ELEKTRONICKÉ SOUČÁSTKY

POUZDŘENÍ

- **ČIP**
- **POUZDRO – ZÁKLADNA**
  umožňuje připojení
- **OCHRANNÝ KRYT**
  ne vždy

POUZDRO

ZÁKLADNÍ FUNKCE

- **rozvod napájení**
- **rozvod signálu**
- **odvod tepla**
- **zajištění mechanické pevnosti**
- **zajištění ochrany před vnějšími vlivy**

MONTÁŽ 1. ÚROVNĚ

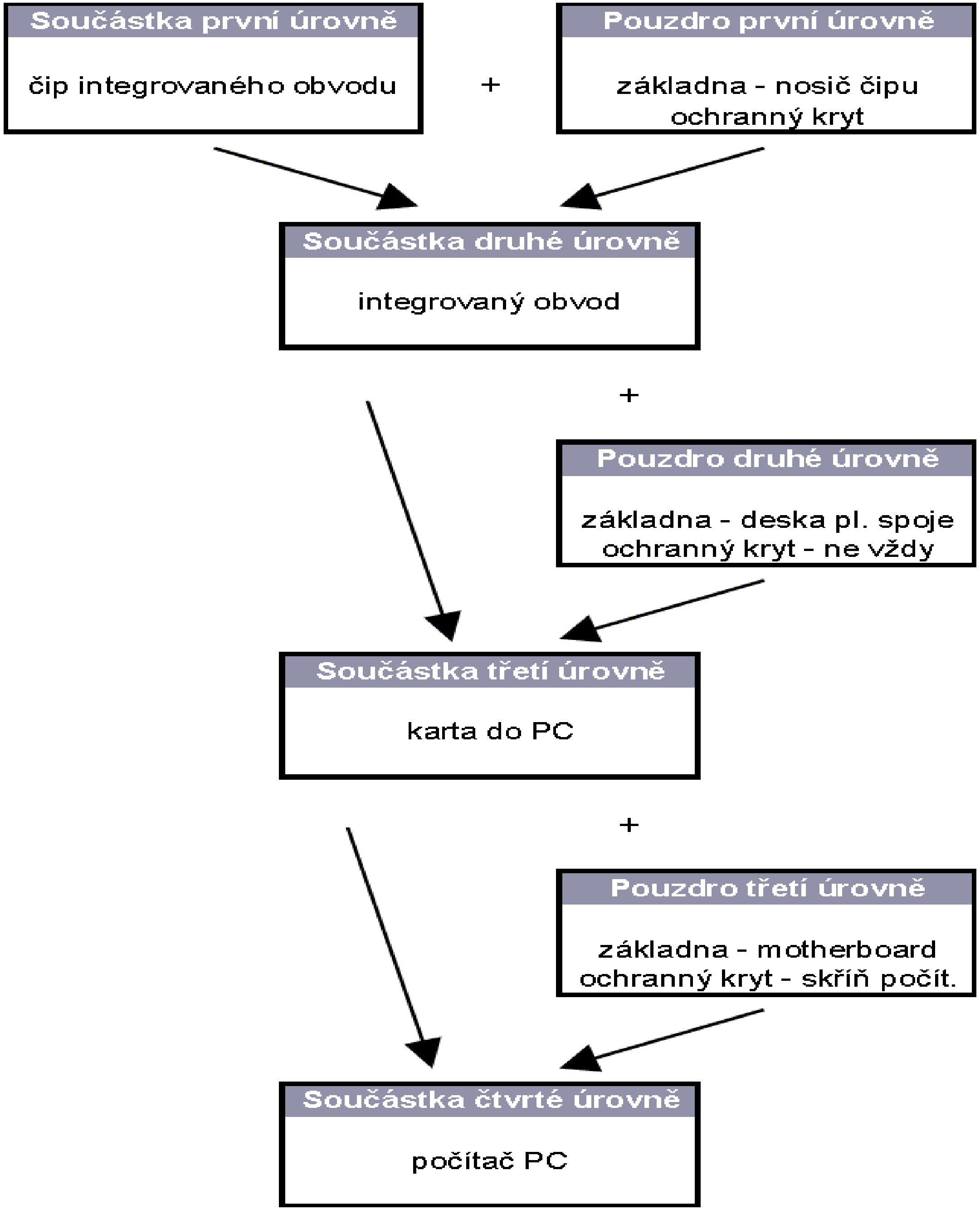
- součástka 1. úrovně na základnu pouzdra 1. úrovně
- součástka, která vznikne jako montáž 1. úrovně se nazývá součástkou 2. úrovně

MONTÁŽ 2. ÚROVNĚ

- součástka 2. úrovně na základnu pouzdra 2. úrovně
- funkční celek, který vznikne jako montáž 2. úrovně se nazývá součástkou 3. úrovně

MONTÁŽ 3. ÚROVNĚ

- součástka 3. úrovně na základnu pouzdra 3. úrovně
- funkční celek, který vznikne jako montáž 3. úrovně se nazývá součástkou 4. úrovně



Součástka první úrovně

čip integrovaného obvodu

+

Pouzdro první úrovně

základna - nosič čipu
ochranný kryt

Součástka druhé úrovně

integrovaný obvod

+

Pouzdro druhé úrovně

základna - deska pl. spoje
ochranný kryt - ne vždy

Součástka třetí úrovně

karta do PC

+

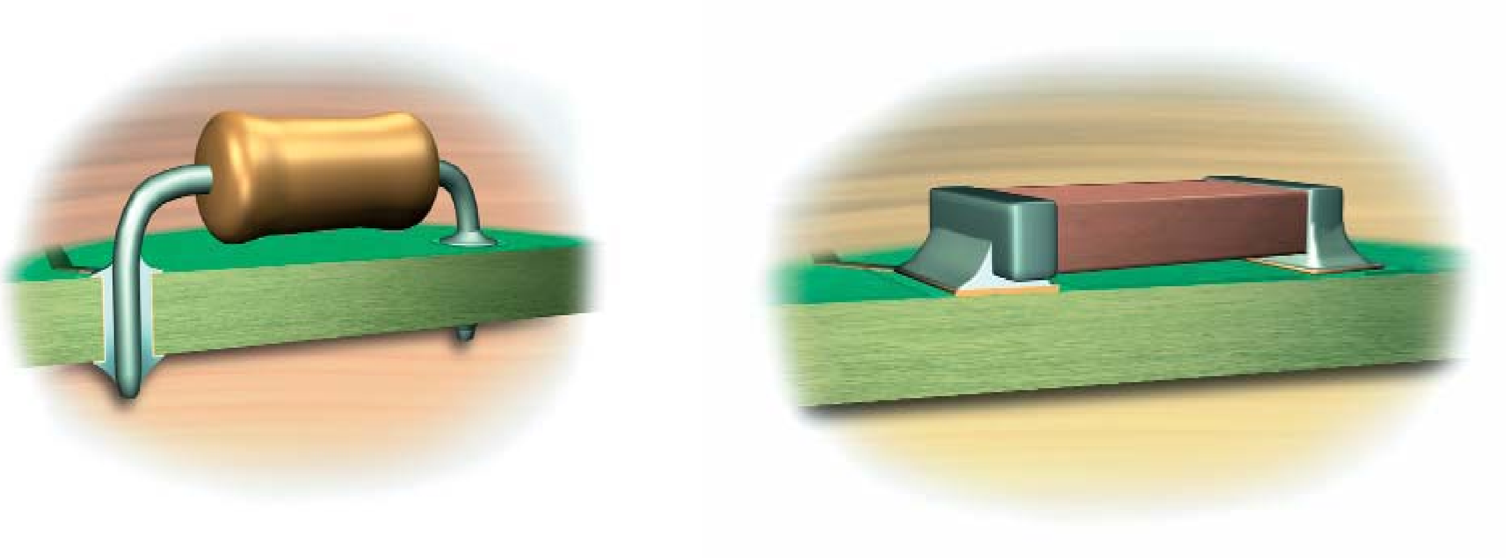
Pouzdro třetí úrovně

základna - motherboard
ochranný kryt - skříň počít.

