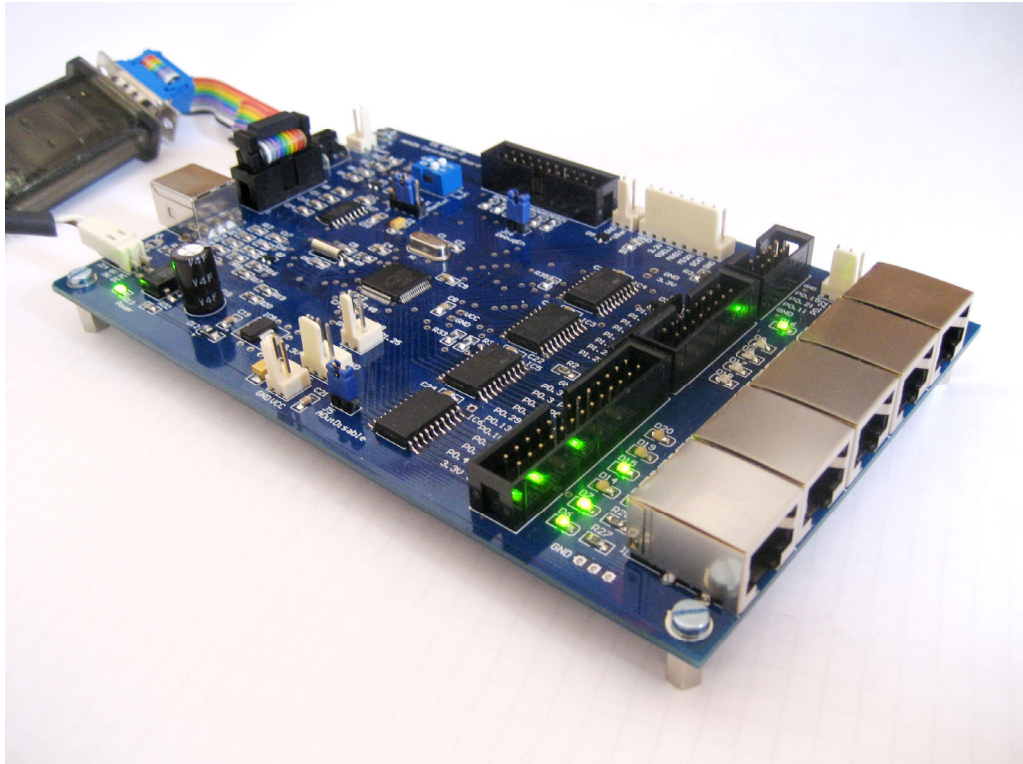


# AKKON USB Controller Board

USB microcontroller board with the ARM7 LPC2148™\*  
[Design files](#)



Authors: Gerhard Burger  
 Version: 1.3  
 Last update: 22.06.2008  
 File: ACB\_Title\_Design.doc, resp. .pdf  
 Attachments: no attachments

