break;
        case 2: levela = 1; levelb = 1; break;
        case 3: levela = levelb = max(0, temp/4 -100); break;
        case 4: levela = max(0, temp/4 -100); levelb = max(0, 255-temp/4 -100); break;
        case 5: levela = levelb = (((counter >> 4) & 15) == 1) || (((counter >> 4) & 15) == 4);
        // hidden modes
        case 10: levela = 255; levelb = 0; break;
        case 11: levela = 0; levelb = 255; break;
        case 12: levela = levelb = ((counter >> 9) & 1) ? 255 : 1; break;
        case 13: levela = levelb = ((counter >> 8) & 1) ? 255 : 1; break;
        case 14: levela = levelb = ((counter >> 7) & 1) ? 255 : 1; break;
    }
}
```

LL	AAAA	TT	DATA-----	SS
10	0000	00	26C03EC070C179C13BC023C139C038C0	D1
10	0010	00	37C036C035C034C033C032C031C00000	34
10	0020	00	00003700000000003800000000003600	2B
10	0030	00	02020202020202020202010204081020	6D
10	0040	00	2004100801020000400000000001124	38
10	0050	00	1FBECFEDCDBF10E0A0E6B0E0E8EFF6E0	C8
10	0060	00	02C005900D92A236B107D9F720E0A2E6	B2
10	0070	00	B0E001C01D92A837B207E1F789D13AC3	B9
10	0080	00	BFCF823089F018F4813051F008958330	69
10	0090	00	19F0843009F008958CB58F7D8CBD0895	DA
10	00A0	00	8AB58F778ABD08958AB58F7DFBCFCF93	B0
10	00B0	00	DF93E7E4F0E08491EDE3F0E0D491E3E3	53
10	00C0	00	F0E0C491CC2399F08111DBDFEC2FF0E0	5C
10	00D0	00	EE0FFF1FE65DFF4FA591B491EC91ED23	6C
10	00E0	00	81E090E009F480E0DF91CF91089580E0	15
10	00F0	00	90E0FACF1F93CF93DF93282F30E0F901	E0
10	0100	00	EC5BFF4F8491F901E65CFF4FD491F901	5C
10	0110	00	E05DFF4FC491CC23A1F0162F8111B1DF	18

...



view o.bin - Far 2.3 21/04/26-1d847868-alpha arm64 gabrielvalky@Gabriels-MacBook-Air.local

...	ts/git/Education/2021/Electro6/o.bin	866	1786	Col 0	0%
0000000000:	26 C0 3E C0 70 C1 79 C1	3B C0 23 C1 39 C0 38 C0	&L>LpLyL; L#L9L8L		
0000000010:	37 C0 36 C0 35 C0 34 C0	33 C0 32 C0 31 C0 00 00	7L6L5L4L3L2L1L		
0000000020:	00 00 37 00 00 00 00 00	38 00 00 00 00 00 36 00	7 8 6		
0000000030:	02 02 02 02 02 02 02 02	02 02 01 02 04 08 10 20	oooooooooooo@@@◆►		
0000000040:	20 04 10 08 01 02 00 00	04 00 00 00 00 00 11 24	◆►□@◆ ◆ ▲\$		
0000000050:	1F BE CF ED CD BF 10 E0	A0 E6 B0 E0 E8 EF F6 E0	▼F±э=►рацршаIr		
0000000060:	02 C0 05 90 0D 92 A2 36	B1 07 D9 F7 20 E0 A2 E6	●L♣RяTв6•L'i рвц		
0000000070:	B0 E0 01 C0 1D 92 A8 37	B2 07 E1 F7 89 D1 3A C3	■рэL↔Tи7•cіЙT:↑		
0000000080:	BF CF 82 30 89 F0 18 F4	81 30 51 F0 08 95 83 30	Г±ВОЙЕ↑ІБ0QЕ■ХГ0		
0000000090:	19 F0 84 30 09 F0 08 95	8C B5 8F 7D 8C BD 08 95	↓ЕД0○Е■ХМ■П}M■X		
00000000A0:	8A B5 8F 77 8A BD 08 95	8A B5 8F 7D FB CF CF 93	K■ПwK■ХK■П}v■у		
00000000B0:	DF 93 E7 E4 F0 E0 84 91	ED E3 F0 E0 D4 91 E3 E3	■УчфЁрДСэуЁр ЕСуу		
00000000C0:	F0 E0 C4 91 CC 23 99 F0	81 11 DB DF EC 2F F0 E0	Ёр—С #ЩЁБ◀■/Ёр		
00000000D0:	EE 0F FF 1F E6 5D FF 4F	A5 91 B4 91 EC 91 ED 23	ю●▼ц] 0eC[СьCэ#		
00000000E0:	81 E0 90 E0 09 F4 80 E0	DF 91 CF 91 08 95 80 E0	БрPpoIAp■C=C■ХАр		
00000000F0:	90 E0 FA CF 1F 93 CF 93	DF 93 28 2F 30 E0 F9 01	Pp·±▼у±у■у(/0p•@		
0000000100:	EC 5B FF 4F 84 91 F9 01	E6 5C FF 4F D4 91 F9 01	ь[ ОДС•Θц\ 0 ЕС•@		
0000000110:	E0 5D FF 4F C4 91 CC 23	A1 F0 16 2F 81 11 B1 DF	р] 0—C #бЕ-/Б◀■		
0000000120:	EC 2F F0 E0 EE 0F FF 1F	EC 5D FF 4F A5 91 B4 91	ь/Ёрю●▼ь] 0eC[С		
0000000130:	8F B7 F8 94 EC 91 11 11	08 C0 D0 95 DE 23 DC 93	ПП°ФъС◀■ЩХ #■у		
0000000140:	8F BF DF 91 CF 91 1F 91	08 95 DE 2B F8 CF CF 93	П■■С±C▼C■Х +°■у		
0000000150:	DF 93 90 E0 FC 01 E6 5C	FF 4F 24 91 80 5D 9F 4F	■УРpMΘц\ 0\$CA]Я0		
0000000160:	FC 01 84 91 88 23 D1 F0	90 E0 88 0F 99 1F FC 01	№ОДСИ#=ЁРpИ±Щ▼№@		
0000000170:	E2 5E FF 4F A5 91 B4 91	FC 01 EC 5D FF 4F C5 91	т^ 0eC[СNΘь] 0+C		
0000000180:	D4 91 61 11 0E C0 9F B7	F8 94 8C 91 E2 2F E0 95	Еса◀■ЛЯП°ФМСt/pX		
0000000190:	8E 23 8C 93 28 81 E2 23	E8 83 9F BF DF 91 CF 91	0#МУ(Бт#шГЯ■■С±C		

1 2 3 4 5 6 7 8 9 10