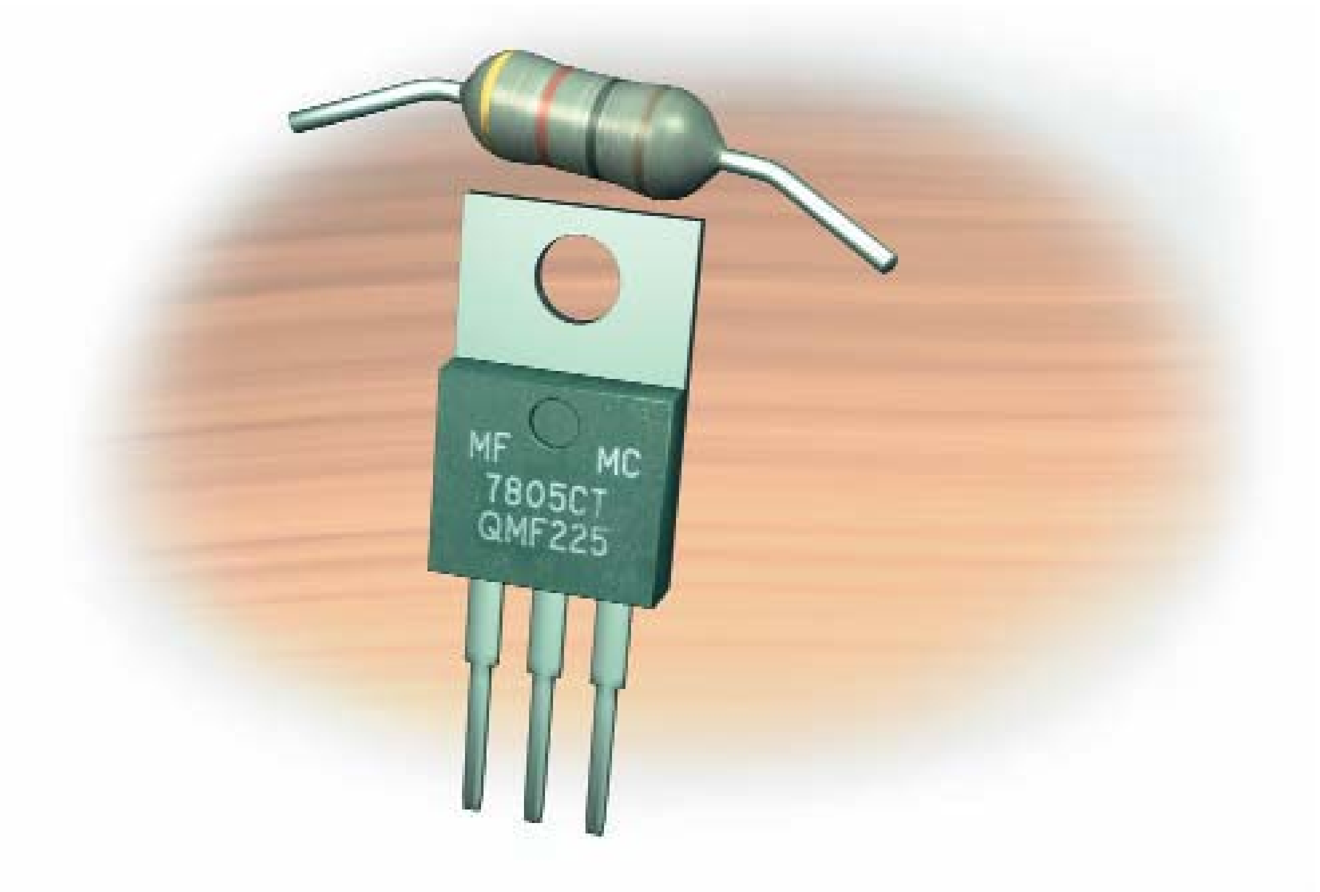
Součástka čtvrté úrovně

počítač PC

THT - SMT

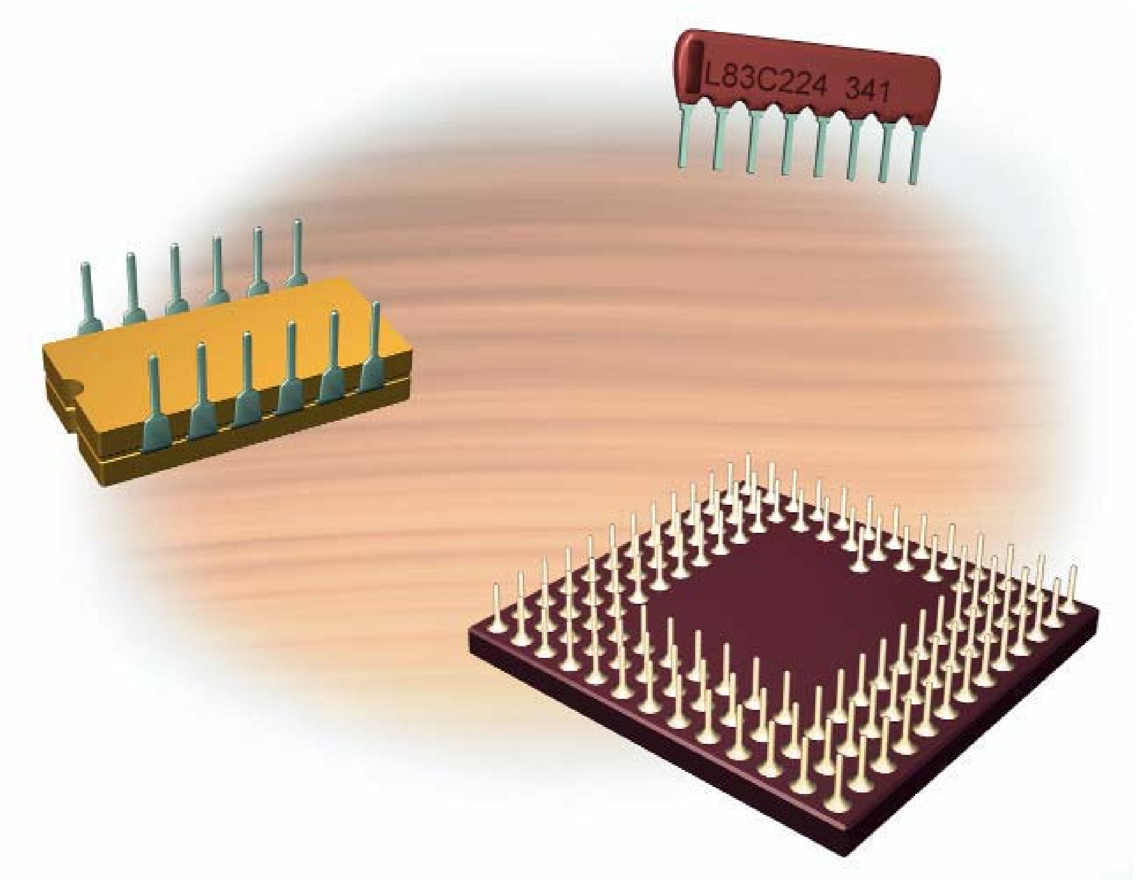


THT : AXIÁLNÍ - RADIÁLNÍ



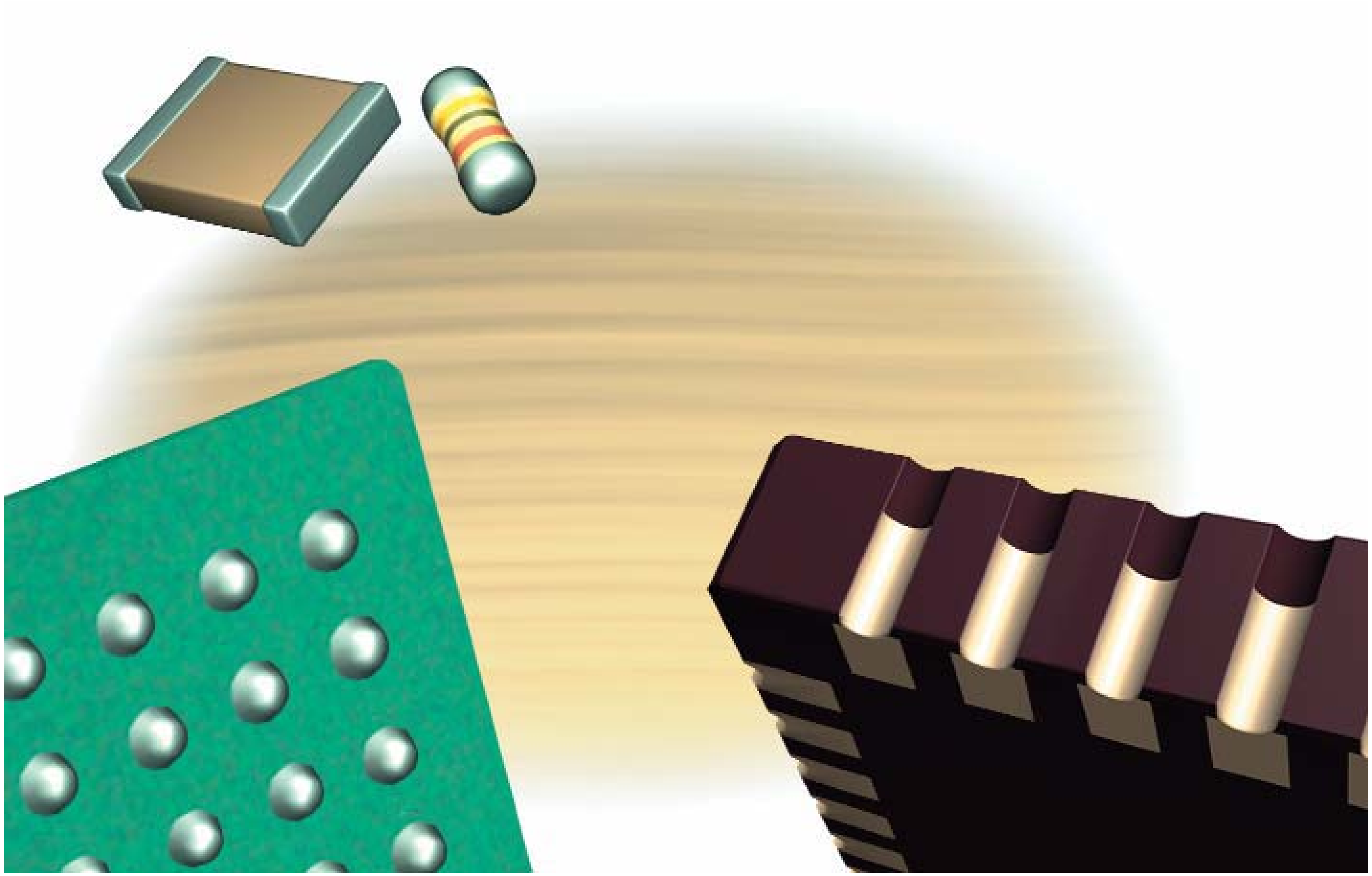
THT : SIP, DIL, PGA

Single In-line Package, Dual In-line Package, Pin Grid Array

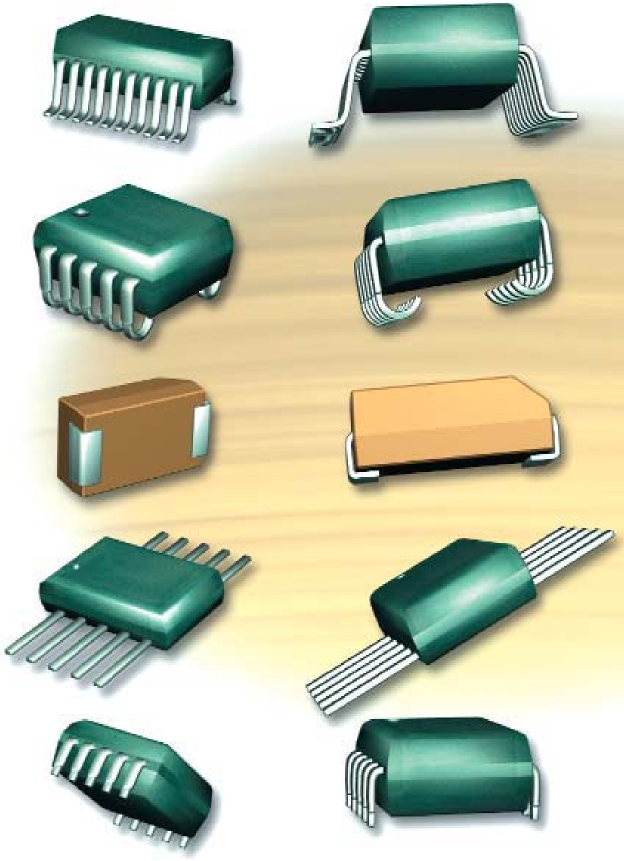


SM : LEADLESS
chip, MELF, BGA, castellation

Metal ELectrode Face, Ball Grid Array, drážkování



SM : LEADED



Gull Wing Lead

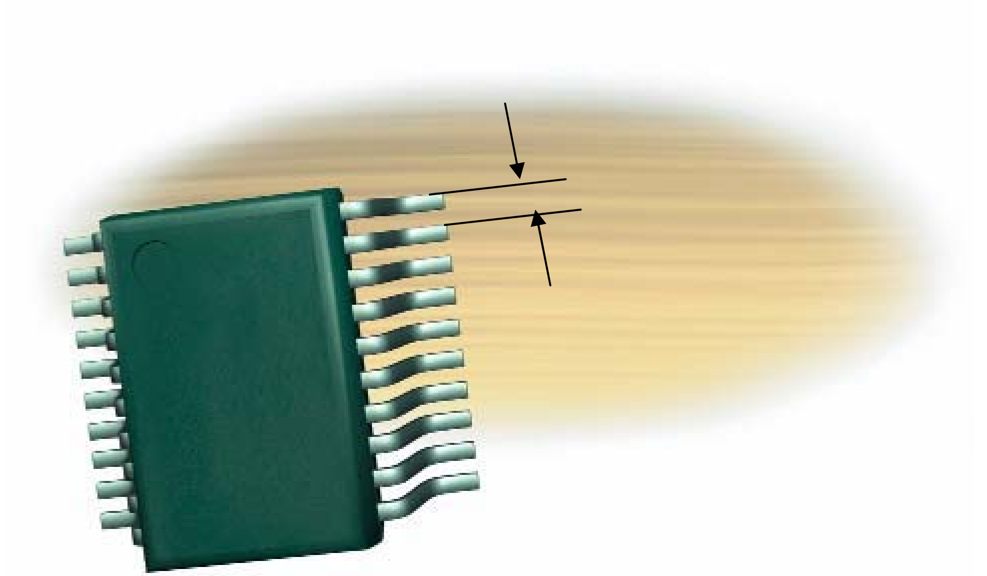
J -Lead

L - Lead

Flat Lead

I - Lead

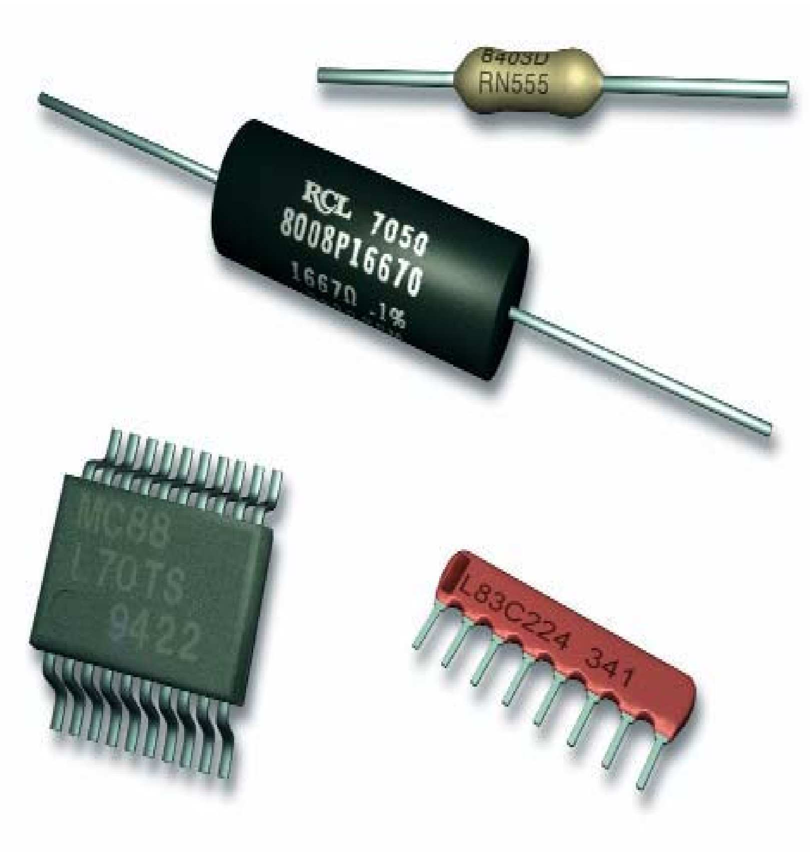
LEAD PITCH

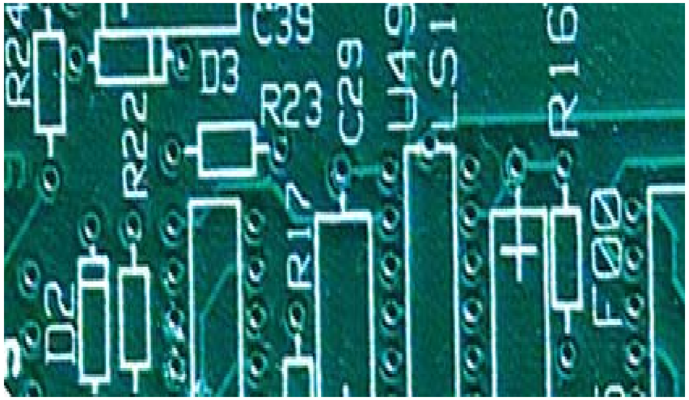


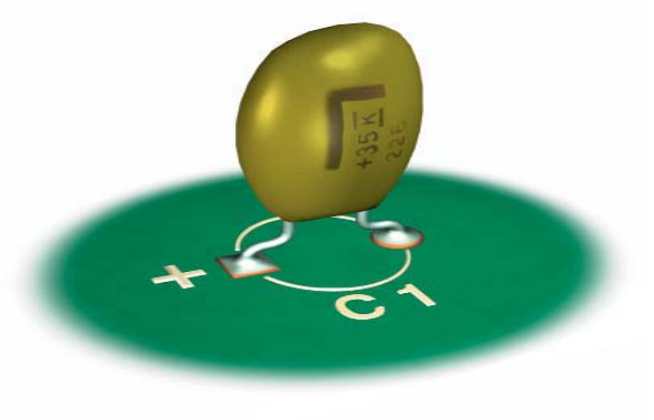
BALENÍ

pásky, cívky,trubice, zásobníky, sáčky

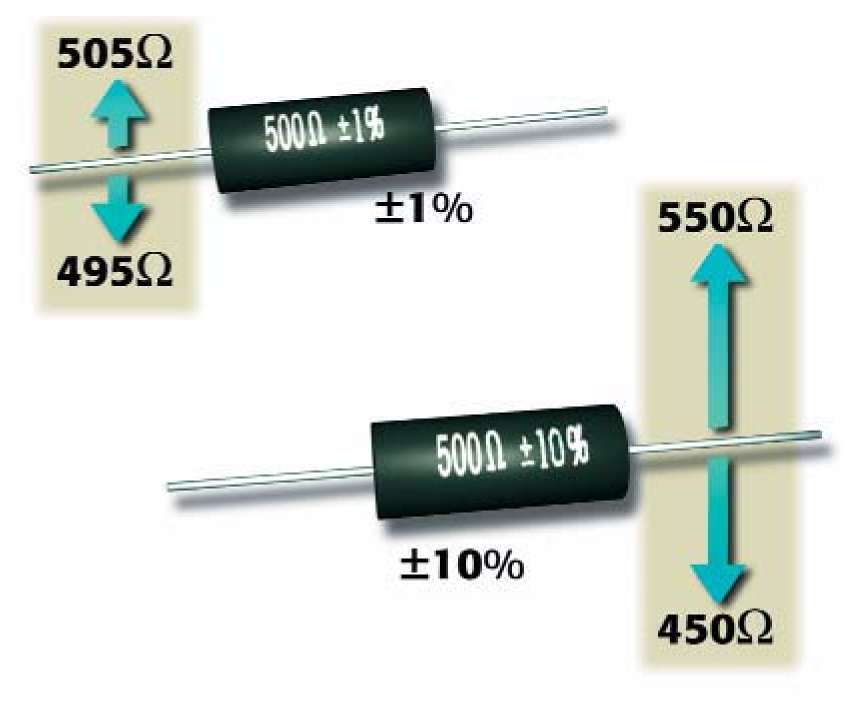
IDENTIFIKACE - ZNAČENÍ







HODNOTY A TOLERANCE



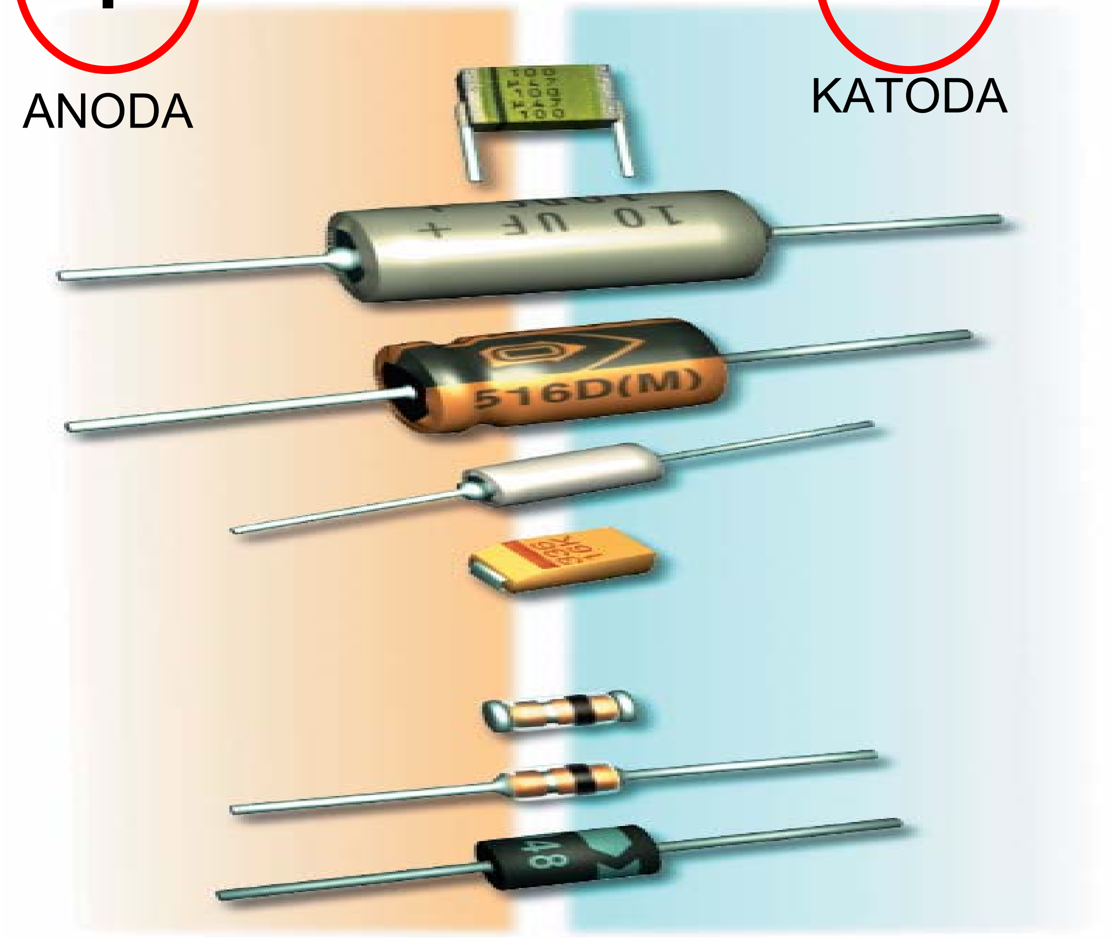
POLARITA

+

ANODA

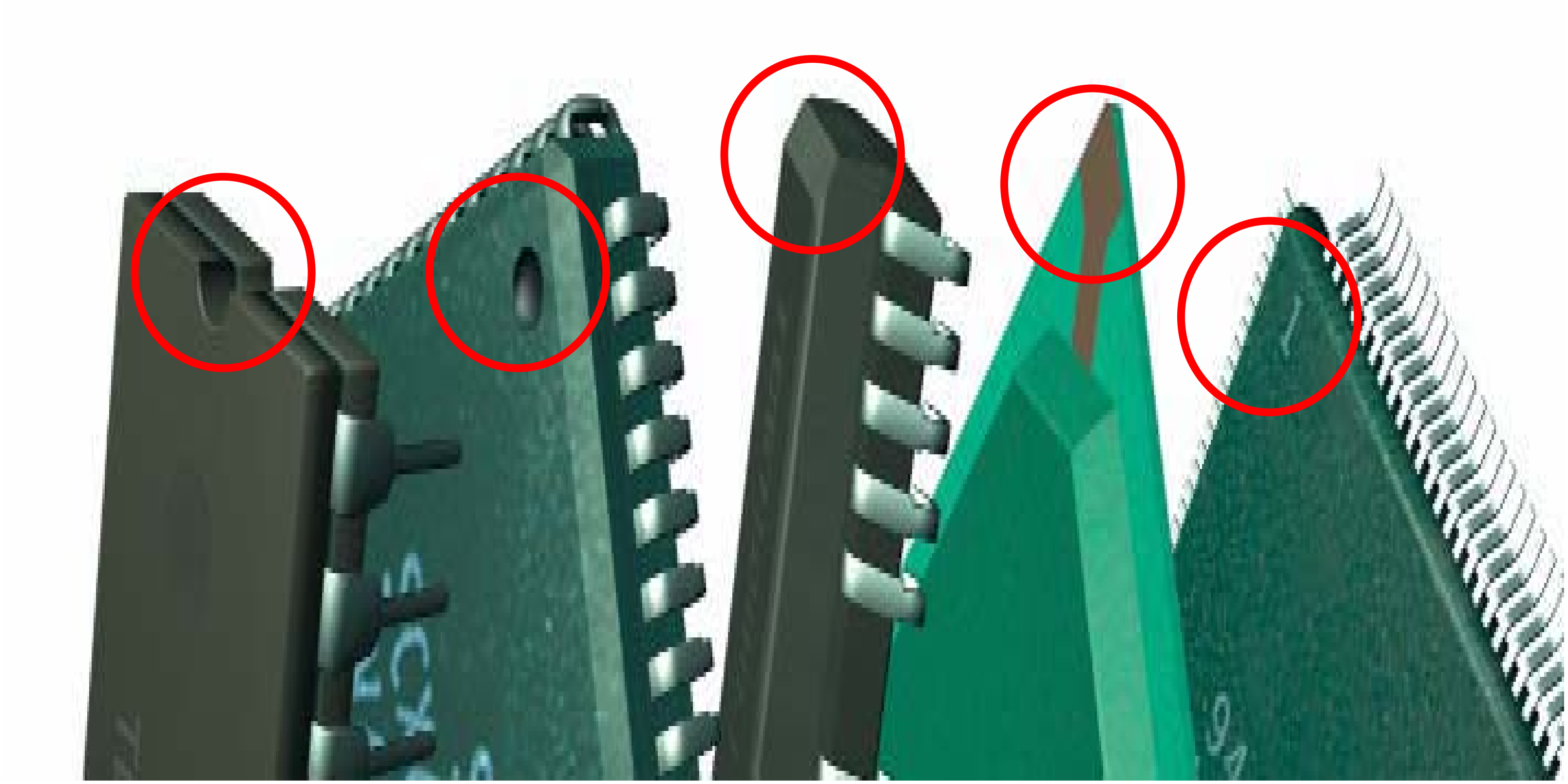
-

KATODA



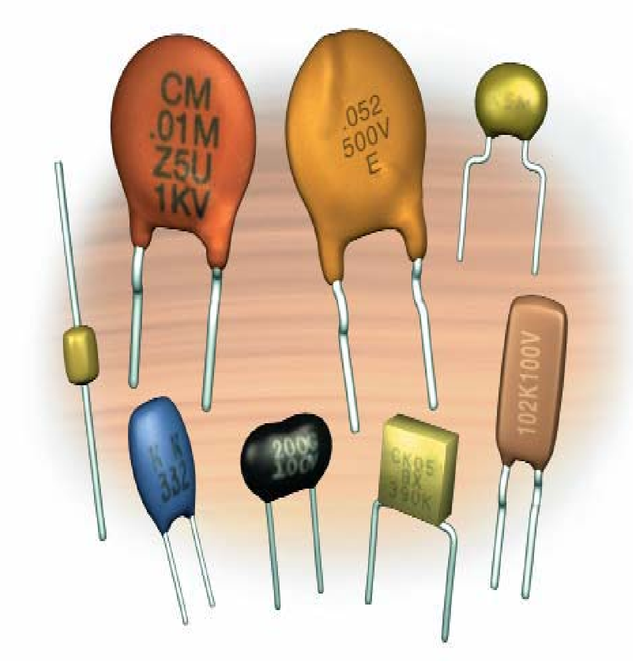
ORIENTACE

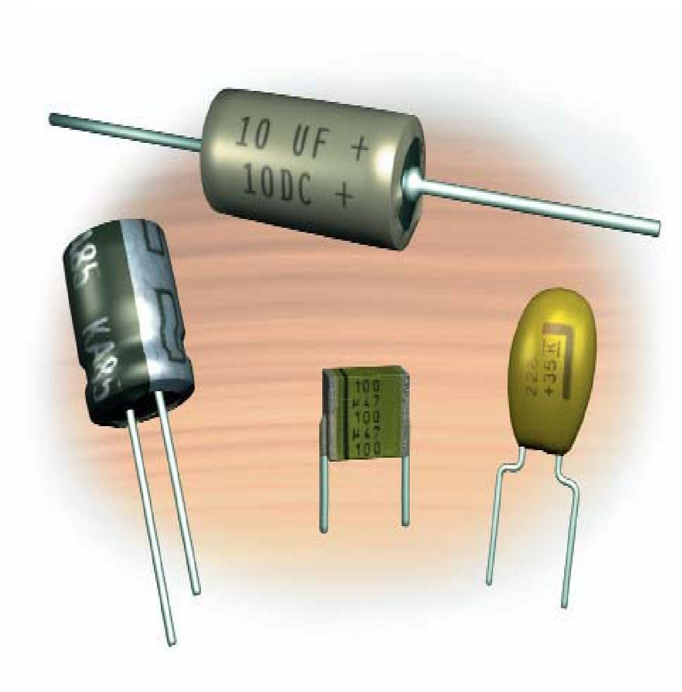
drážka, důlek, zkosení, barevný proužek, číslo



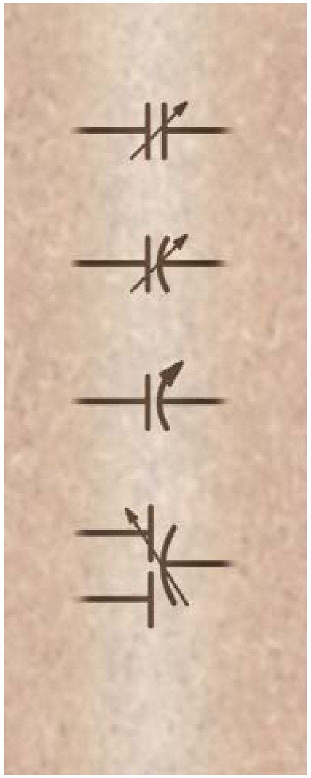
KAPACITORY – C - [µF,nF, pF]

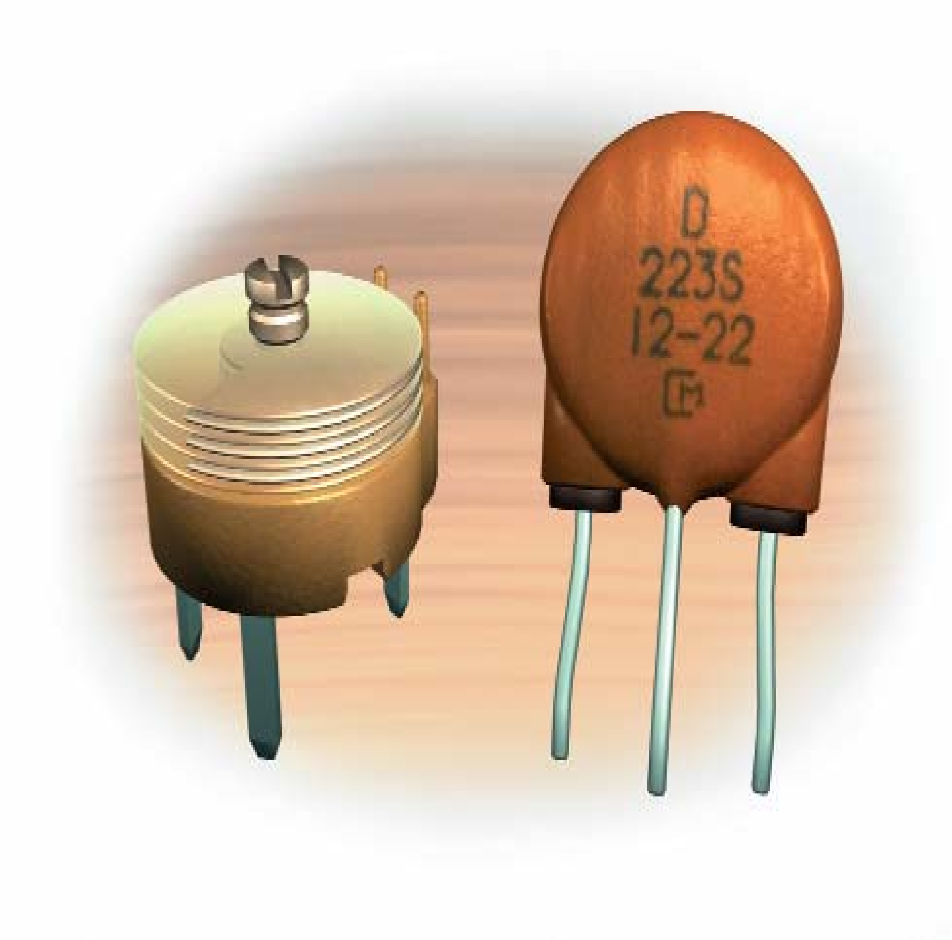
nepolarizované – polarizované (+,●, proužek)



