

reading elektor

TUNs and TUPs

owadays, most low-frequency, small-signal silicon transistors from reputable manufacturers meet the following minimum specifications:

U_{CE0} , max	20 V
I_C , max	100 mA
h_{fe} , min	100
P_{tot} , max	100 mW
f_T , min	100 MHz

When a transistor of this type is required, it is referred to in Elektor as **TUN** (Transistor, Universal, NPN) or **TUP** (Transistor, Universal, PNP).

Some TUNs are the BC107, BC108 and C109 families, and the 2N3856A, 2N3859, 2N3860, 2N3904, 2N4124 and HEP S0011.

Some TUPs are the BC177, BC178 and C179 families, and the 2N2412, 2N3251, 2N3906, 2N4126, 2N4291 and HEP S0013.

DUS and DUG

imilarly, for many small-signal applications the only really important difference between all the available diodes is that some are silicon and some are germanium. When a general-purpose small-signal diode is required in an Elektor circuit, it is often designated **DUS** (Diode, Universal, Silicon) or **DUG** (Diode, Universal, Germanium). However, it should be noted that even a US or DUG should meet minimum specifications:

	DUS	DUG
U_R , max	25 V	20 V
I_F , max	100 mA	35 mA
I_R , max	1 μ A	100 μ A
P_{tot} , max	250 mW	250 mW
C_D , max	5 pF	10 pF

Some DUS's are: BA127, BA217, BA218, BA221, BA222, BA317, BA318, BAX13, BAY61, 1N914 and 1N4148.

Some DUGs are: OA85, OA91, OA95 and AA116.

Resistors

Unless otherwise specified, resistors are 1/4Watt 5% tolerance carbon types. Higher power ratings are, of course,

permissible (e.g. the recently introduced '1/3 Watt' types), provided they fit on the p.c. board — if this is to be used. A 10% tolerance type is usually also permissible, with only a minor effect on the performance.

The resistance values are specified using 'k' for 1000 Ω and 'M' for 1,000,000 Ω ; the decimal point is replaced by either ' Ω ', 'k' or 'M'.

For instance, 4 Ω 7 = 4.7 Ω ;
4k7 = 4700 Ω ; 4M7 = 4.7 M Ω .

Capacitors

The DC working voltage of capacitors (other than electrolytics) is normally assumed to be at least 60 V, unless otherwise specified. Generally speaking, of course, a DC working voltage equal to (or greater than) twice the supply voltage is sufficient. In most circuits where electrolytic capacitors are used, a working voltage equal to the supply voltage plus 20% is safe; very often, a lower voltage is sufficient. In recent Elektor circuits, the lowest DC working voltage permissible is often specified, regardless of availability; in practice, any higher voltage type can be used — bearing in mind that a higher voltage rating involves greater physical size, so the available space on the board should be watched. For instance, in a circuit operating off a 9 V battery, an elco might be specified as 1 μ /16 V — even though the normally available types are 1 μ /63 V.

Capacitor values are specified using 'p' for 10⁻¹², 'n' for 10⁻⁹ and ' μ ' for 10⁻⁶. As with resistors, the decimal point is replaced by one of these letters. This means that 4700 pF, for instance, is written as 4n7 — not as 0.0047 μ F!

Voltages

The international letter symbol 'U' for voltage is normally used instead of the ambiguous 'V'. 'V' is normally reserved for 'volts'. For instance: $U_B = 10$ V, not $V_B = 10$ V.

The DC test voltages shown in circuits are measured with a 20 k Ω /V instrument, unless otherwise specified.

No mains (power line) voltages are given in Elektor circuits. It is assumed that our readers know what voltage is standard in their part of the world!

International problems

Although it is the intention that Elektor circuits can be built and used all over the world, some problems are unavoidable.

Readers in countries that use 60 Hz should note that Elektor circuits are designed for 50 Hz operation. This will not normally be a problem; however, in cases where the mains frequency is used for synchronisation some modification may be required. In some cases, the necessary modifications are given; in others, especially where modification involves drastic re-design, the circuit idea may be of use — even though the circuit itself is not.

Circuits intended for use with domestic television receivers may also run into difficulties. As many of our readers will know, 'Television Standards' are anything but 'standard'! However, by avoiding sound and colour wherever possible, a reasonable degree of international compatibility can be achieved — provided the preset adjustments are given a sufficiently wide range.

Finally, especially for our readers in Canada and the USA, a list of equivalents for some of the commonly-used transistor types may prove useful:

- AF 239: G0003
- BC 140, BC 141, BC 142: S3011
- BC 160: S3012
- BC 546: no direct equivalent known to us, however in most cases an S0024 can be used
- BD 241: TIP29, S5000
- BD 242: TIP30, S5006
- BF 259, BF 494, BFT 66: no direct equivalent known to us; basically, these are low-voltage, low-current high-frequency devices.
- Some further equivalents differ only in that the emitter and collector connections are transposed, so that they must be mounted 'back-to-front' on the EPS p.c. boards:
 - TUN: RS2010, RS2016
 - TUP: RS2022, RS2034
 - BC 107 or equ.: S0015
 - BC 177 or equ.: S0019
 - BC 109B,C or equ.: S0024
 - BC 517: S9100
 - BC 556: S0026