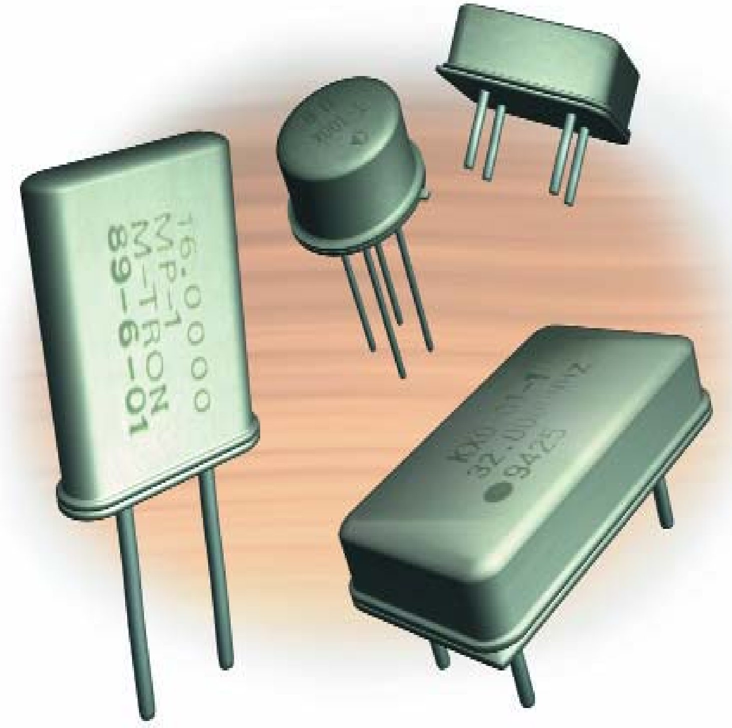


PROMĚNNÉ KAPACITORY
C VAR. C ADJ

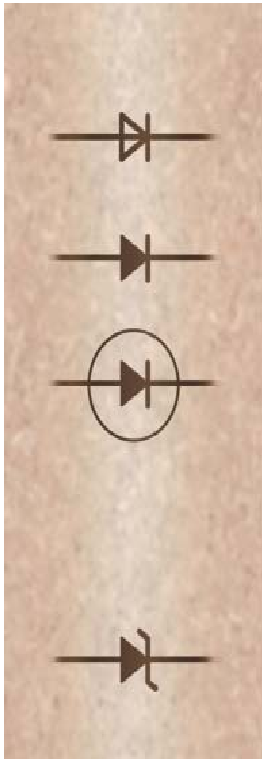


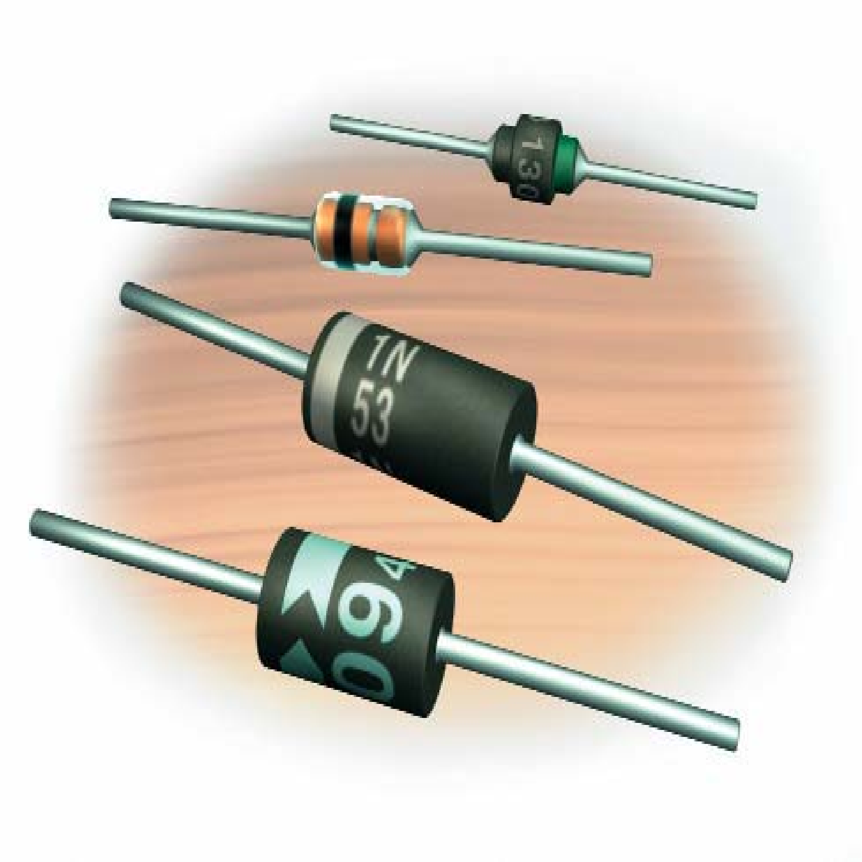


KRYSTALY – Y



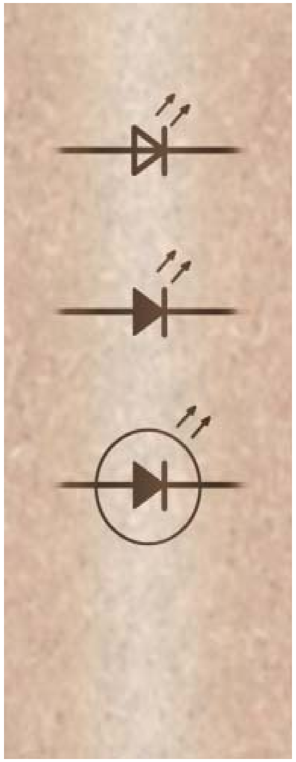
DIODY – D, CR

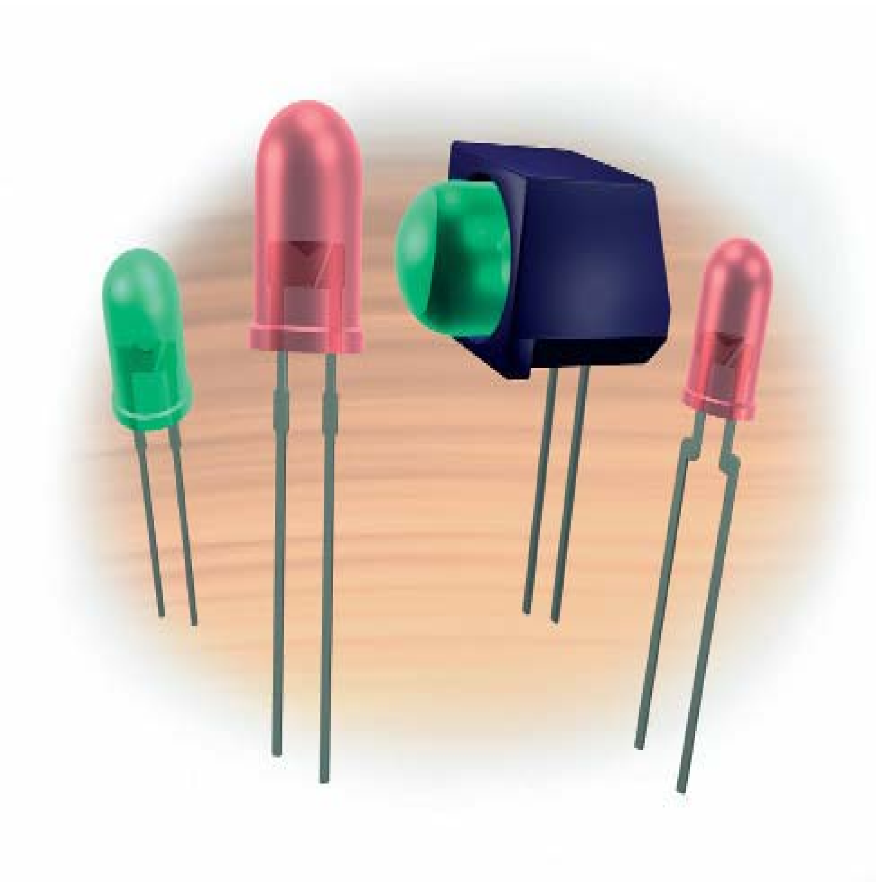




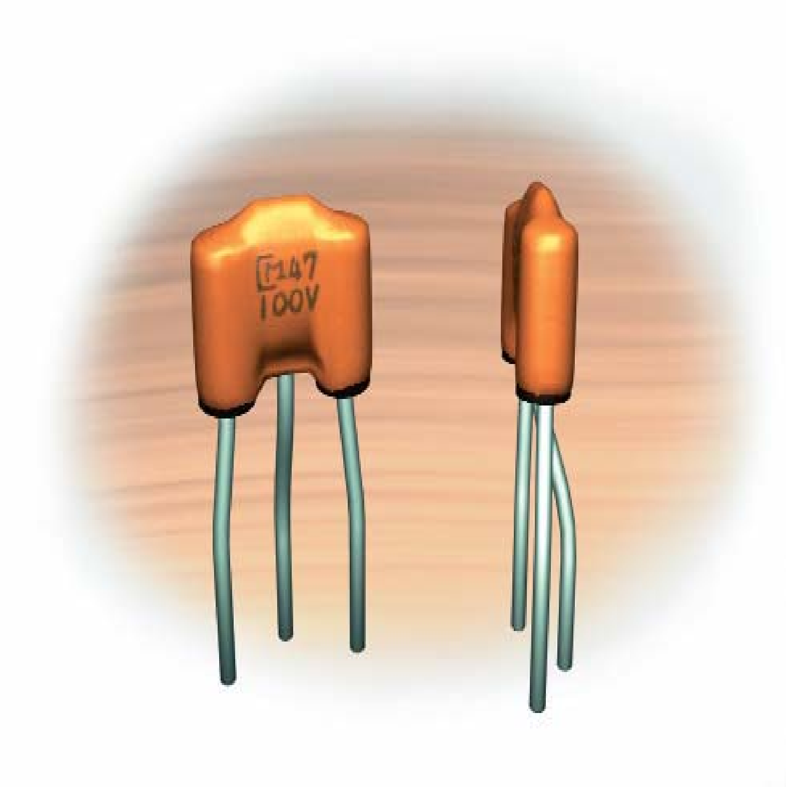
SVĚTELNÁ DIODA

E, LED, D, DIS, CR

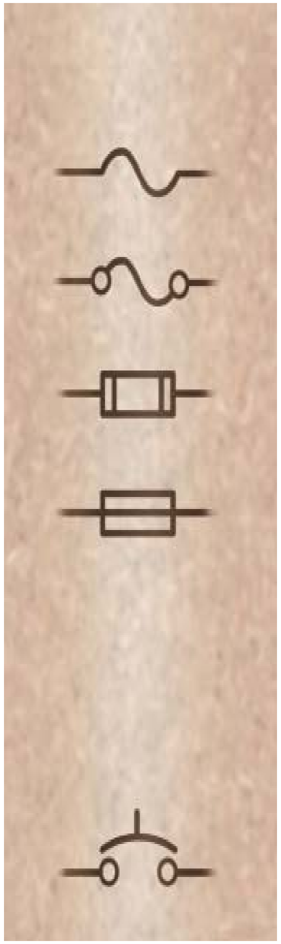


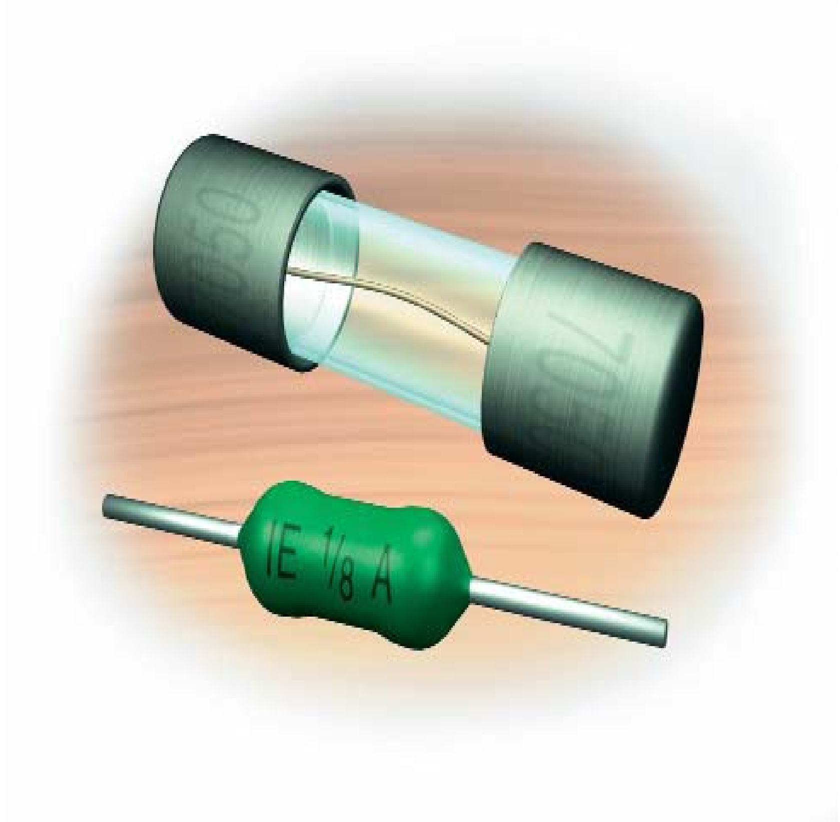


FILTRY – FL

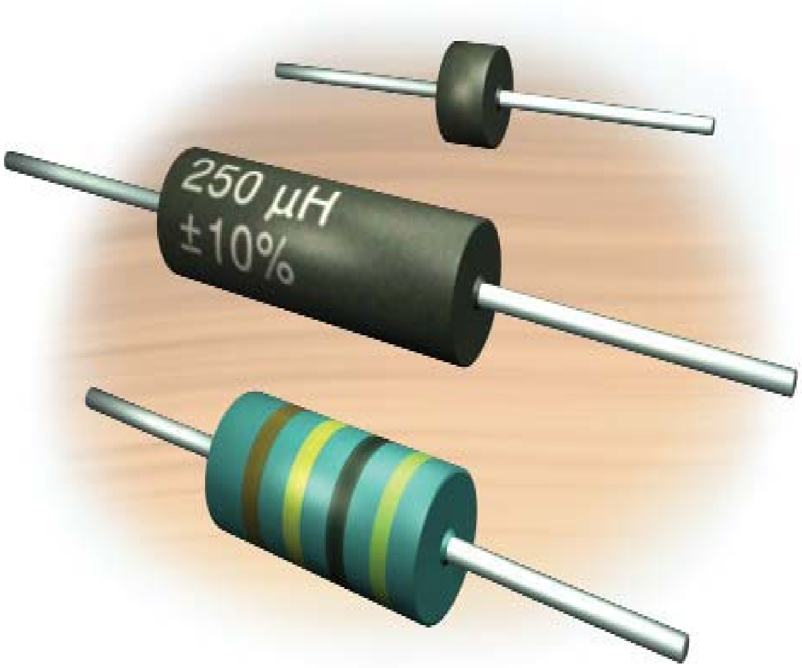


POJISTKY - F

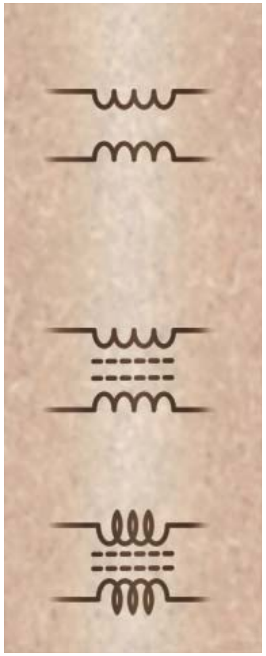




INDUKTOR – L - [µH, mH]

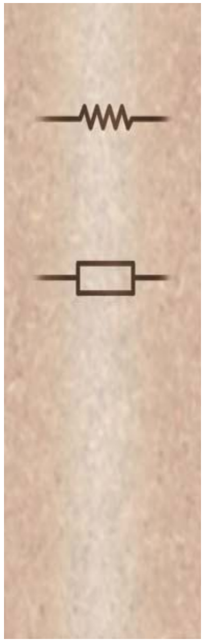


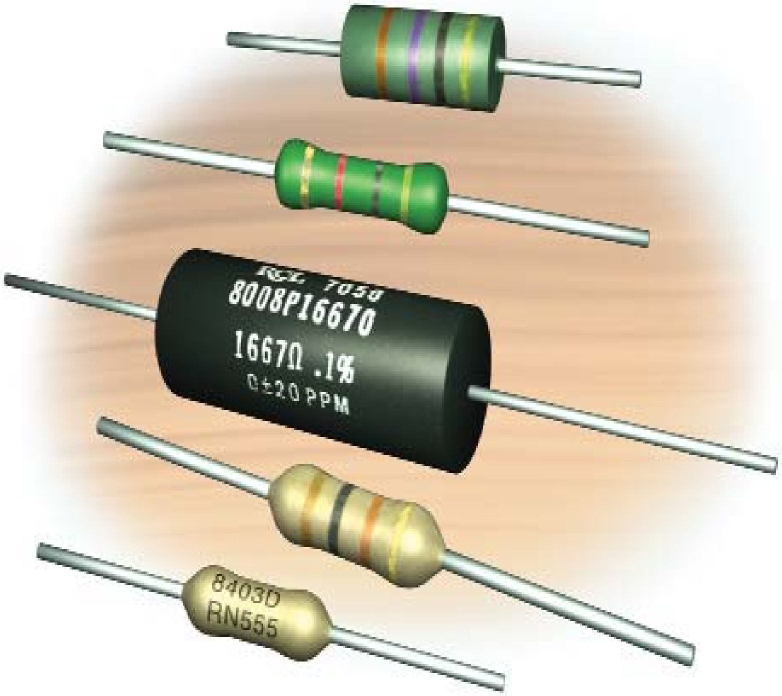
TRANSFORMÁTOR - T



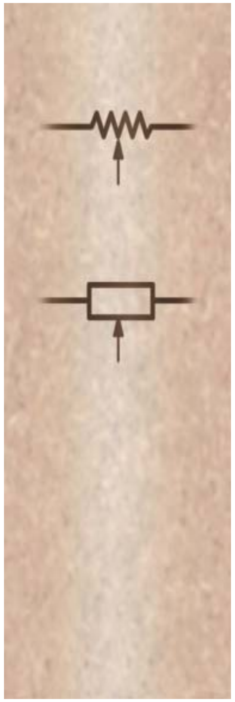
RESISTOR – R - [Ω]

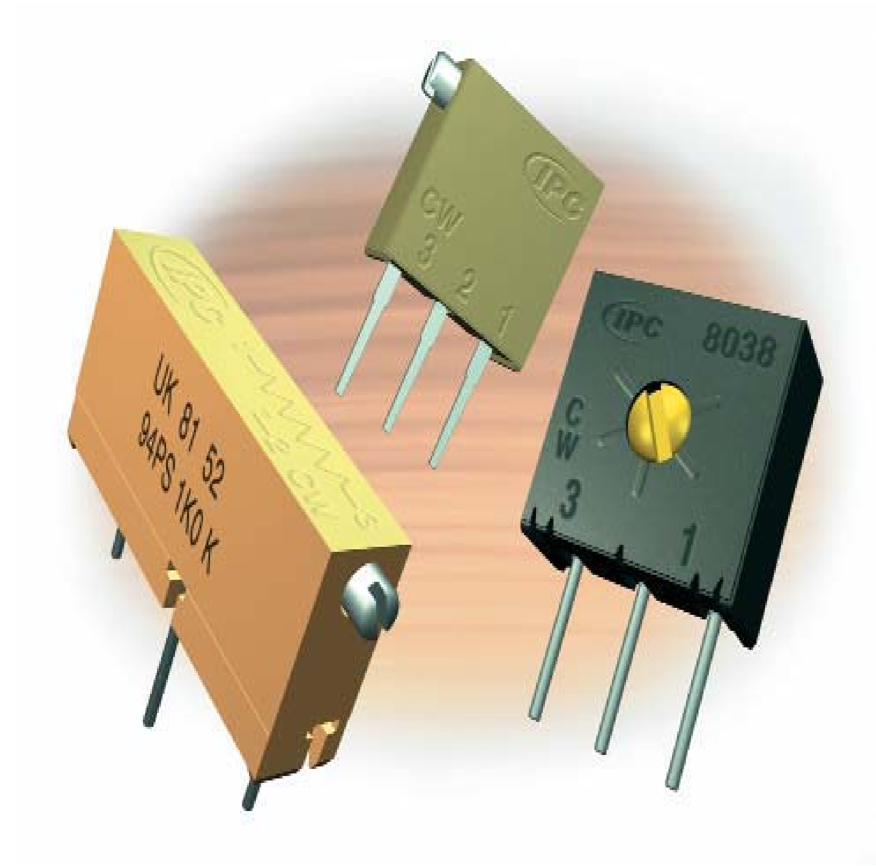
RC – color coded, RN – metal film, RCL – wire wound



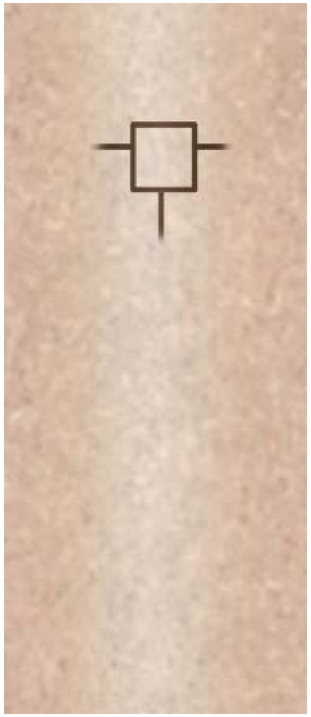


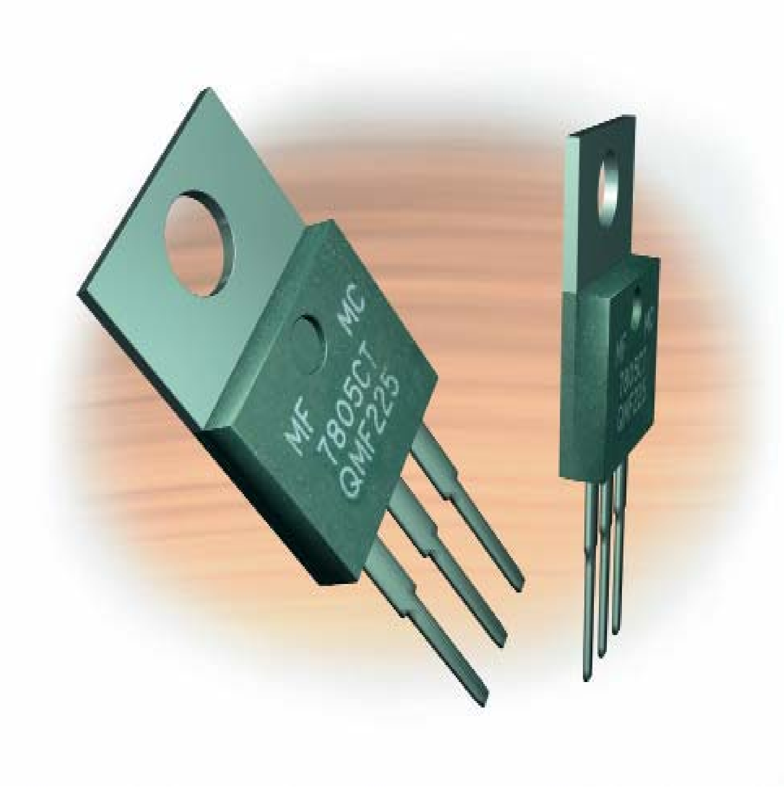
PROMĚNNÝ RESISTOR
R, VR, VAR, VRN, ADJ - [Ω]



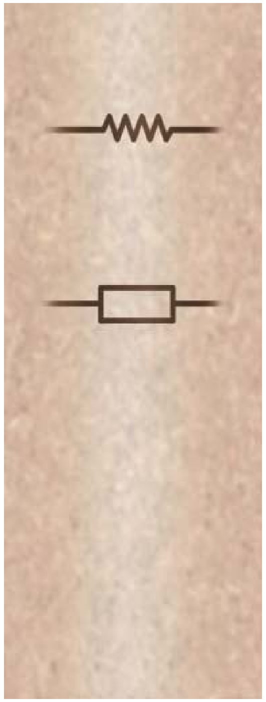


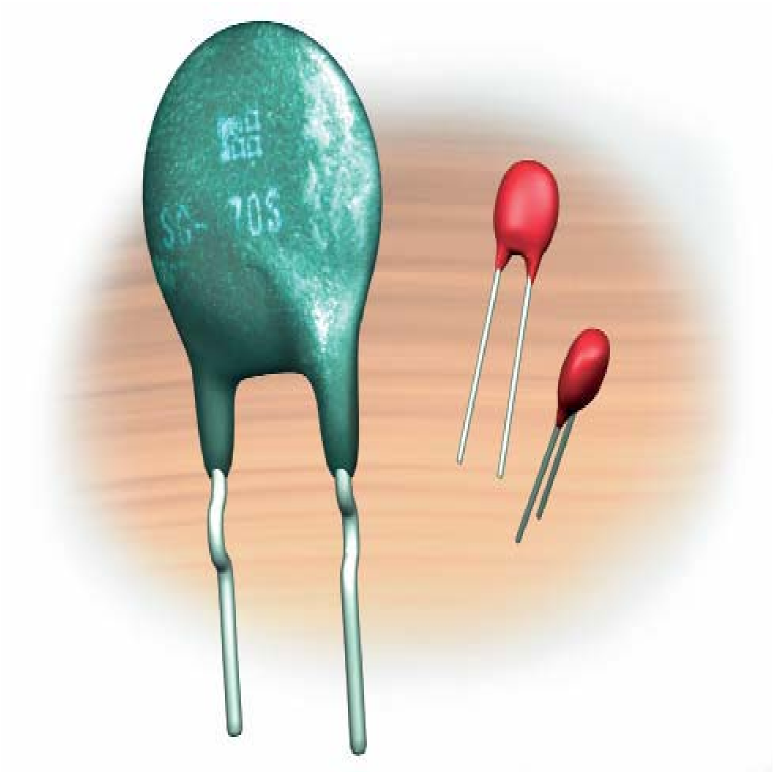
REGULÁTOR NAPĚTÍ - VR





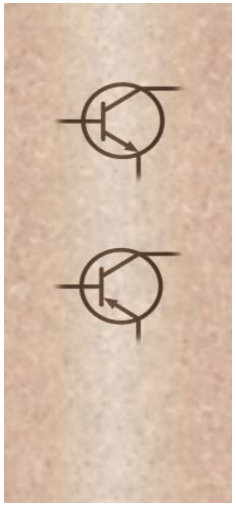
TERMISTOR - RT

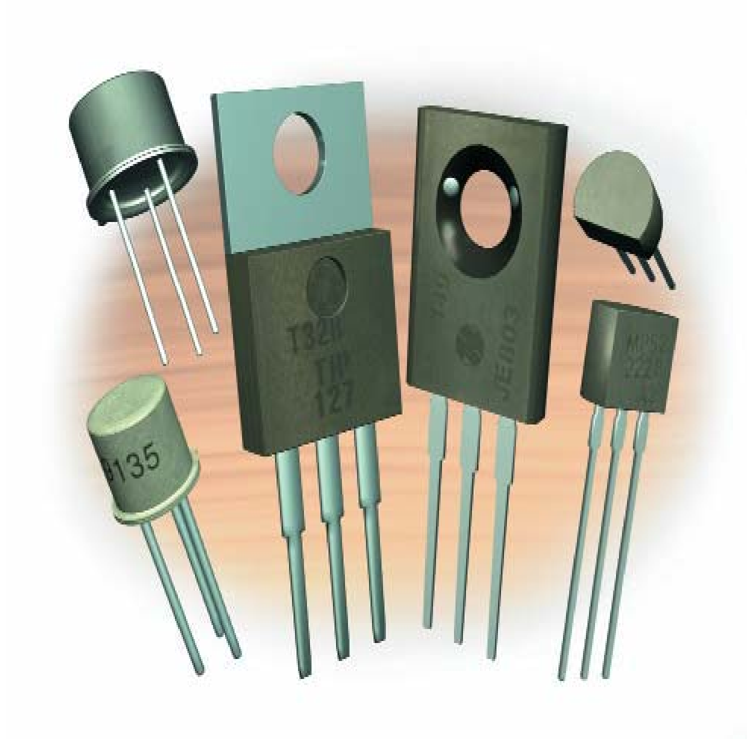




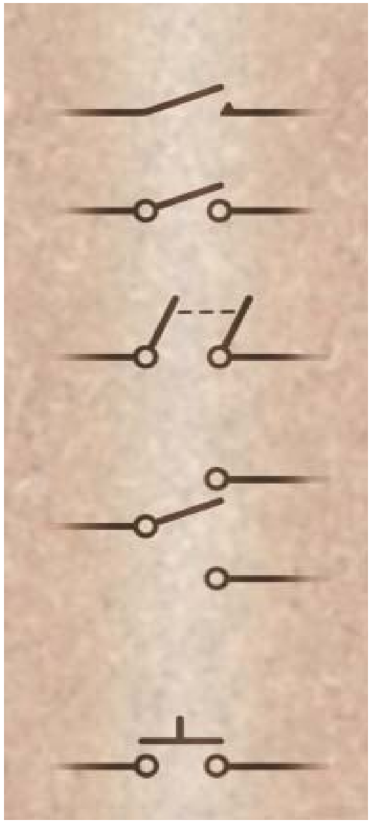
TRANZISTOR – Q

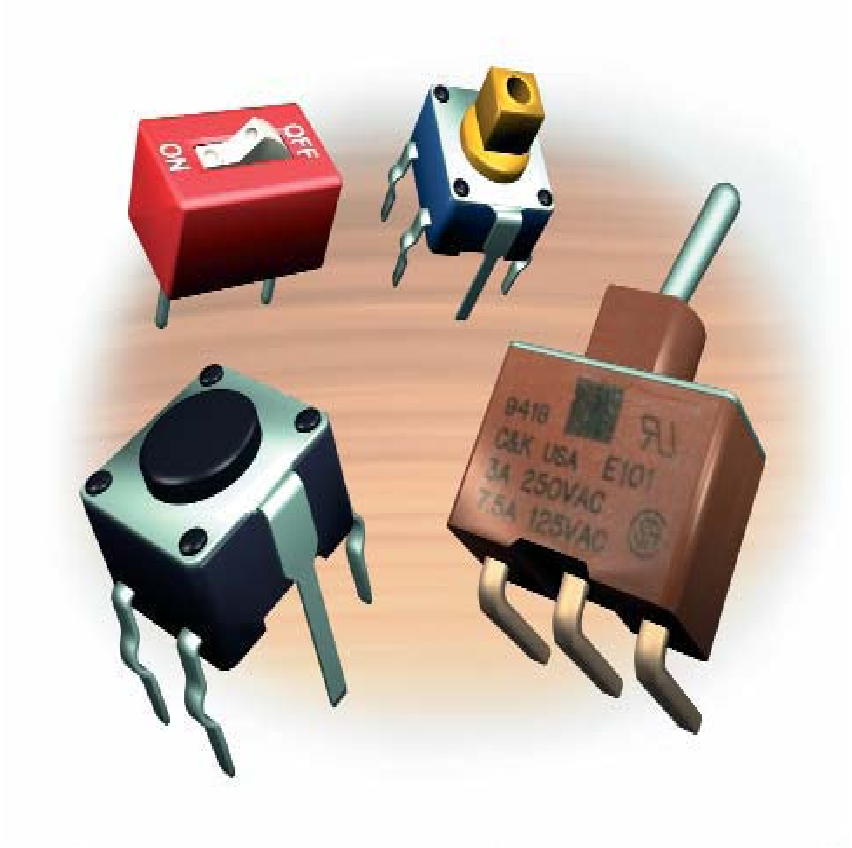
THT, axial, radial



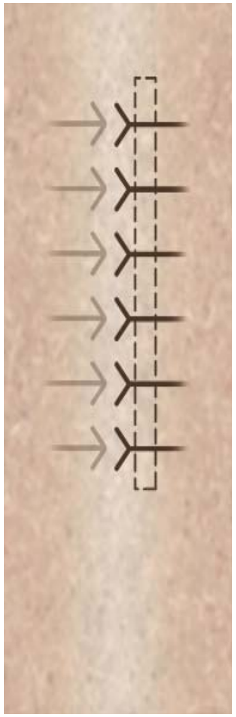


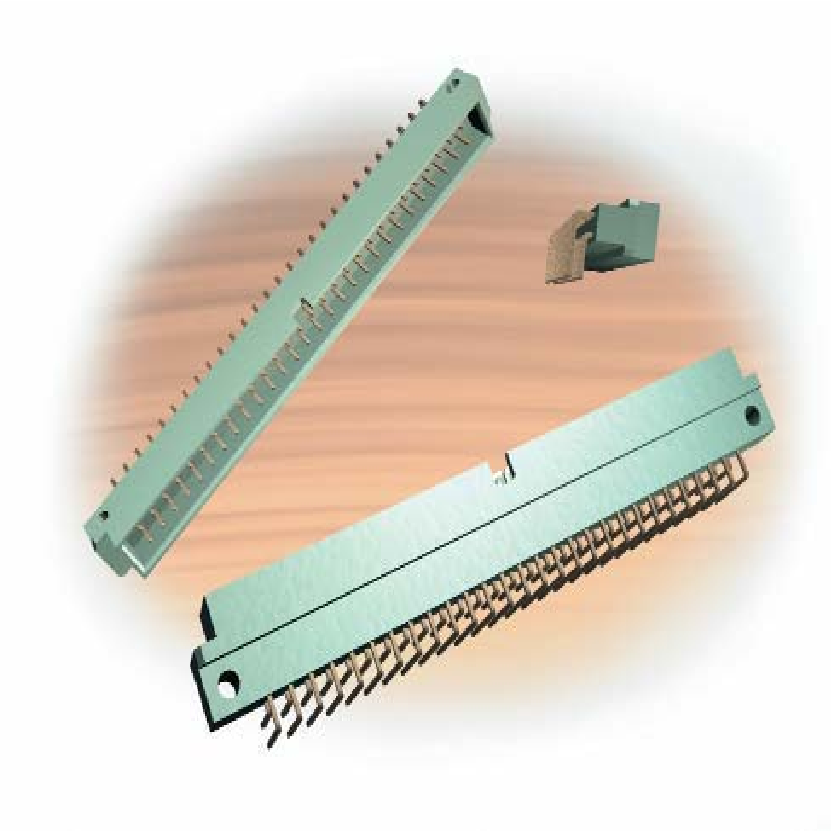
SPÍNAČE - S



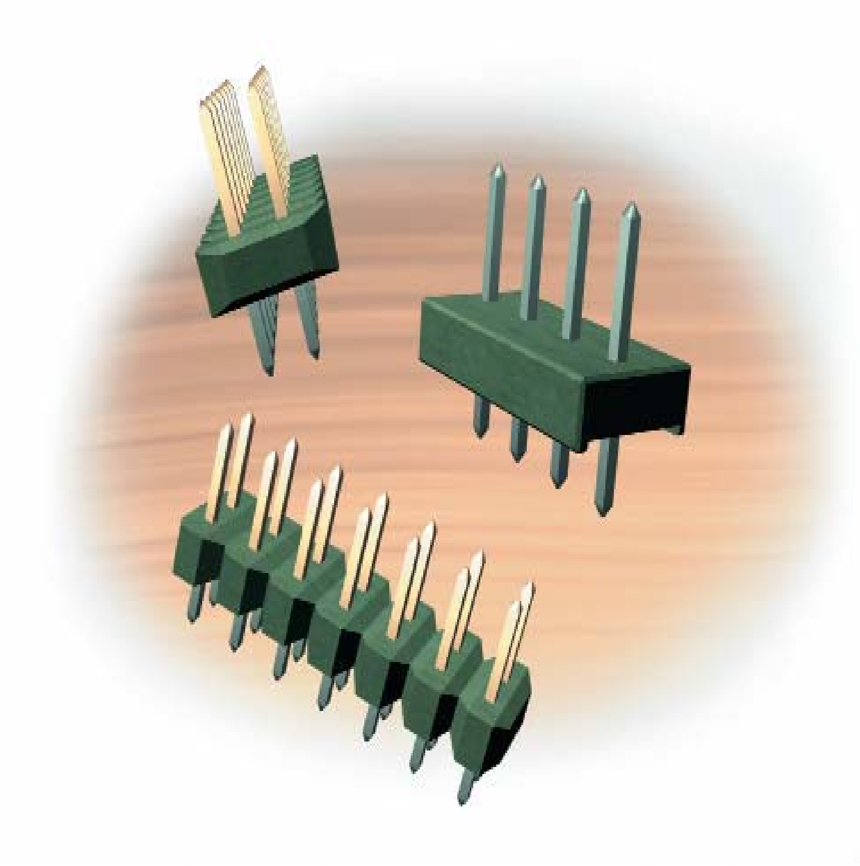


KONEKTORY – P, J

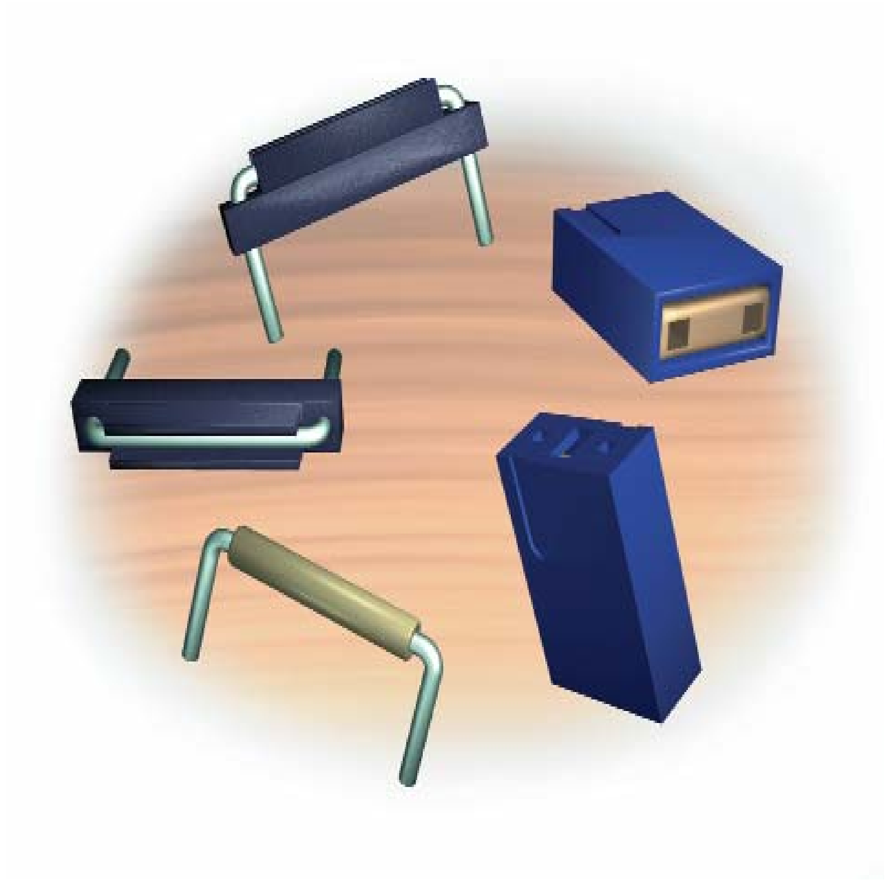




PATICE – HEADER – J, P

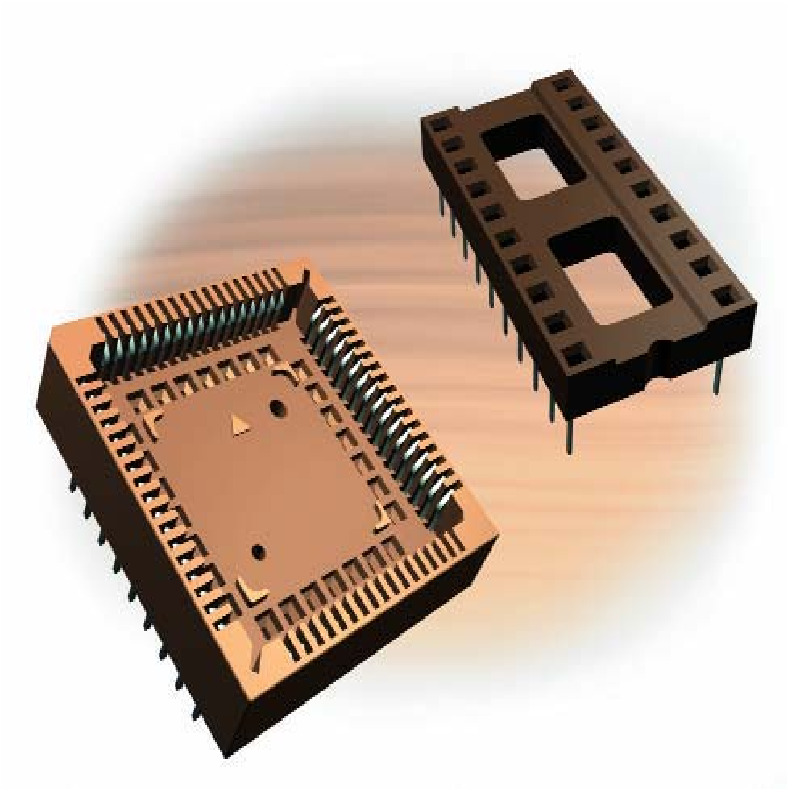


PROPOJKA - JUMPER- W, E, P



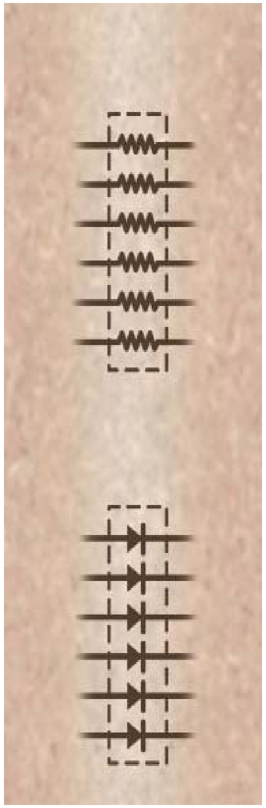
PATICE, ZÁSUVKA

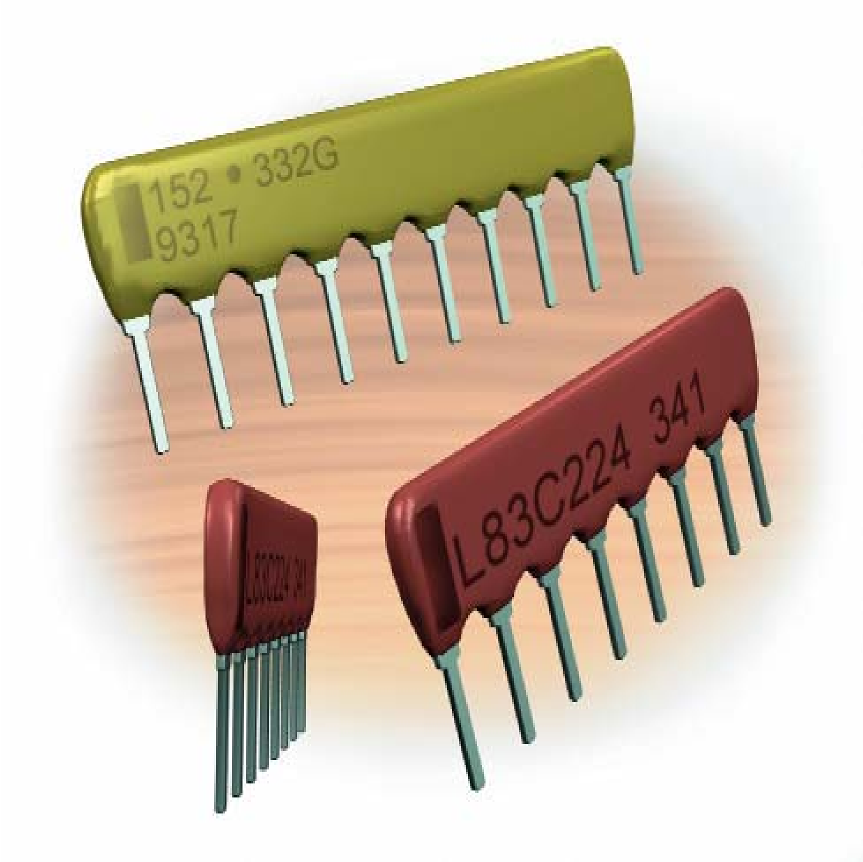
X, XAR, XU, XQ



IO – IC - SIP

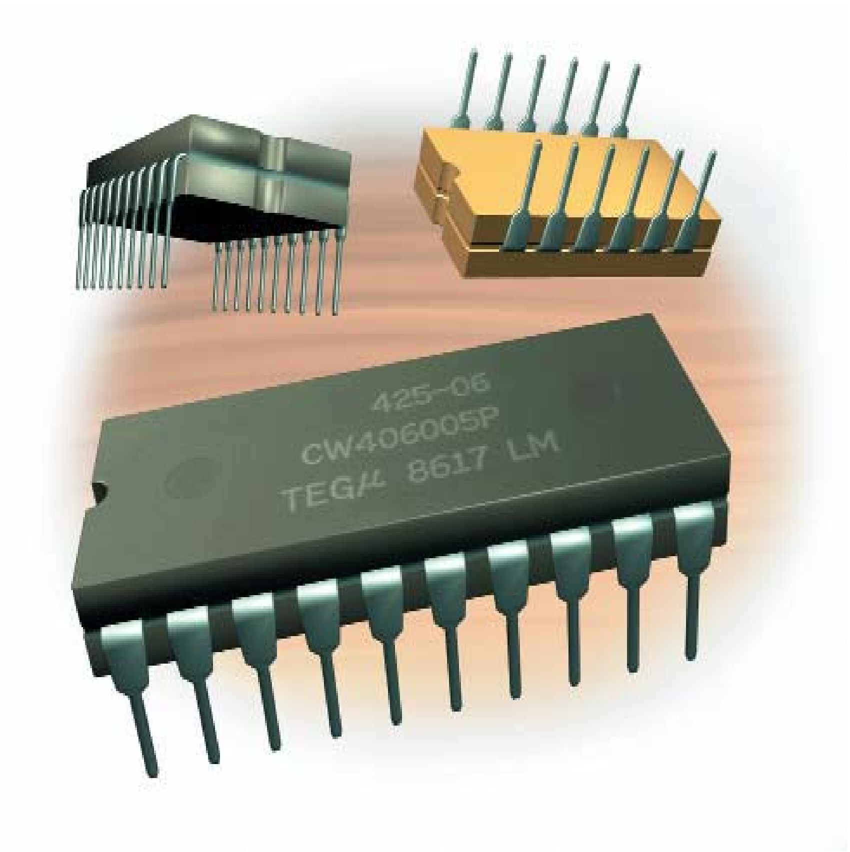
Single In-line Package



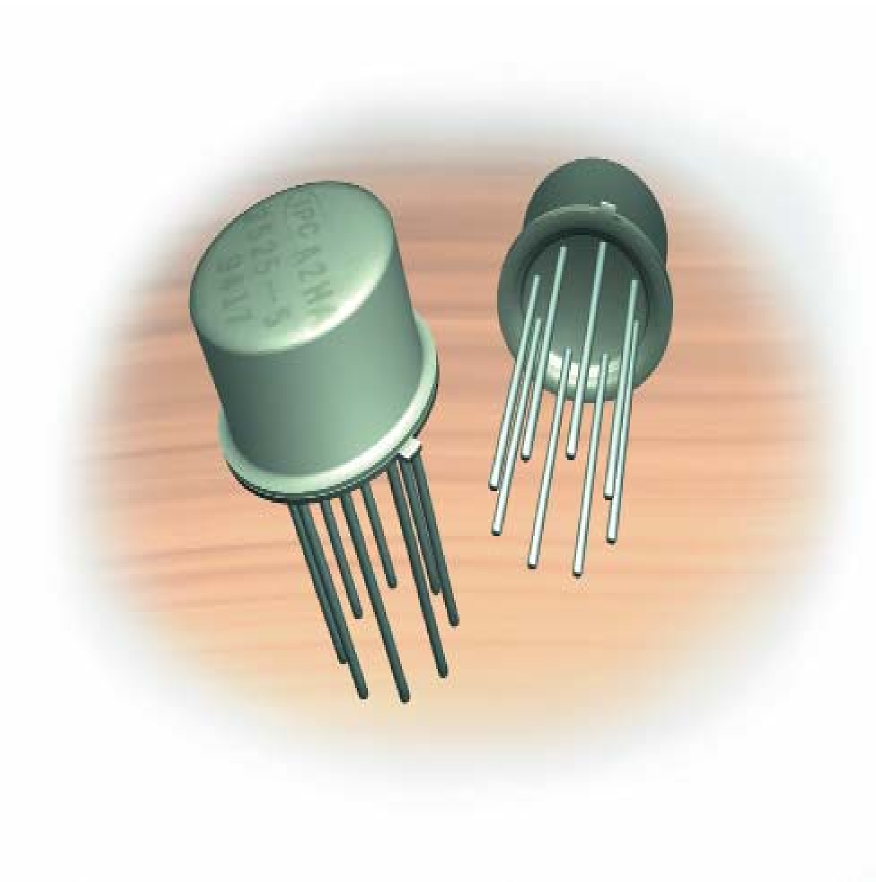


IC – DIP

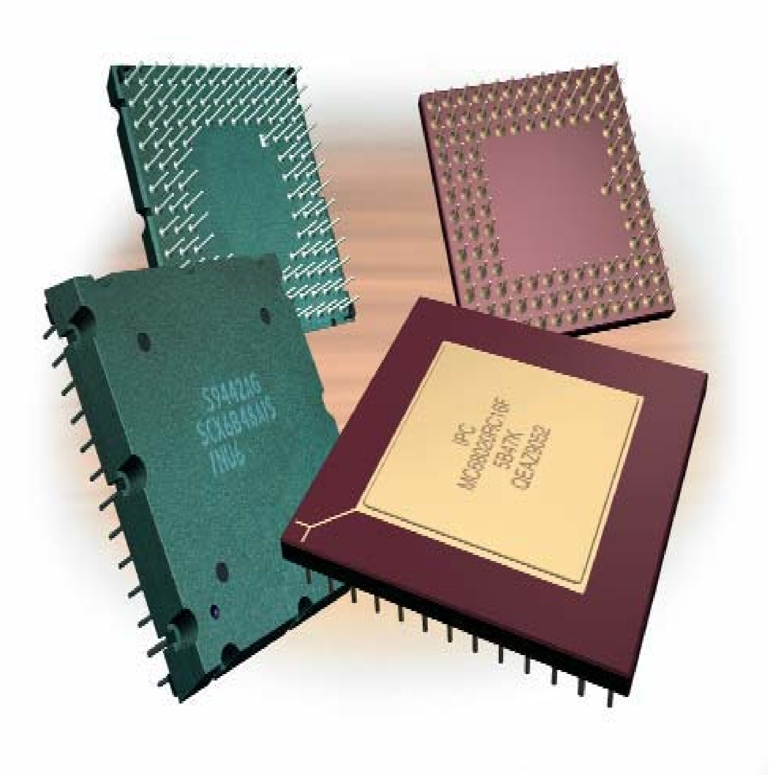
Dual In-line Package



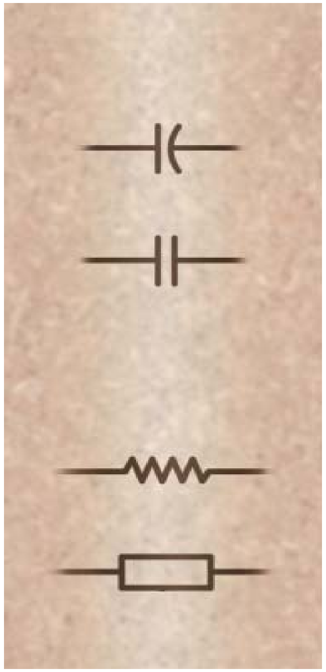
IC pouzdro

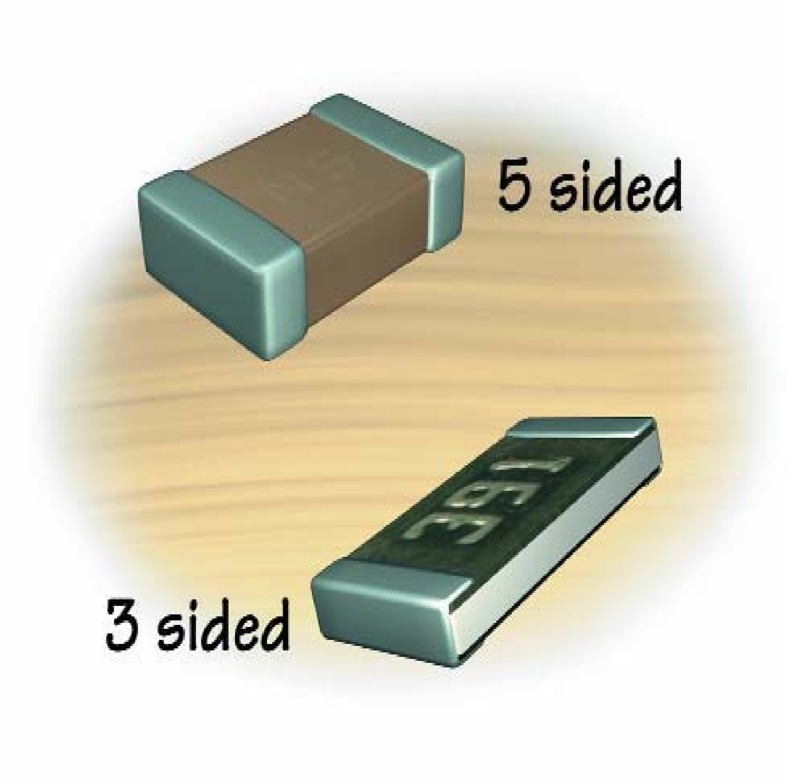


PGA
Pin Grid Array



SM ČIPOVÉ SOUČÁSTKY





ZNAČENÍ TOLERANCÍ

- B = ± .1%
- C = ± .25%
- D = ± .5%
- F = ± 1%
- G = ± 2%
- J = ± 5%
- K = ± 10%
- M = ± 20%
- Z = + 80/-20%

ROZMĚRY SOUČÁSTEK

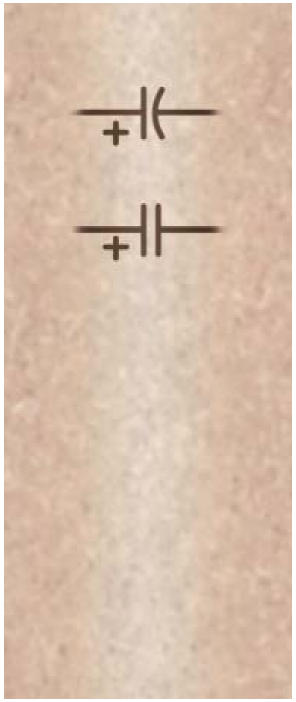
- **Size Codes (inches)**

0402	.04” x .02”
0605	.06” x .05”
0805	.08” x .05”
1005	.10” x .05”
1206	.12” x .06”
1210	.12” x .10”
1812	.18” x .12”
2225	.22” x .25”

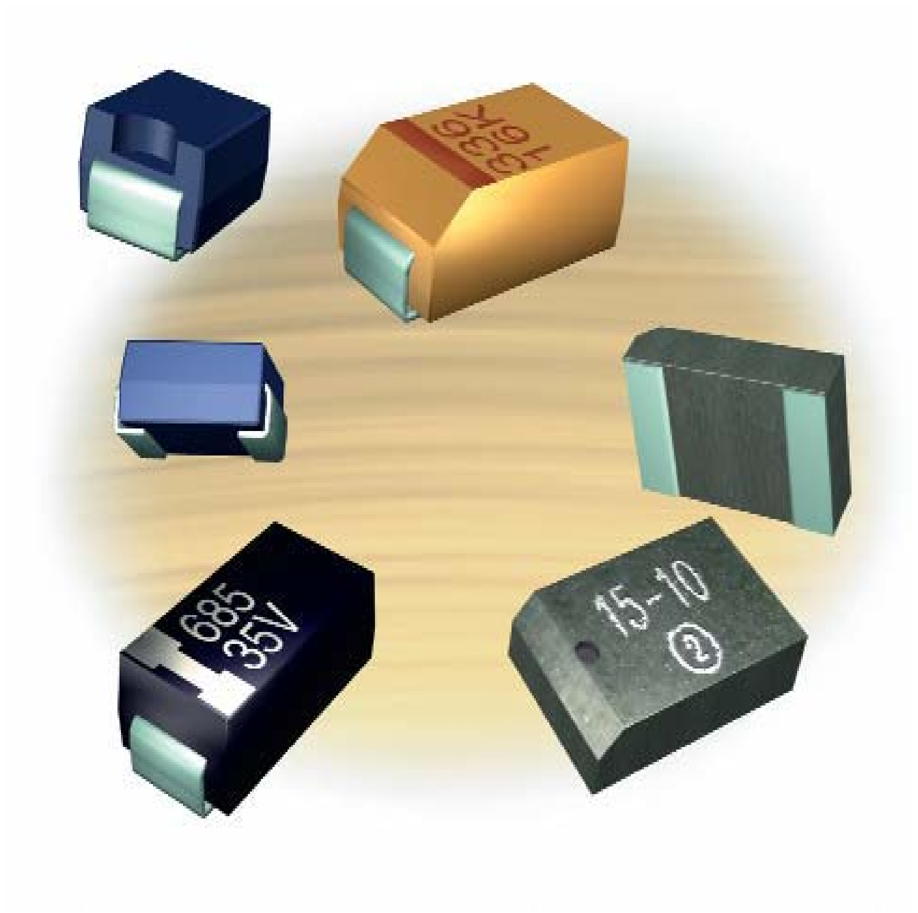
- **Size Codes (metric)**

1005	1.0 x 0.5 mm
1508	1.5 x 0.8 mm
2012	2.0 x 1.2 mm
2512	2.5 x 1.2 mm
3225	3.2 x 2.5 mm
4532	4.5 x 3.2 mm
5664	5.6 x 6.4 mm

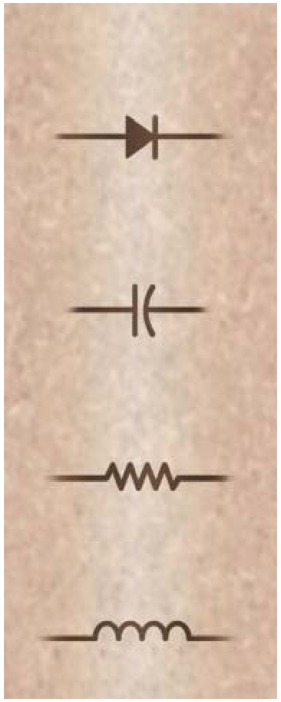
TANTALOVÉ KAPACIRY

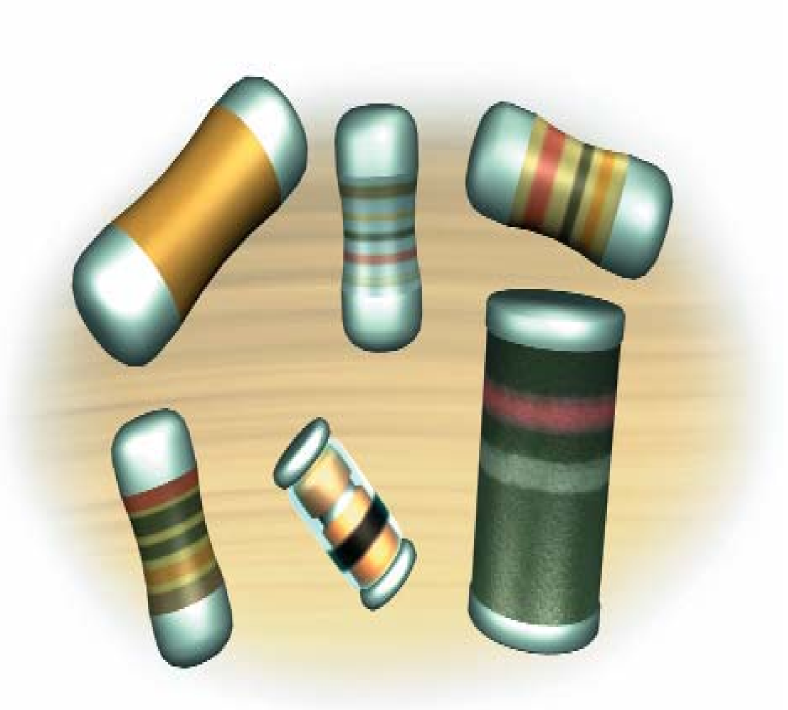


A = 3.2 x 1.6 mm
B = 3.5 x 2.8 mm
C = 6.0 x 3.2 mm
D = 7.3 x 4.3 mm

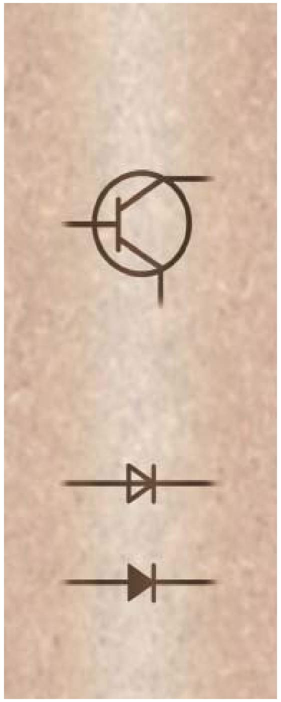


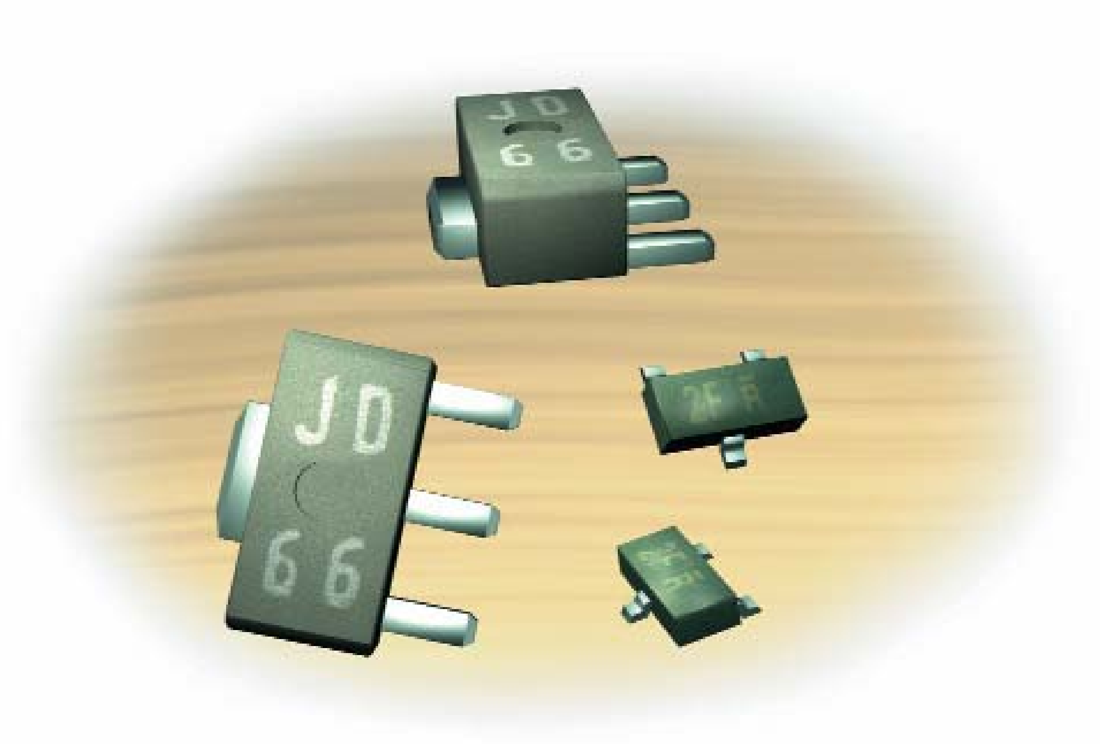
MELF Metal ELectrode Face



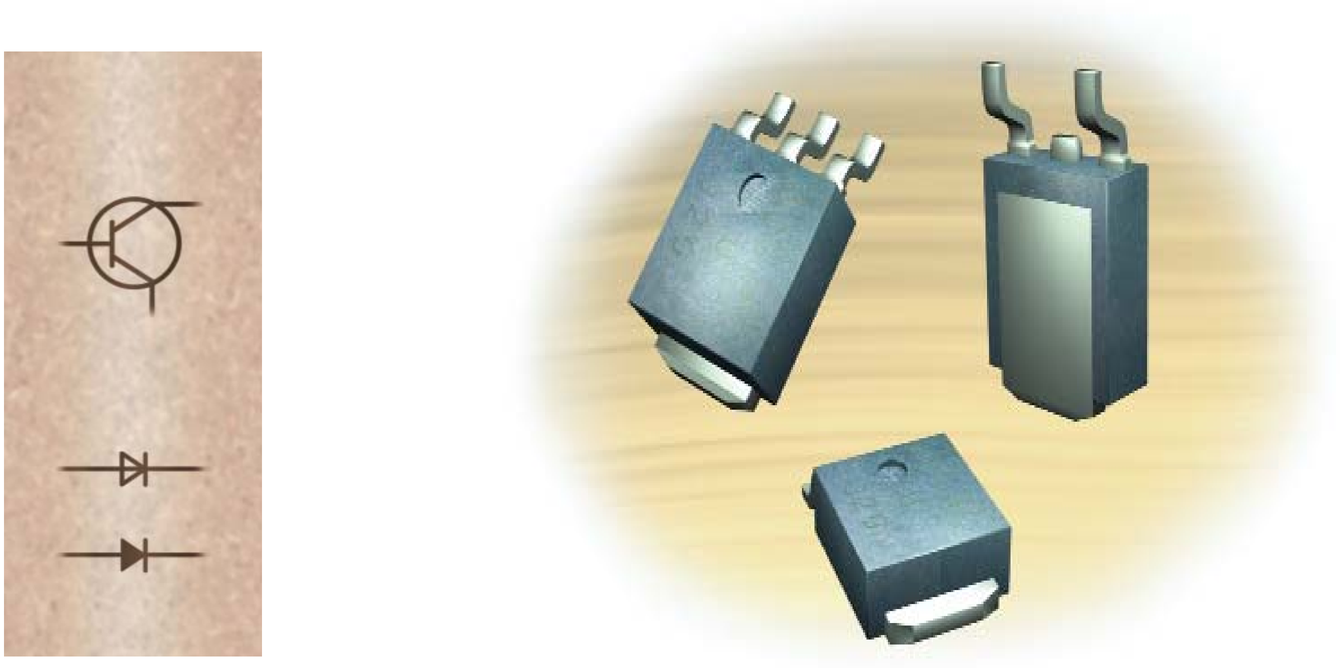


SOT -Small Outline Transistor

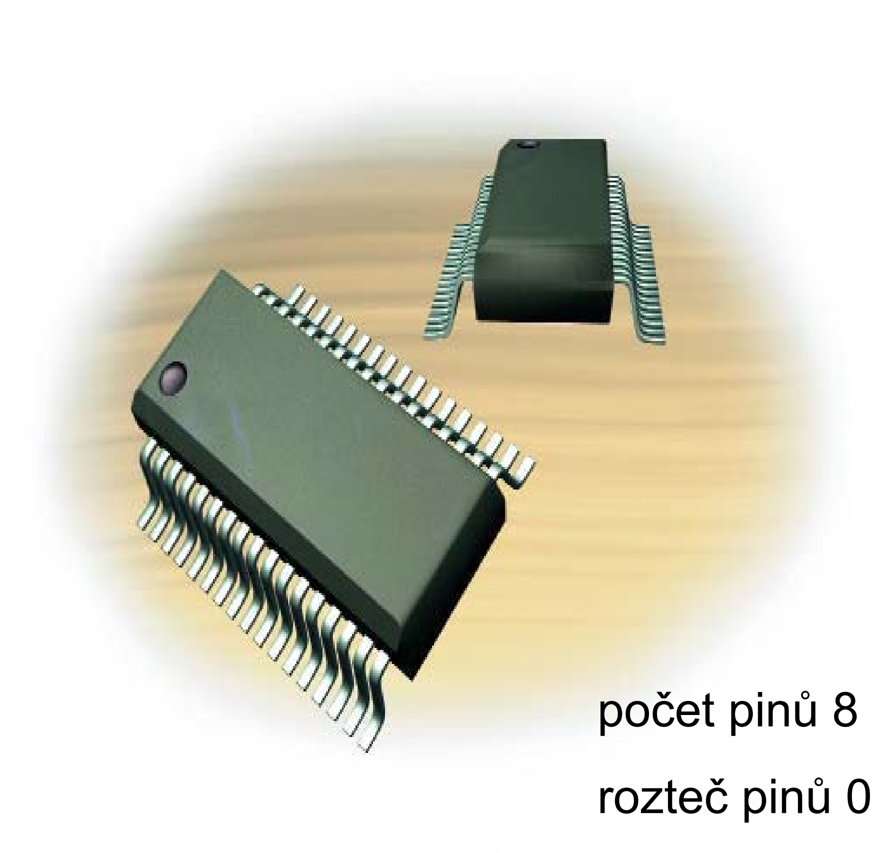




DPAK – Diode PAcKage



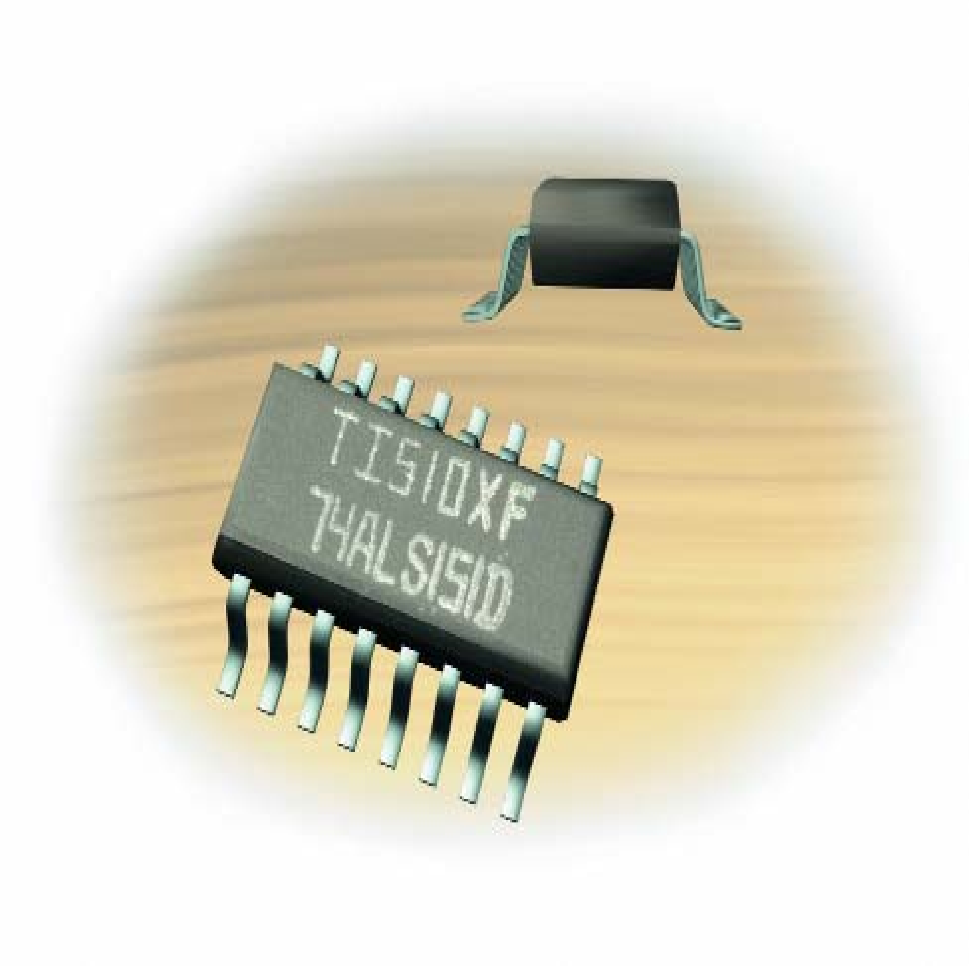
SOIC – Small Outline Integrated Circuit



počet pinů 8 – 56

rozteč pinů 0,4 – 1,27 mm

SO Small Outline

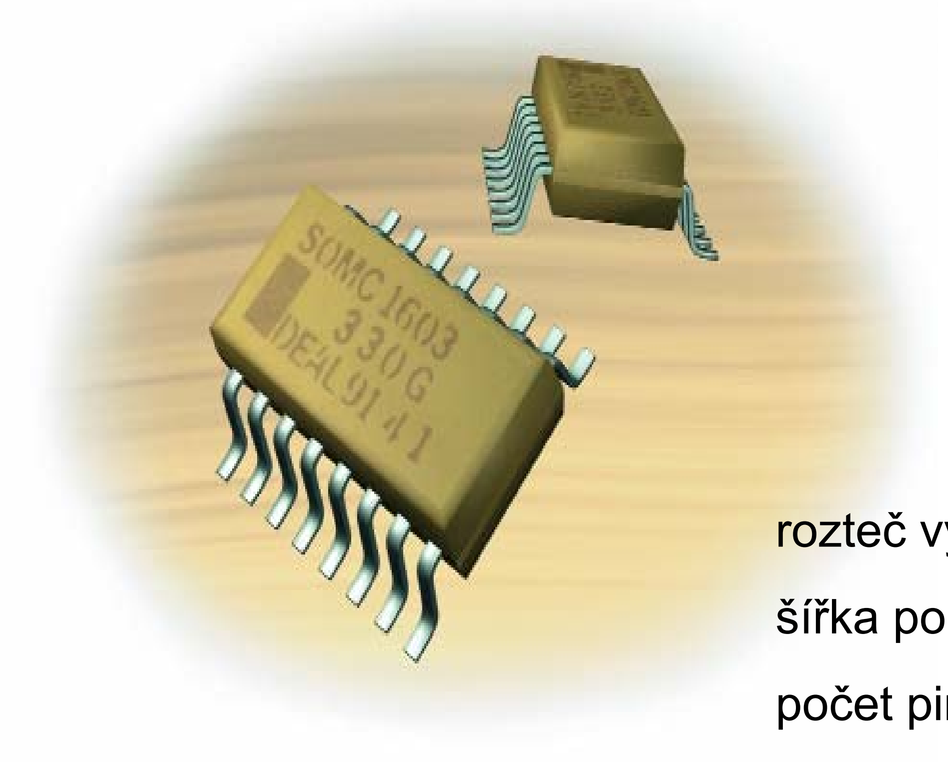


rozteč vývodů 1,27 mm

šířka pouzdra 3,97 mm

počet pinů 8 - 16

SOM – Small Outline Medium

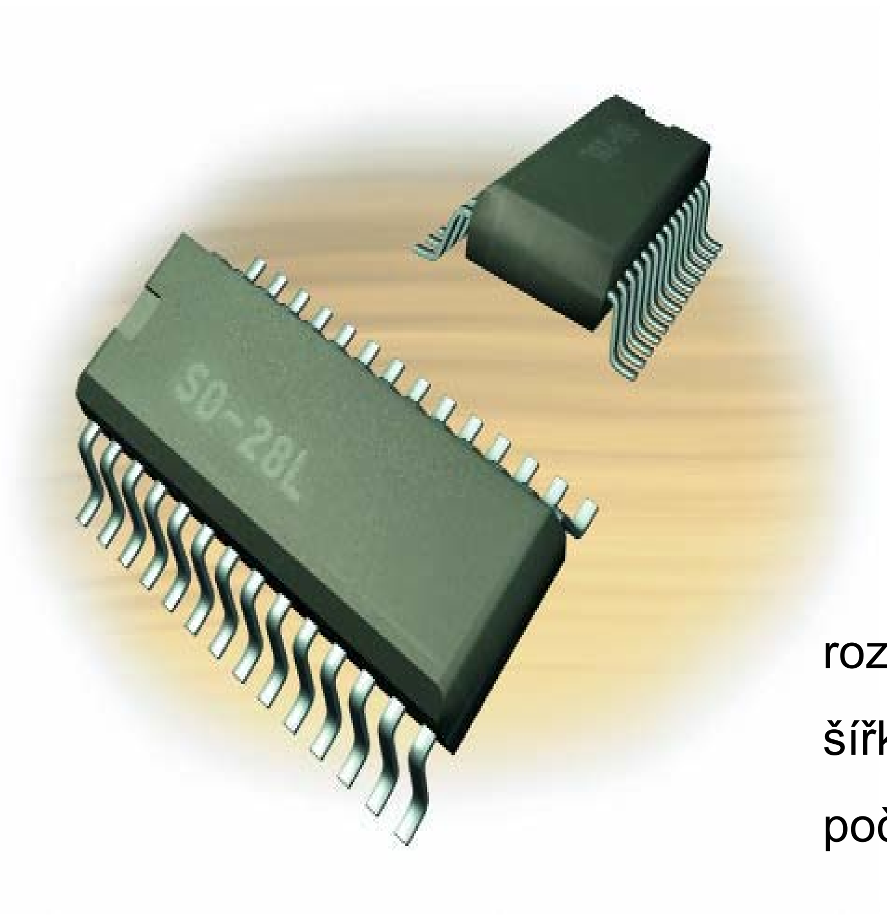


rozteč vývodů 1,27 mm

šířka pouzdra 5,6 mm

počet pinů 8 - 16

SOL Small Outline Large, SOW Small Outline Wide

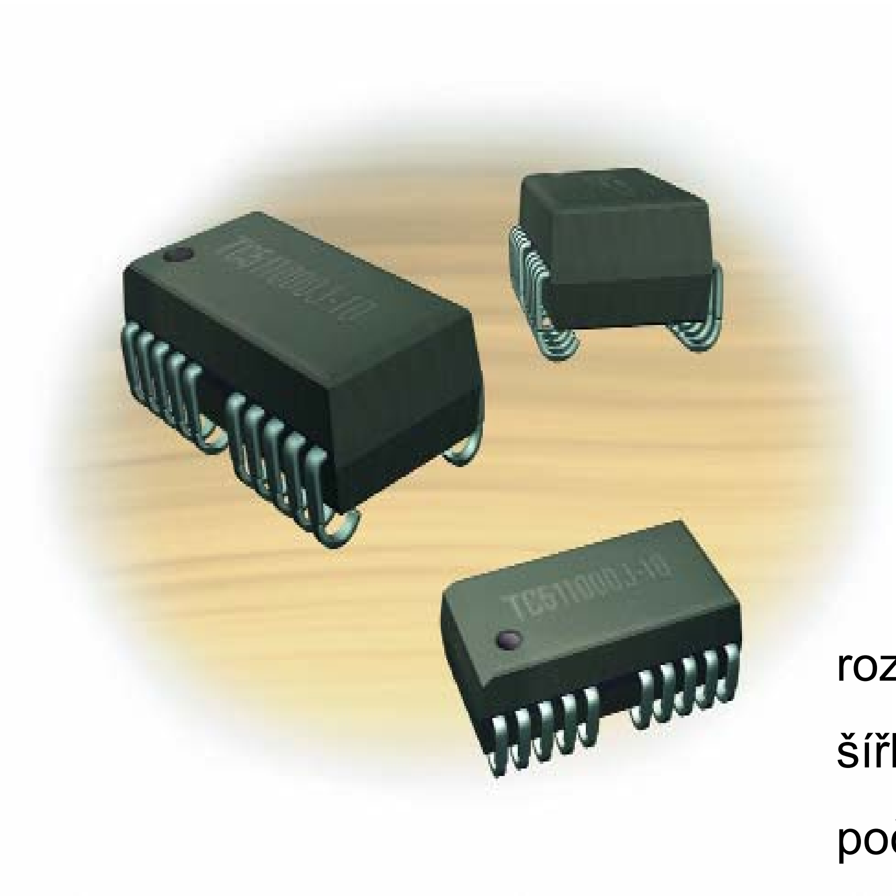


rozteč vývodů 1,27 mm

šířka pouzdra 6,63 - 12,2 mm

počet pinů 16 - 32

SOL – J Small Outline Large, vývody J

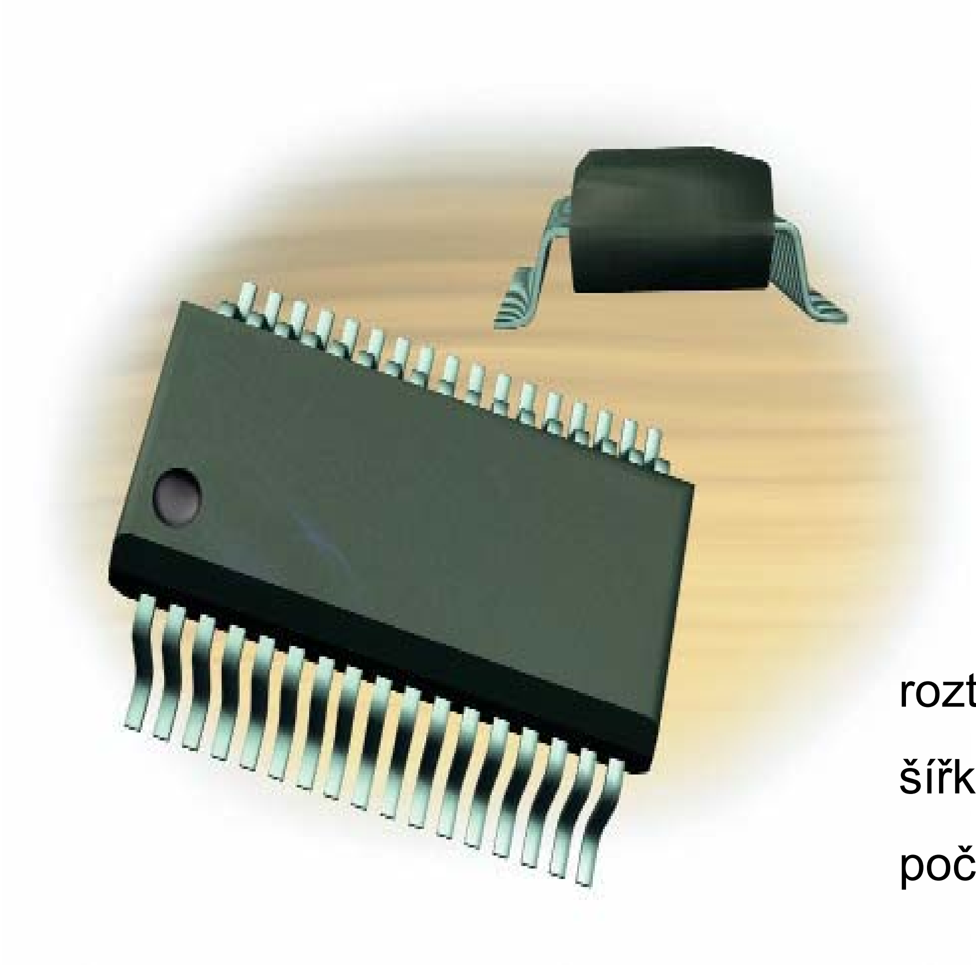


rozteč vývodů 1,27 mm

šířka pouzdra 6,63 - 12,2 mm

počet pinů 16 - 40

VSOP Very Small Outline Package

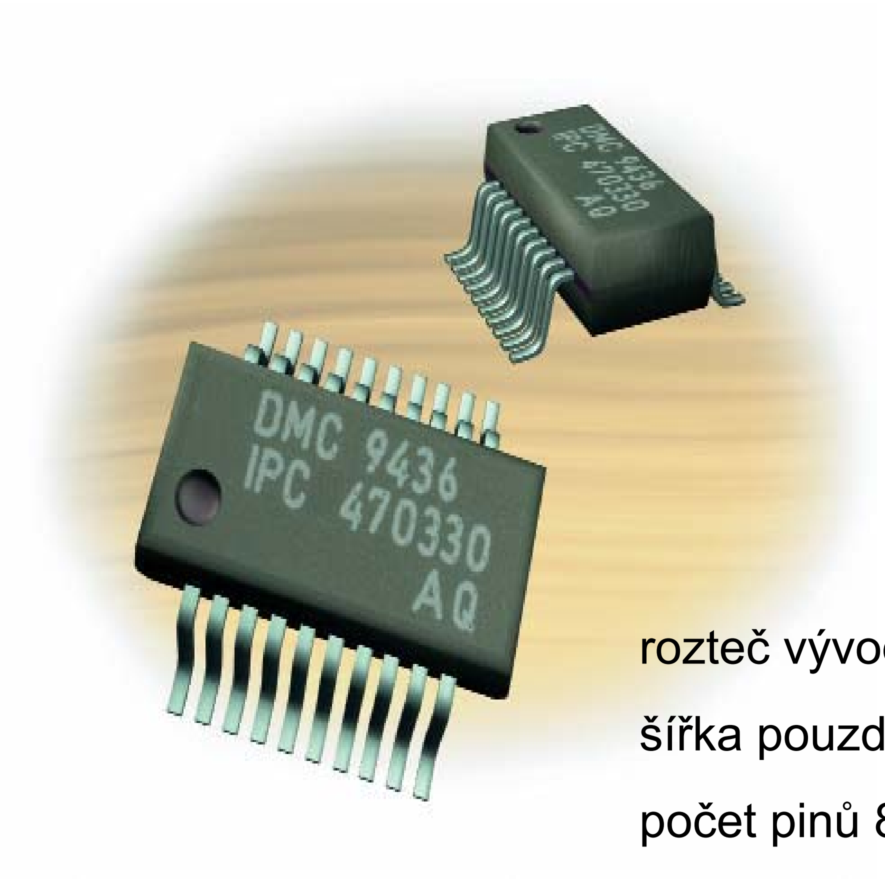


rozteč vývodů 0,65 mm

šířka pouzdra 6,63 mm

počet pinů 32 - 56

SSOP Shrink Small Outline Package

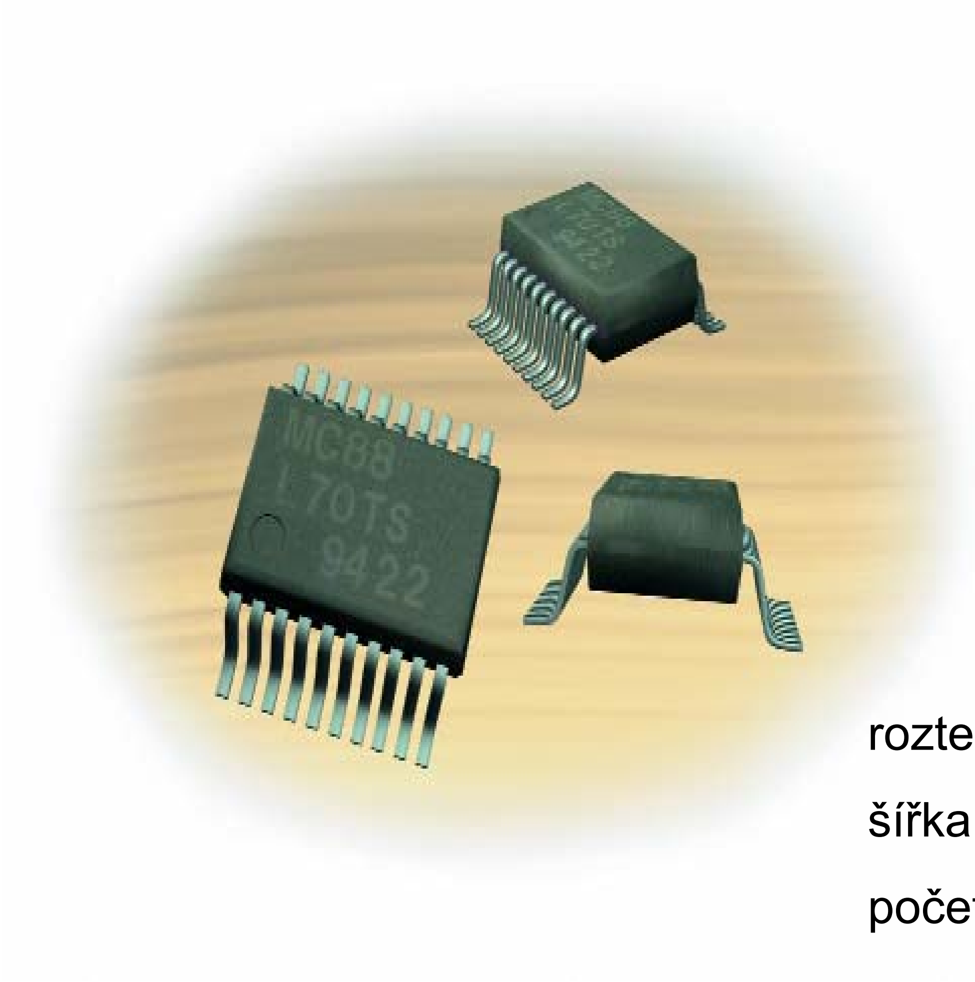


rozteč vývodů 0,65 mm

šířka pouzdra 5,3 mm

počet pinů 8 - 30

QSOP Quarter Small Outline Package

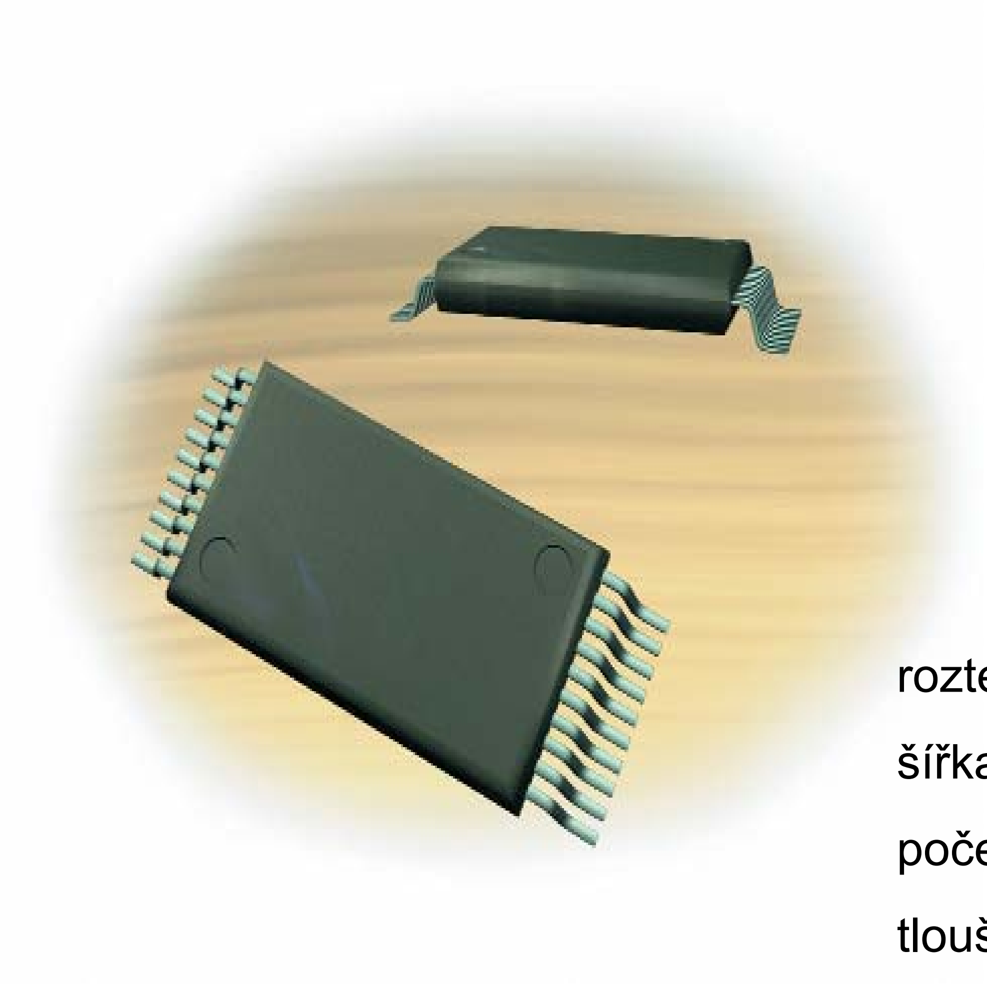


rozteč vývodů 0,65 mm

šířka pouzdra 3,97 mm

počet pinů 20 - 56

TSOP Tin Small Outline Package



rozteč vývodů 0,5 mm

šířka pouzdra 5,3 mm

počet pinů 20 – 56

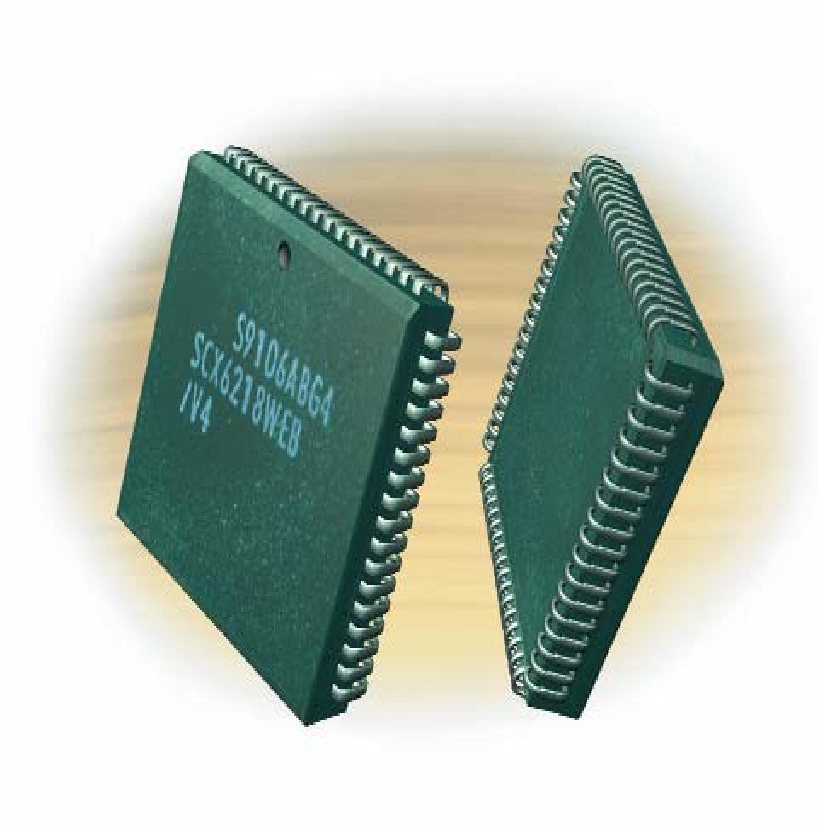
tloušťka 1 mm

LCC Leadless Chip Carrier
LCCC – Leadless Ceramic Chip Carrier

rozteč vývodů 1,27 mm

počet pinů 16 - 124

PLCC Plastic Leaded Chip Carrier

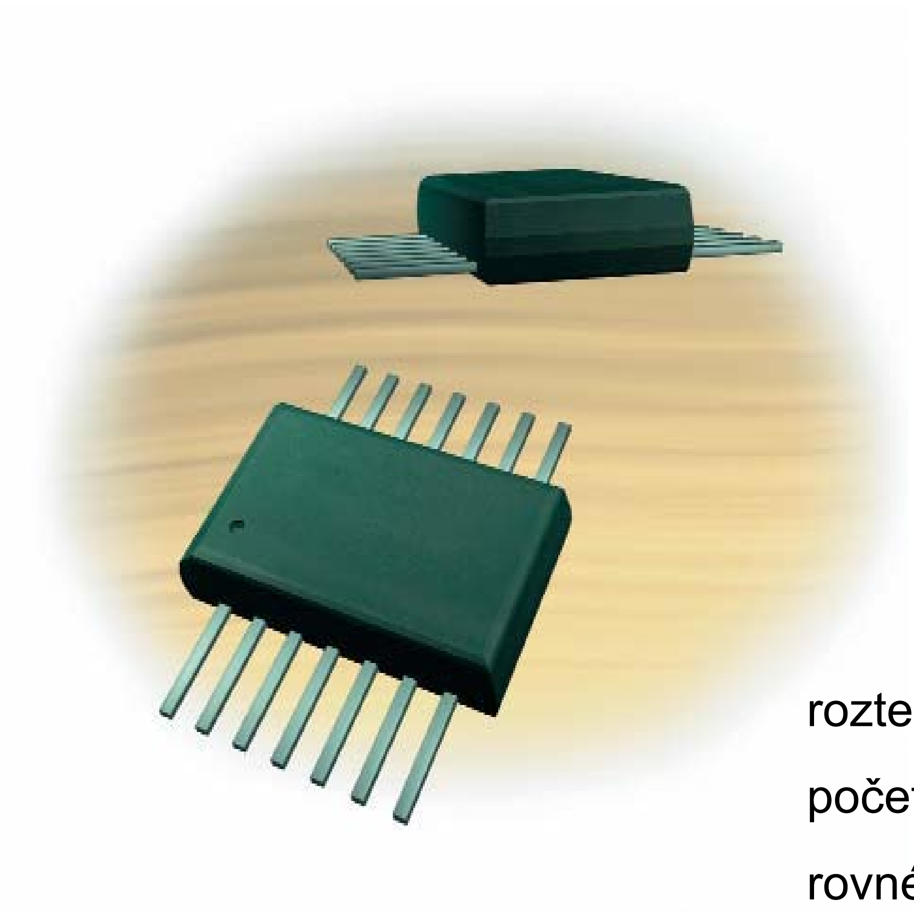


rozteč vývodů 1,27 mm

počet pinů 20 – 100

J vývody

FLAT LEAD PACKAGE



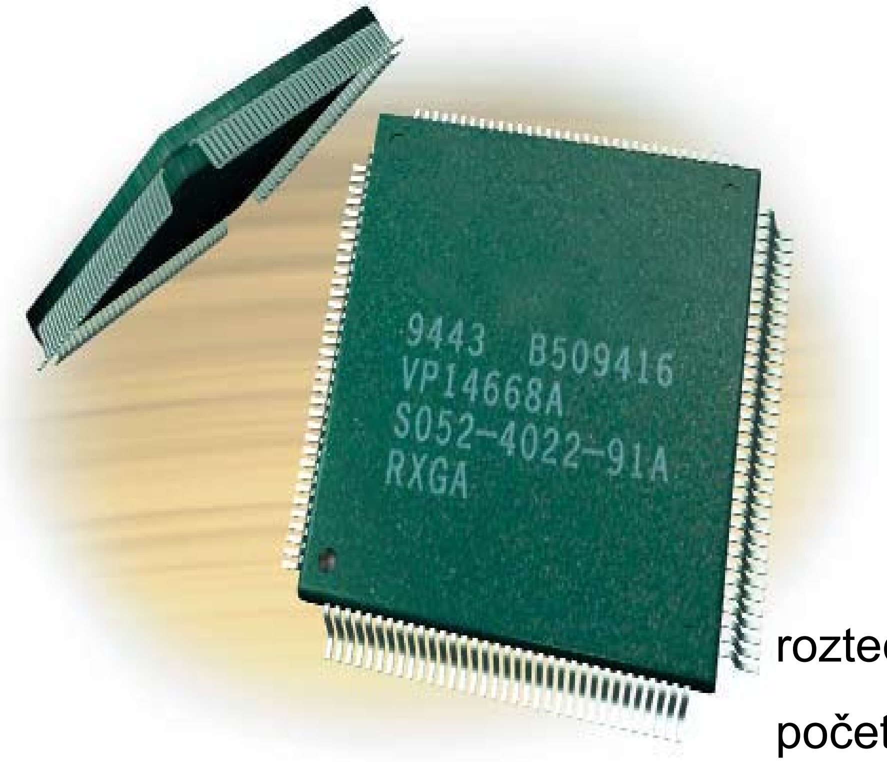
rozteč vývodů 1,27 mm

počet pinů 10 - 28

rovné vývody

QFP Quad Flat Package

MQFP Metric Quad Flat Package

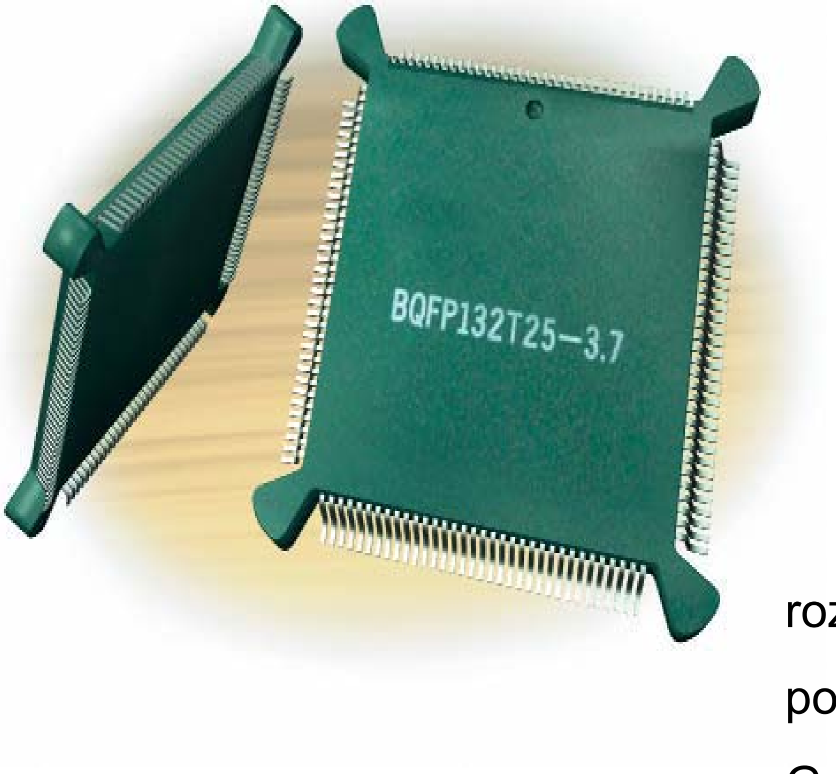


rozteč vývodů 0,3 – 0,65 mm

počet pinů 40 - 132

Gull Wing vývody na 4 stranách

PQFP Plastic Quad Flat Package

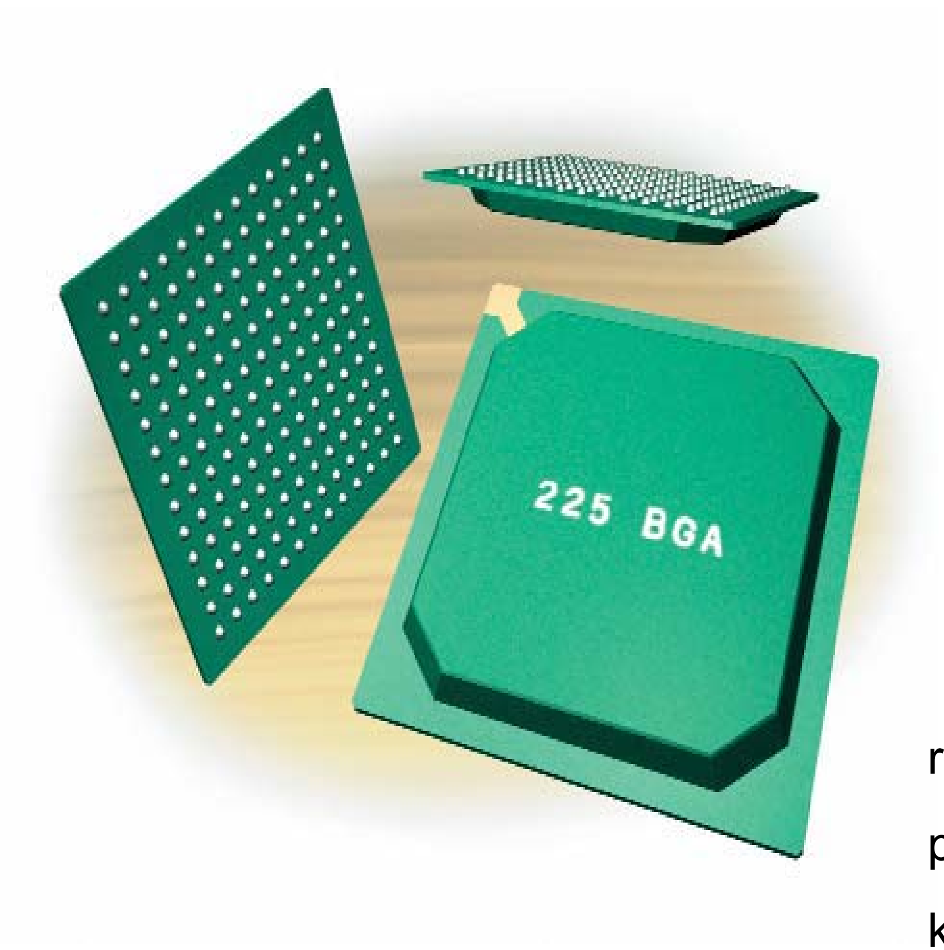


rozteč vývodů 0,636 mm

počet pinů 40 - 132

Gull Wing vývody na 4 stranách

BGA Ball Grid Array

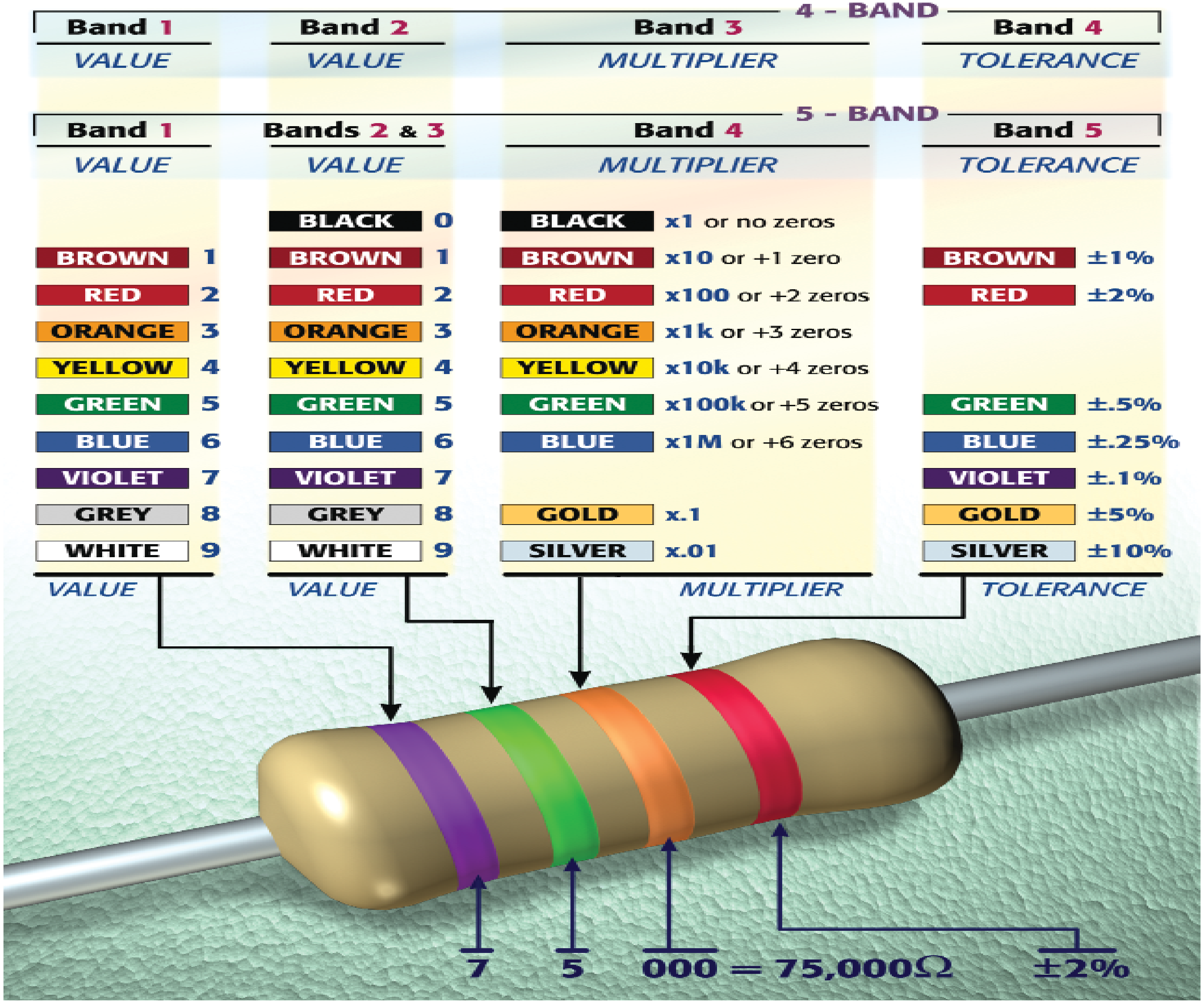


rozteč vývodů 1,27 mm

počet pinů 25 - 625

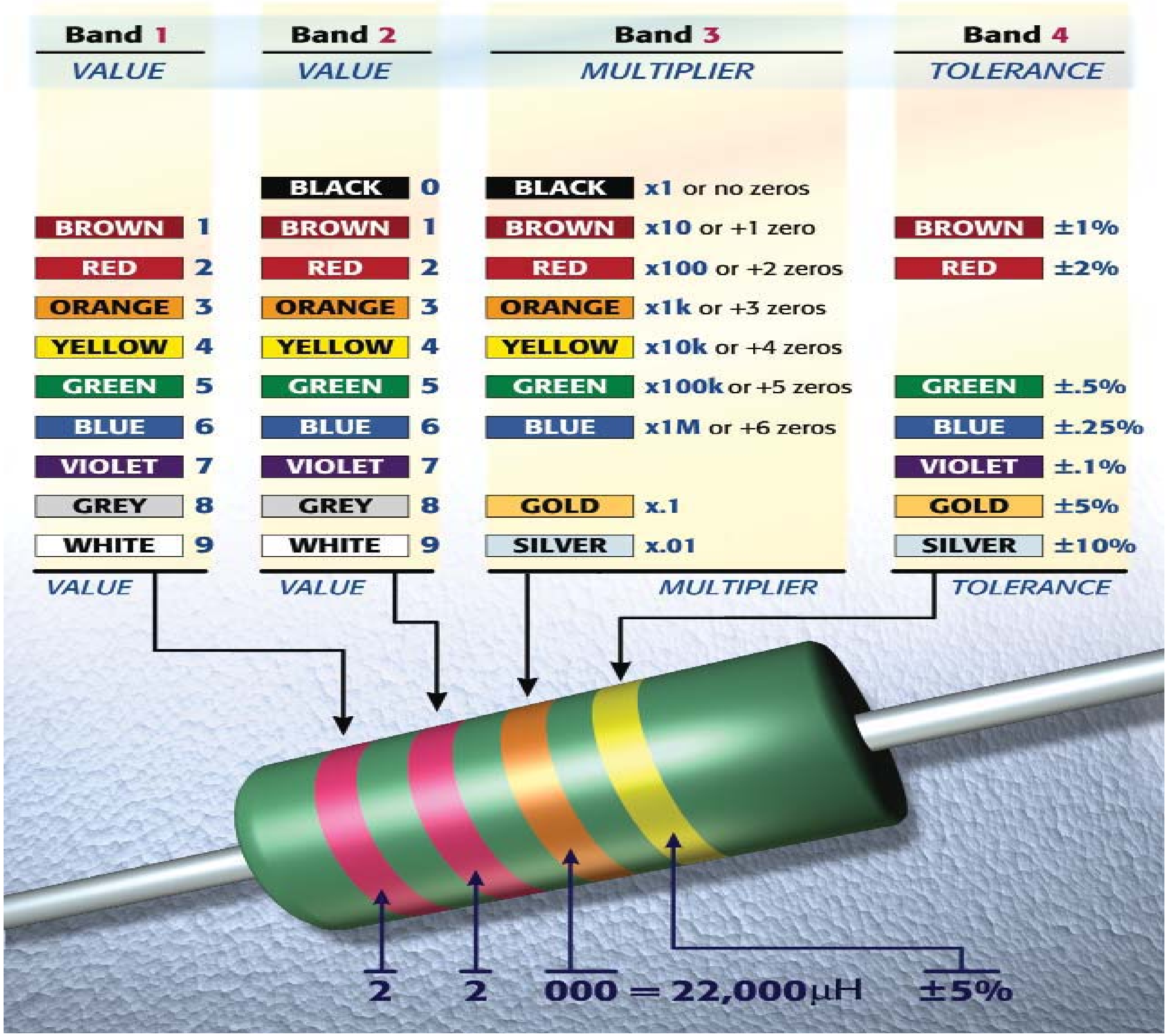
kuličkové vývody zespodu

RESISTORY s barevným kódem



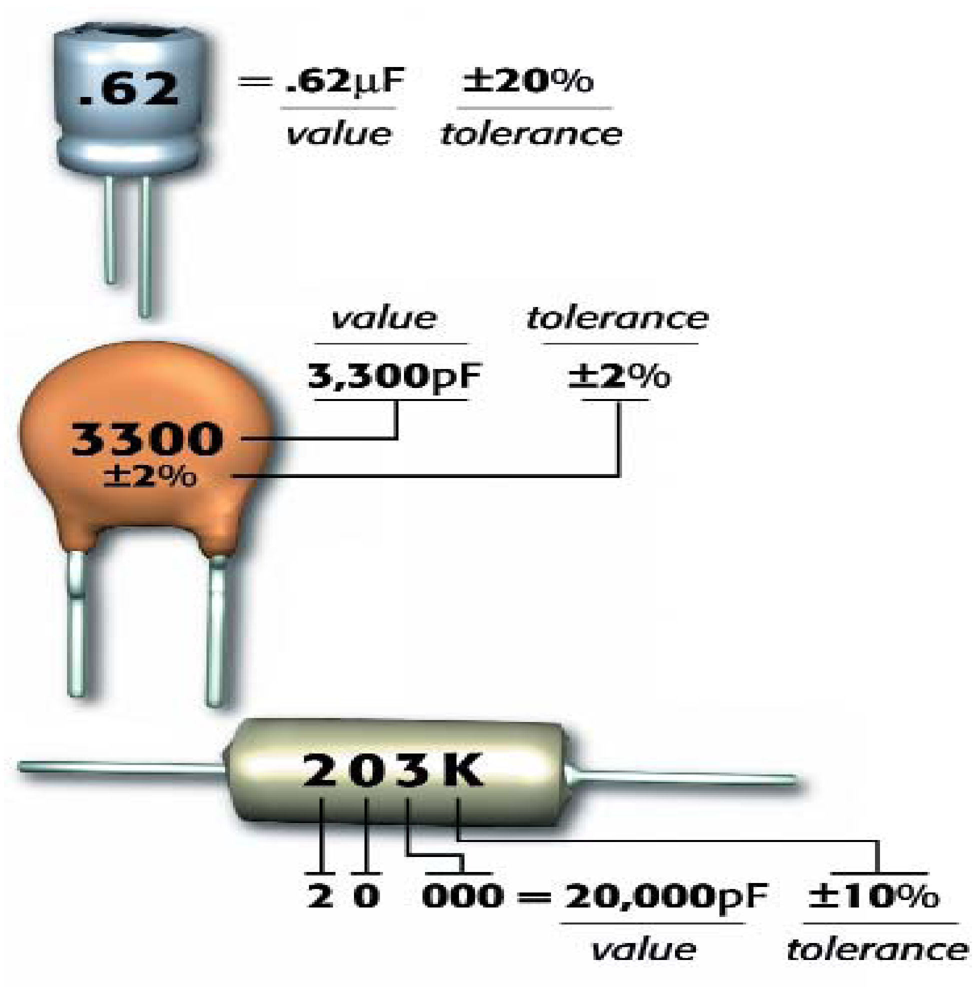
4 - BAND							
Band 1		Band 2		Band 3		Band 4	
VALUE		VALUE		MULTIPLIER		TOLERANCE	
5 - BAND							
Band 1		Bands 2 & 3		Band 4		Band 5	
VALUE		VALUE		MULTIPLIER		TOLERANCE	
		BLACK	0	BLACK	x1 or no zeros		
BROWN	1	BROWN	1	BROWN	x10 or +1 zero	BROWN	±1%
RED	2	RED	2	RED	x100 or +2 zeros	RED	±2%
ORANGE	3	ORANGE	3	ORANGE	x1k or +3 zeros		
YELLOW	4	YELLOW	4	YELLOW	x10k or +4 zeros		
GREEN	5	GREEN	5	GREEN	x100k or +5 zeros	GREEN	±.5%
BLUE	6	BLUE	6	BLUE	x1M or +6 zeros	BLUE	±.25%
VIOLET	7	VIOLET	7			VIOLET	±.1%
GREY	8	GREY	8	GOLD	x.1	GOLD	±5%
WHITE	9	WHITE	9	SILVER	x.01	SILVER	±10%

INDUKTORY s barevným kódem



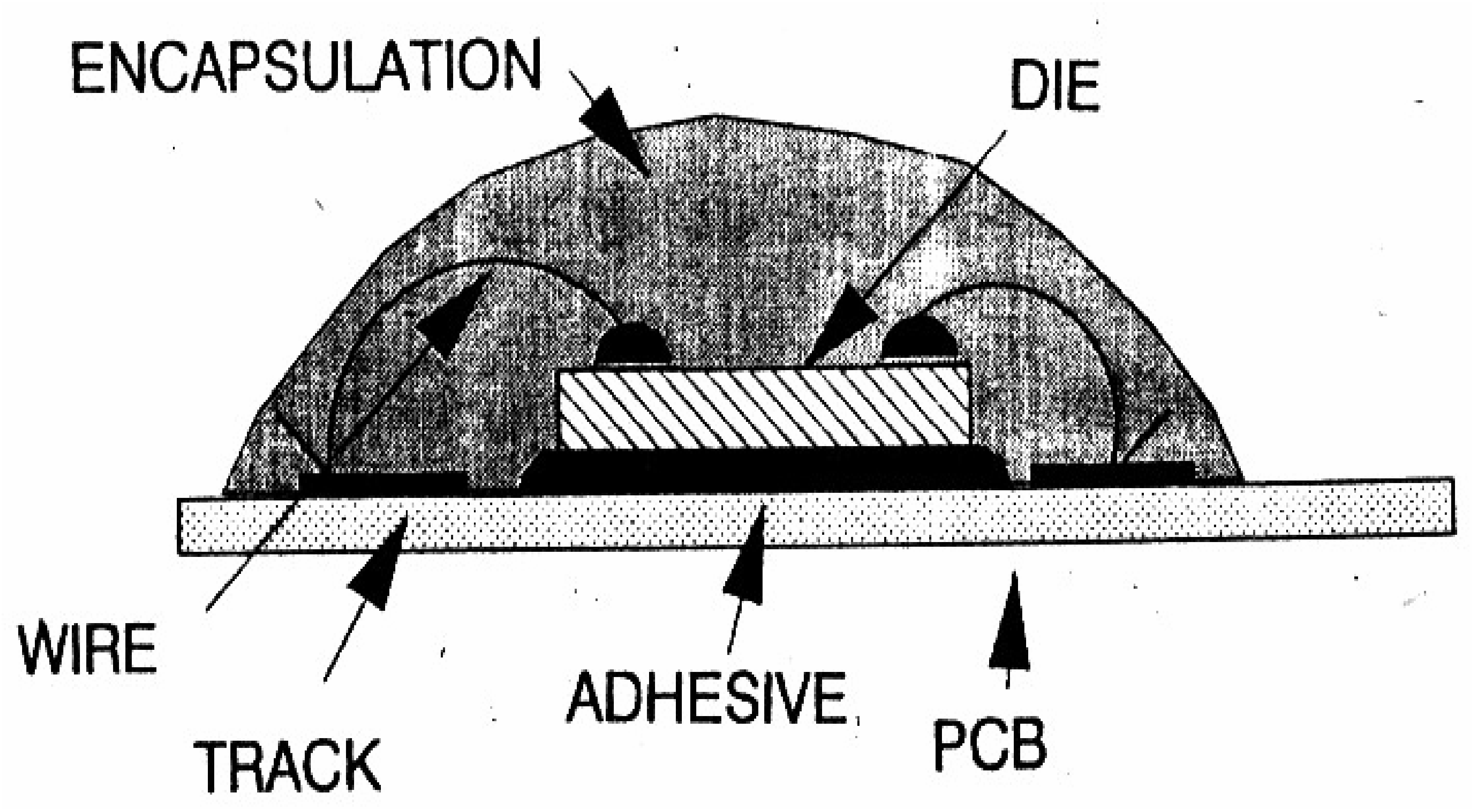
Band 1		**Band 2**		**Band 3**		**Band 4**	
VALUE		*VALUE*		*MULTIPLIER*		*TOLERANCE*	
		BLACK	0	BLACK	x1 or no zeros		
BROWN	1	BROWN	1	BROWN	x10 or +1 zero	BROWN	±1%
RED	2	RED	2	RED	x100 or +2 zeros	RED	±2%
ORANGE	3	ORANGE	3	ORANGE	x1k or +3 zeros		
YELLOW	4	YELLOW	4	YELLOW	x10k or +4 zeros		
GREEN	5	GREEN	5	GREEN	x100k or +5 zeros	GREEN	±.5%
BLUE	6	BLUE	6	BLUE	x1M or +6 zeros	BLUE	±.25%
VIOLET	7	VIOLET	7			VIOLET	±.1%
GREY	8	GREY	8	GOLD	x.1	GOLD	±5%
WHITE	9	WHITE	9	SILVER	x.01	SILVER	±10%

KAPACITORY

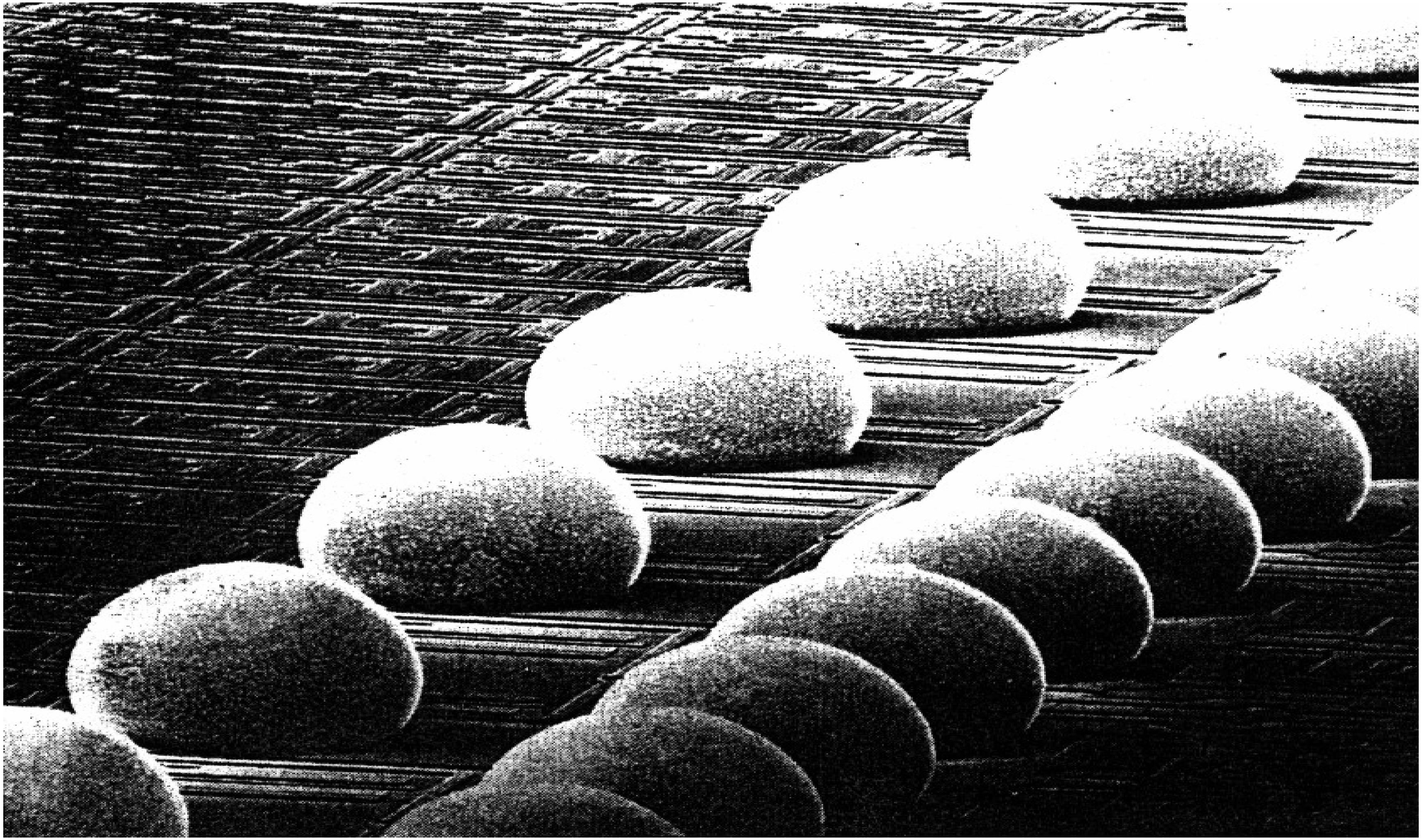


F = ±1%
G = ±2%
J = ±5%
K = ±10%
M = ±20%
Z = +80/-20%

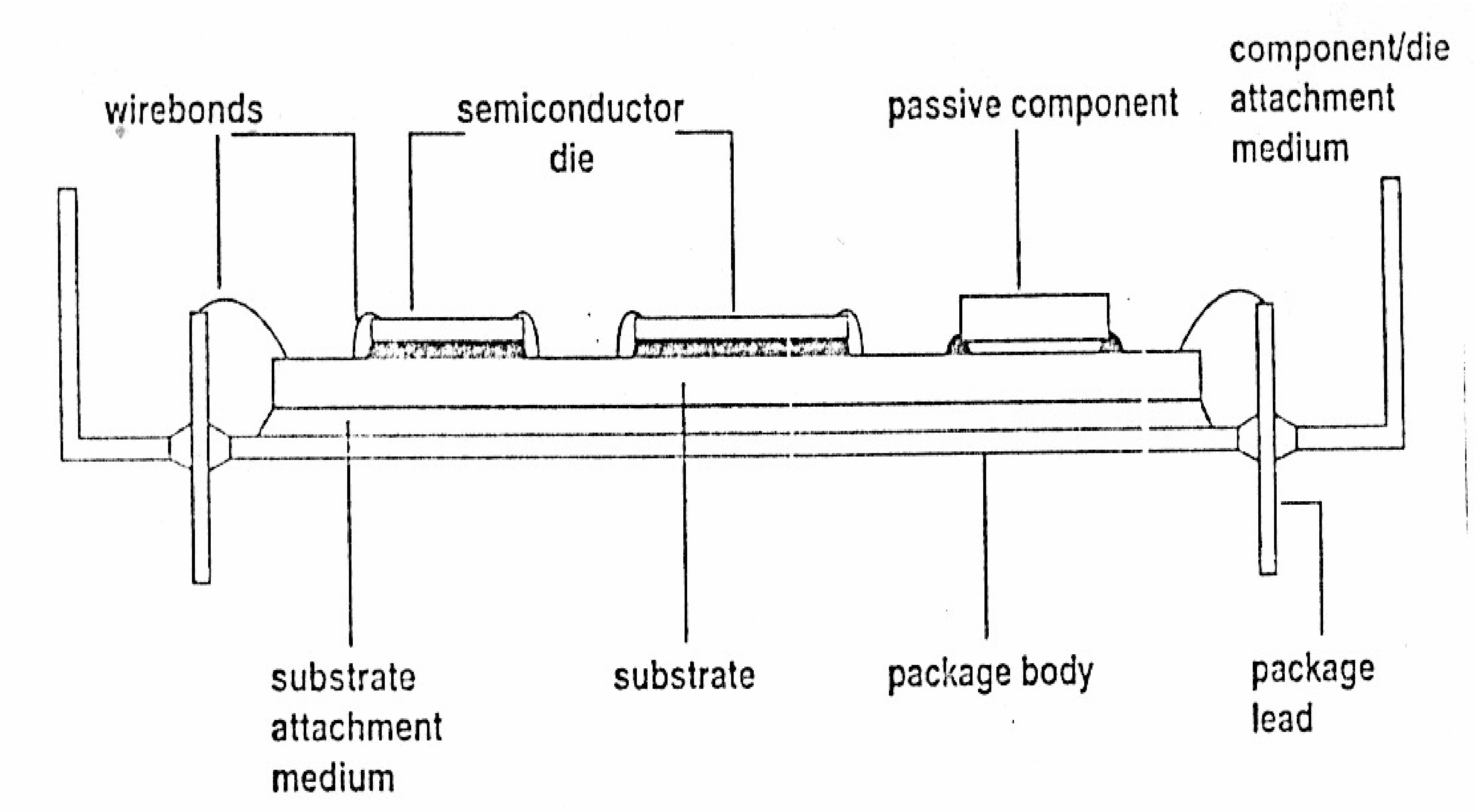
COB Chip On Board



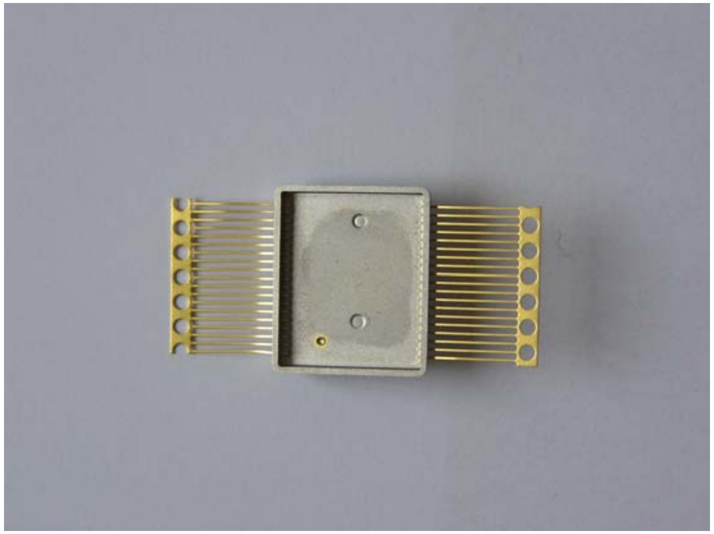
COB Chip On Board



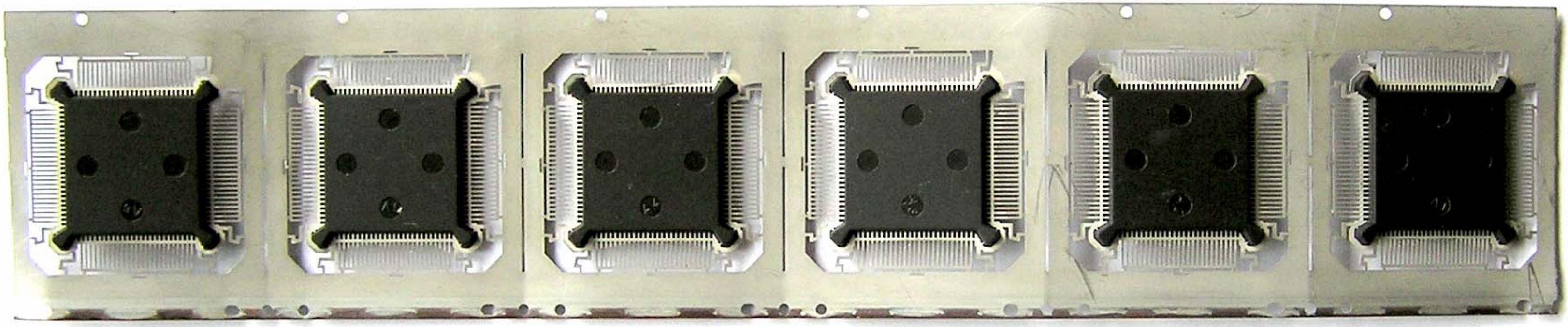
MCM – Multi Chip Modul



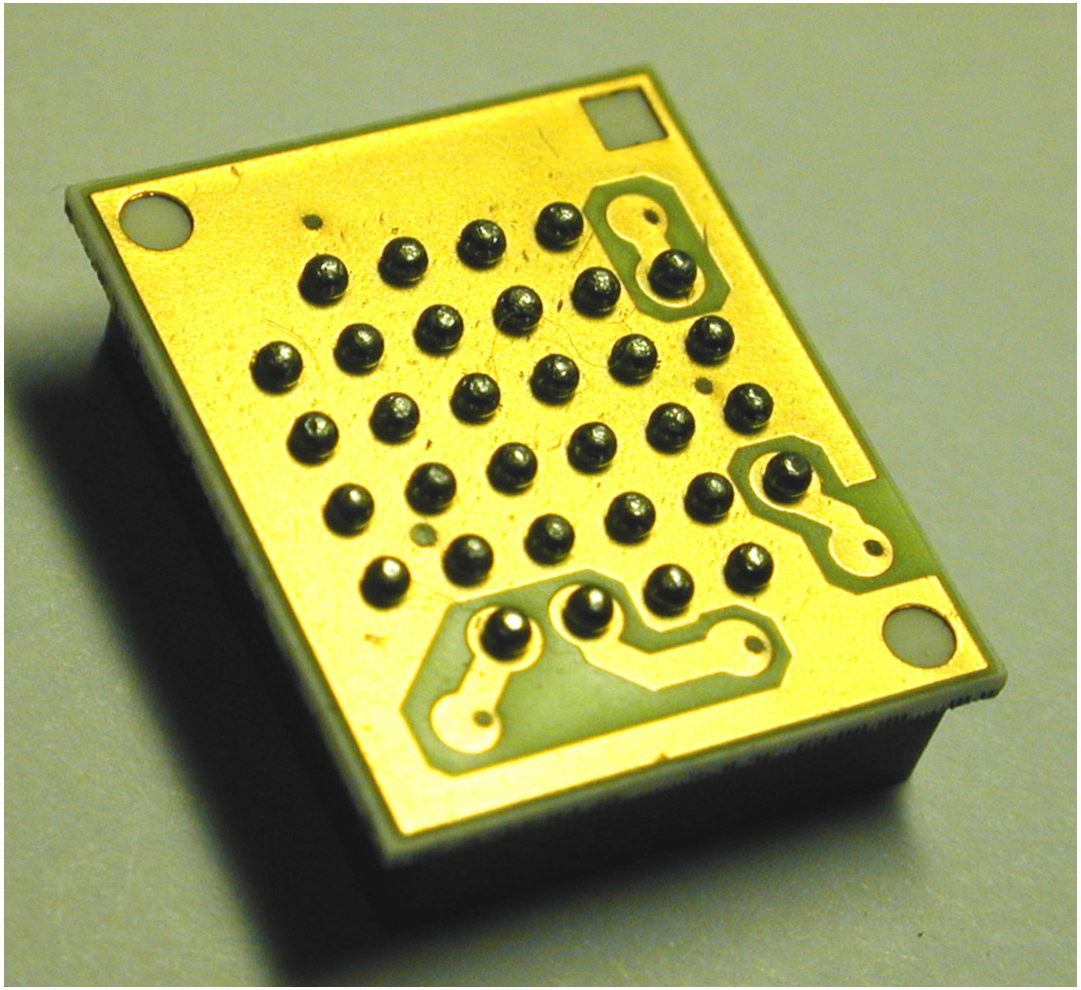
MCM – Multi Chip Modul



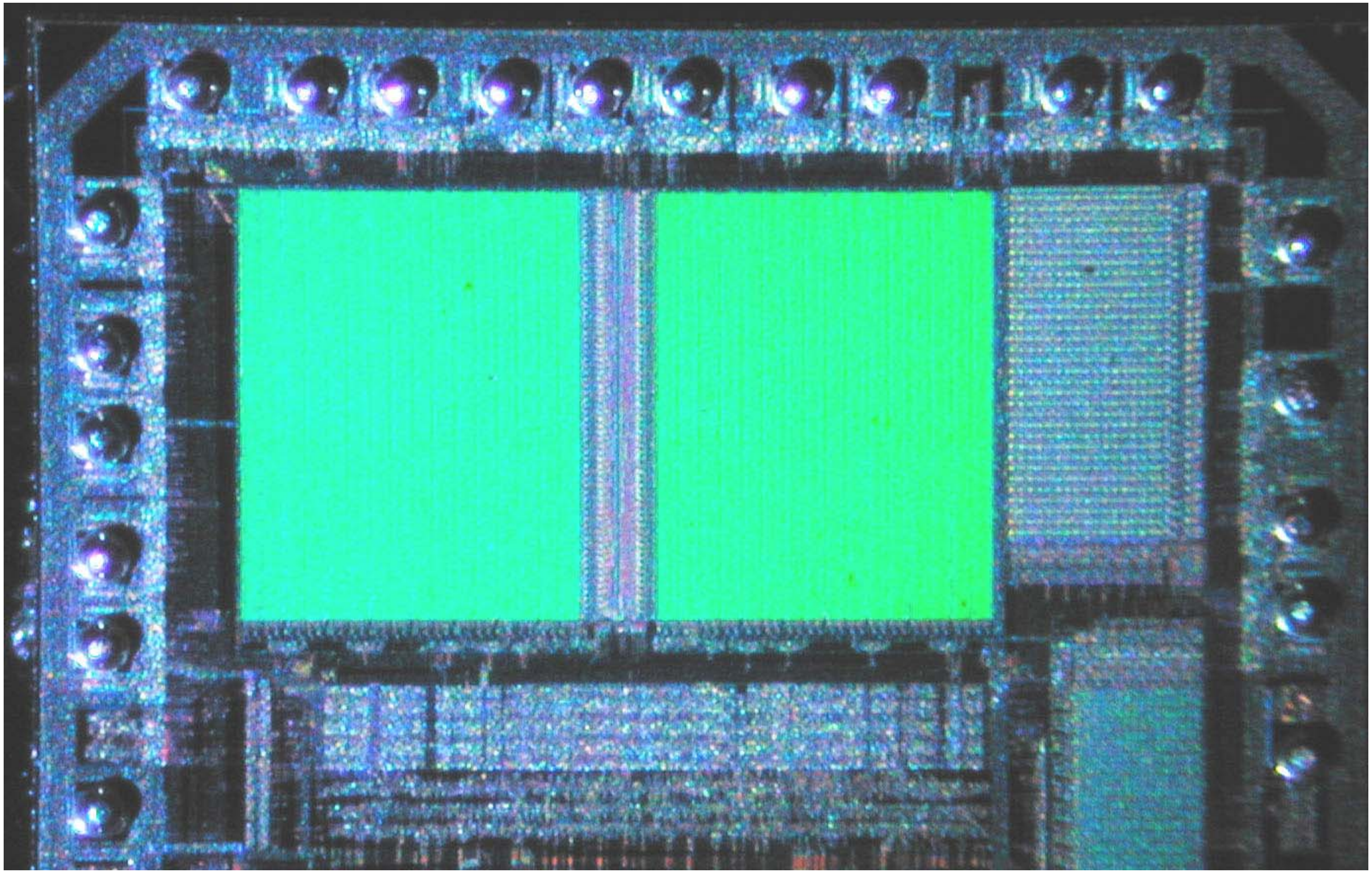
TAB - Tape Automating Bonding



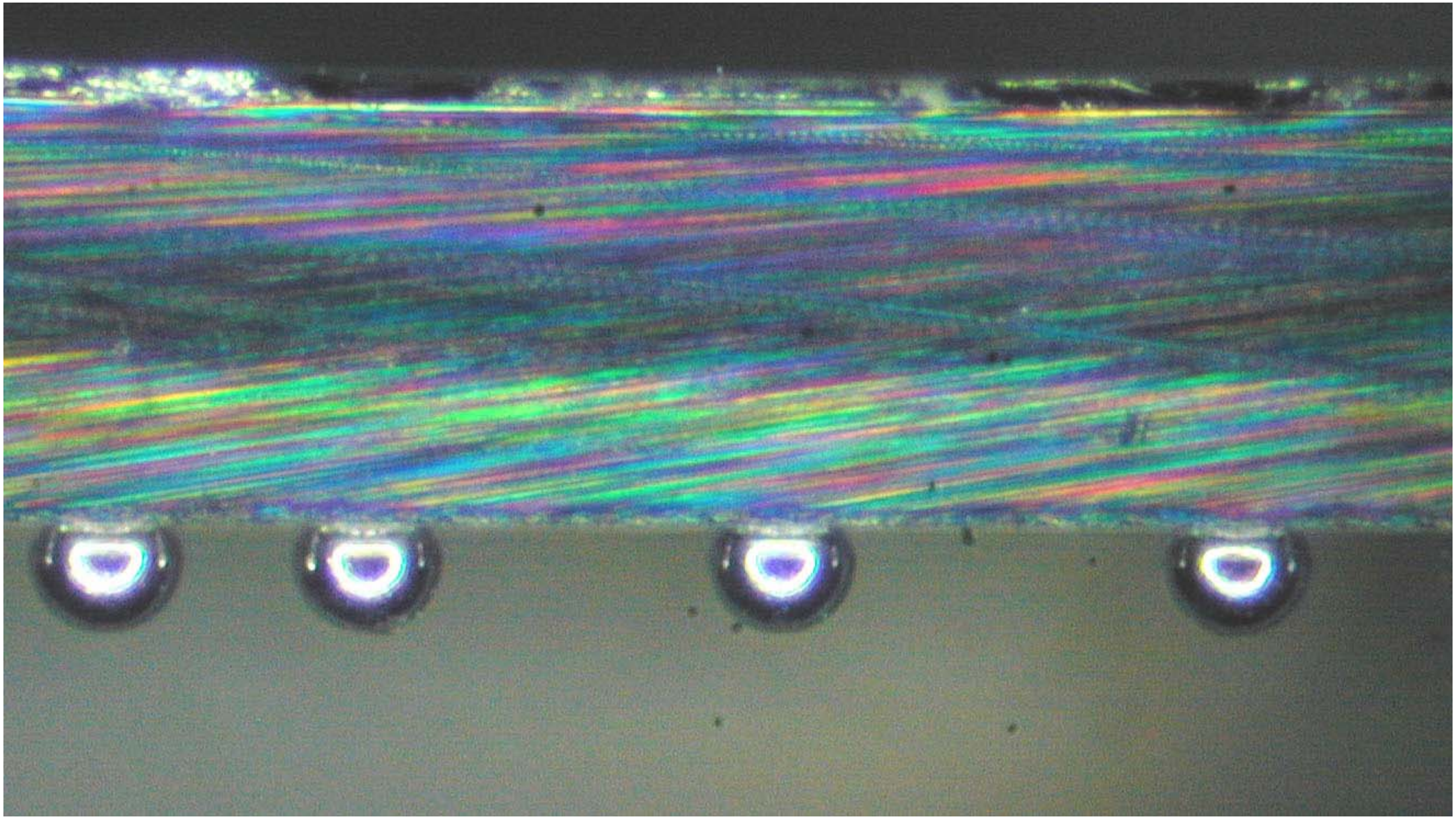
BGA – Ball Grid Array



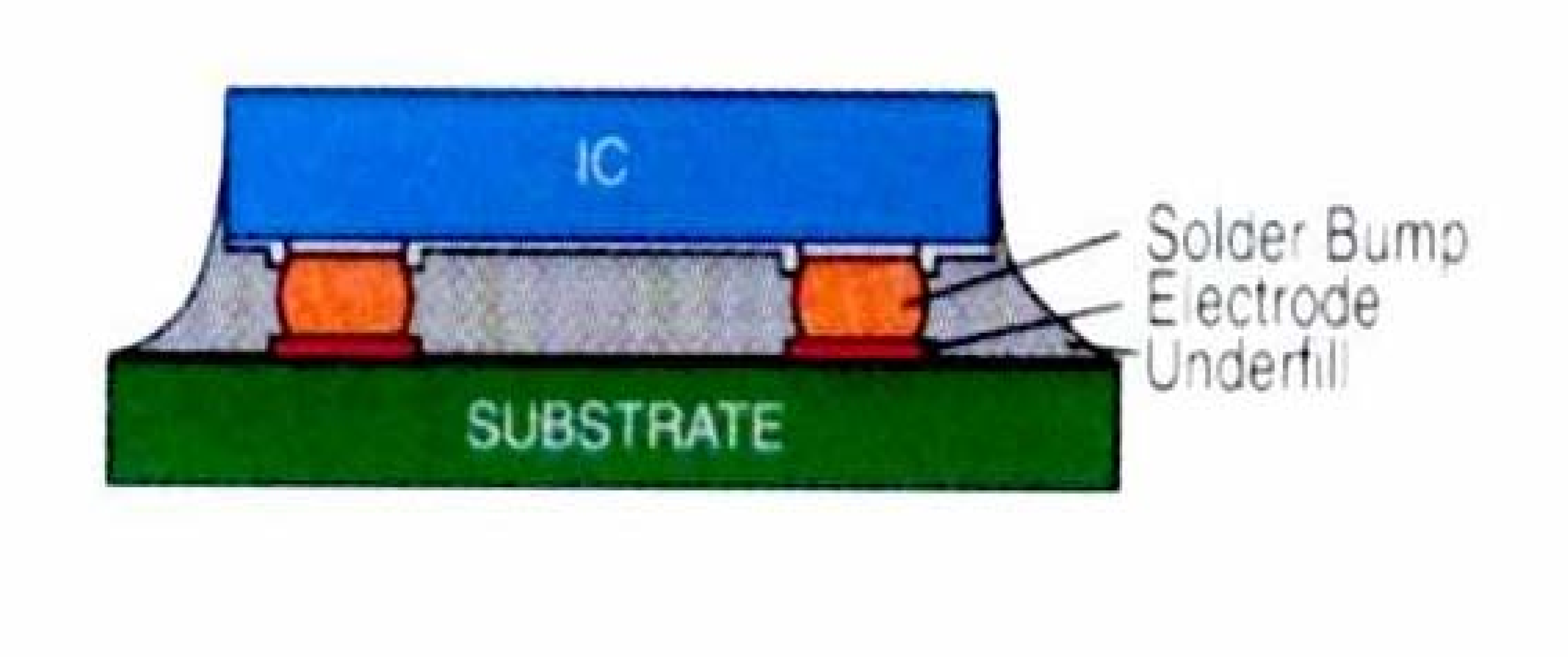
FC – Flip Chip



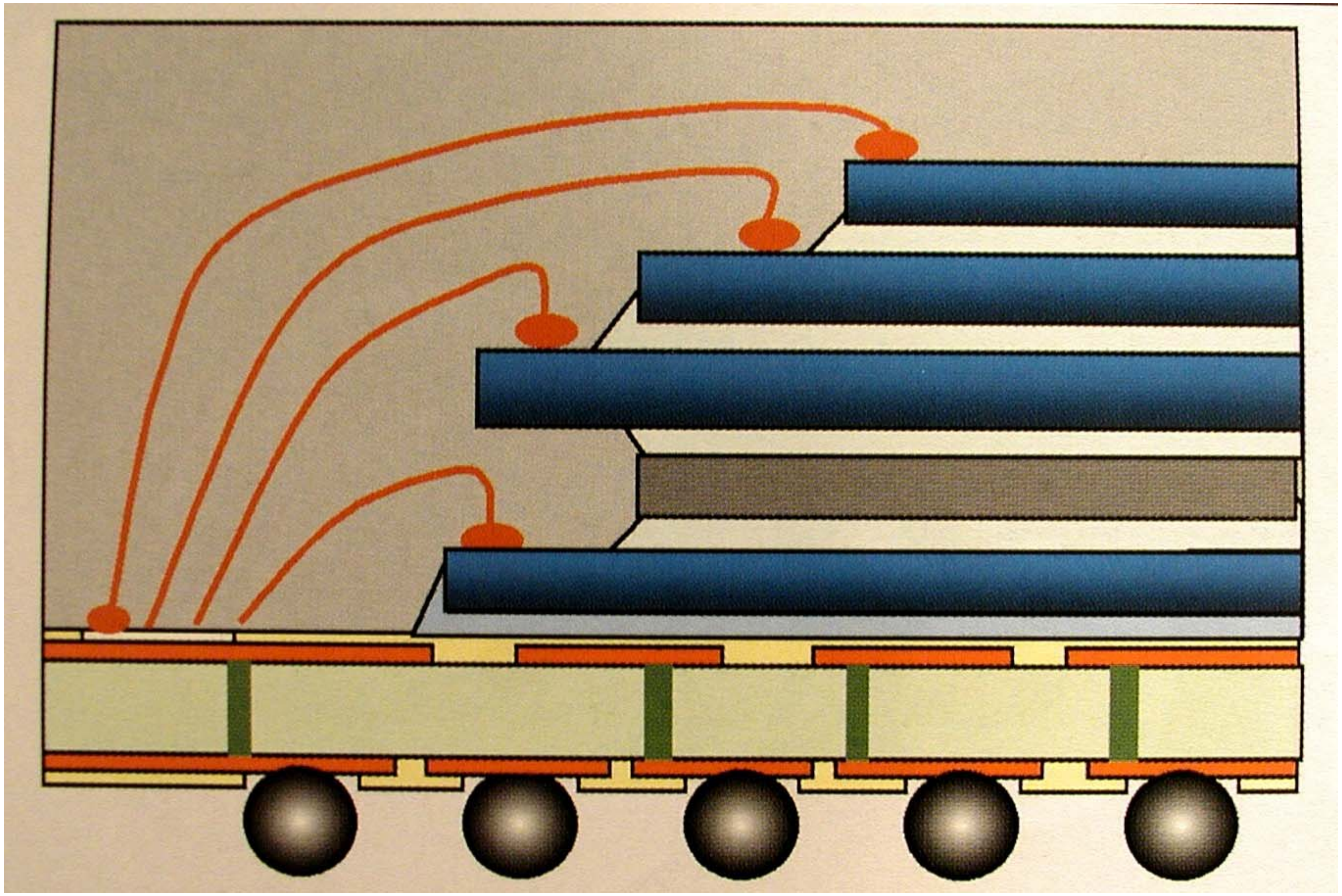
FC – Flip Chip



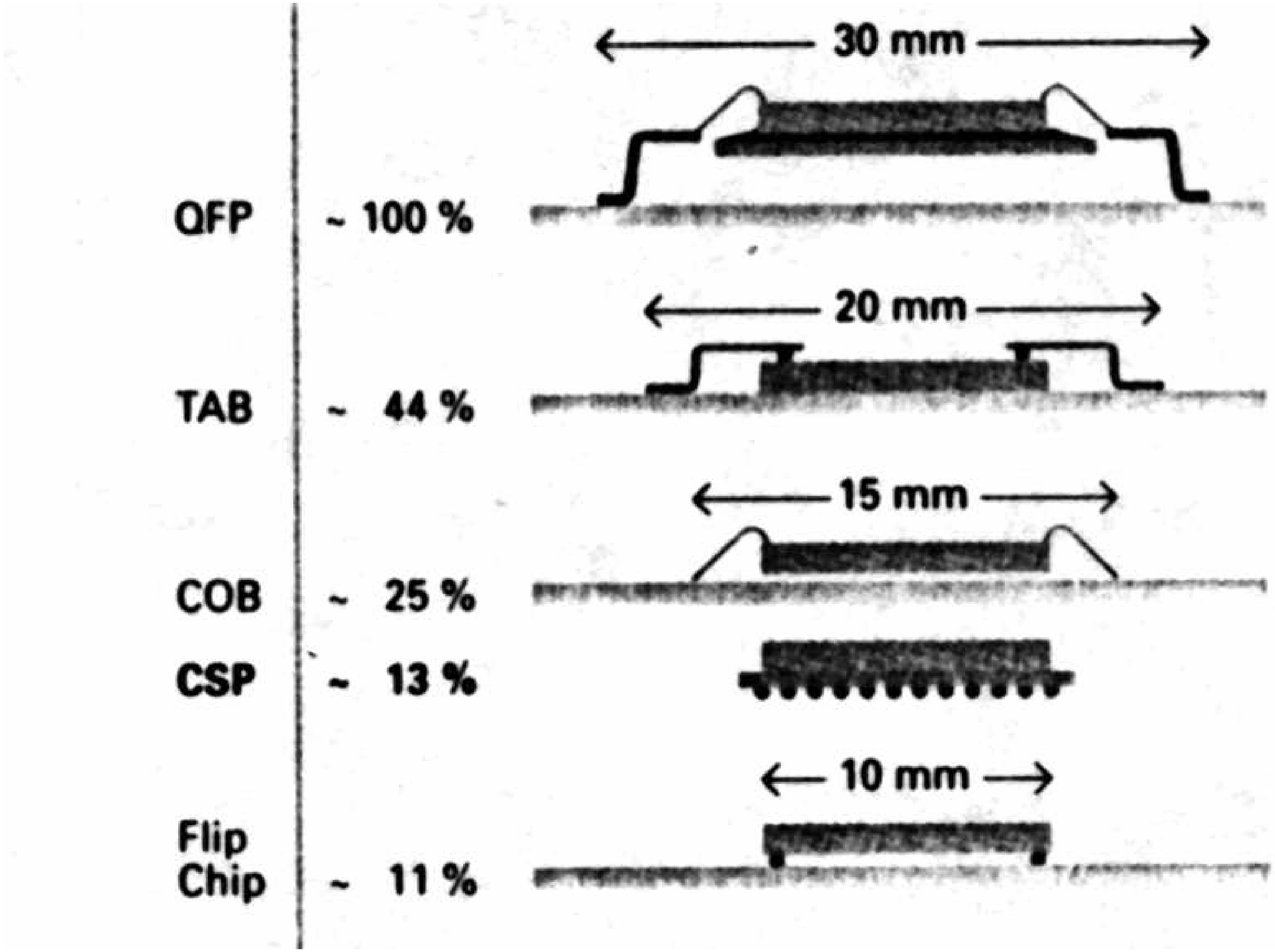
FC – Flip Chip



STACKED DIE



SROVNÁNÍ SOUČÁSTEK



- **SM -** surface mounted - povrchová montáž
- **SMD -** surface mounted device – SM součástka
- **SMA -** surface mounted assembly – SM montáž
- **SMT -** surface mounted technology – SM technologie
- **IMT -** insert mounted technology - vkládací p.m.
- **SO – VSO -** small outline - malý rozměr
- **SOT -** small outline transistor - tranzistor malorozměr.
- **SOD -** small outline diode - dioda malorozměr.
- **SOIC -** small outline integrated circuit - IO malorozměr.

- **DIL -** dual in line - paralení vývody na delších stranách
- **DIP -** dual in line package - dtto
- **CC -** chip carrier - nosič čipu
- **CCC –** ceramic CC - keramický n.č.
- **LCCC -** leadless CCC - bezvývodový ….
- **PLCC -** plastic CCC - plastový……
- **HCC –** hermetic - hermetický….

- **SSI -** small scale integration - malá integrace
- **MSI –** medium – střední integrace
- **LSI –** large – velká integrace
- **VLSI -** very large - velmi velká integrace

- **FP -** flat pack - vývody na 2 stranách
- **QFP** - quad FP - s vývody na 4 stranách
- **PQFP** - plastic QFP - plastový
- **MELF** - metal electrode face - válcové
- **FPT -** fine pitch technology - velmi jemné rozteče

- **CSP -** chip scale packaging - pouzdro velikosti čipu
- **FC -** flip chip - čip pro montáž v převr.poloze
- **COB -** chip on board - kontaktovaný čip na PS
- **BGA -** ball grid array - s kul. vývody v rastru
- **MCM -** multi chip module - vícečipový modul
- **TAB -** tape automated bonding - na pásu
- **HIC -** hybrid integrated circuit - hybridní IO
- **ASIC -** aplication specific IC - speciální aplikace IO
- **PCB -** printed circuit board - plošný spoj