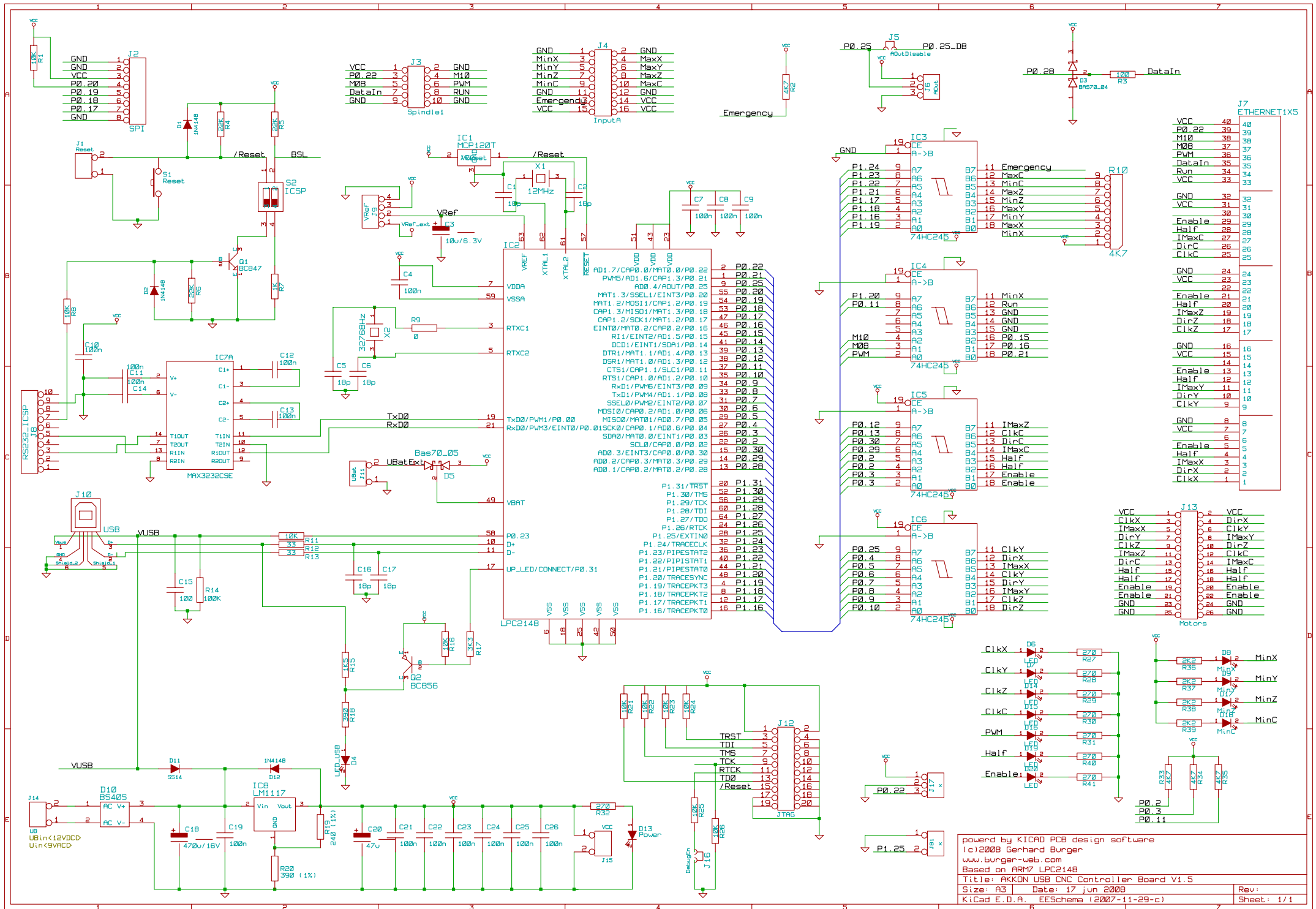
## Table of versions

Version	Date	Remarks
1.0	28.05.2008	first version
1.1	17.06.2008	improvement
1.2	21.06.2008	Improvement, extending document with description about identification of SMD-parts
1.3	22.06.2008	improvement

### Introduction

The AKKON USB Controller Board is a prototyping or development board based on the LPC2148 ARM7 micro controller, with USB support, power supply and IO drivers. The board is designed as development kit for starting up working with ARM7 microcontrollers and for fast development of new devices.

This document includes the schematics, mounting plan, part list and general information for realizing the project.



J7 ETHERNET1X5

VCC	40	40
P0_22	39	39
M10	38	38
M08	37	37
PWM	36	35
DataIn	35	36
Run	34	34
VCC	33	33
GND	32	32
VCC	31	31
Enable	29	30
Half	28	28
IMaxC	27	27
DirC	26	26
ClkC	25	25
GND	24	24
VCC	23	23
Enable	22	22
Half	21	21
IMaxZ	20	19
DirZ	19	19
ClkZ	18	18
GND	17	17
VCC	16	16
VCC	15	15
Enable	14	14
Half	13	13
IMaxY	12	11
DirY	11	10
ClkY	9	9
GND	8	8
VCC	7	7
Enable	6	6
Half	4	4
IMaxX	3	3
DirX	2	2
ClkX	1	1

J13

VCC	1	2	VCC
ClkX	3	4	DirX
IMaxX	5	6	ClkY
DirY	7	8	IMaxY
ClkZ	9	10	DirZ
IMaxZ	11	12	ClkC
DirC	13	14	IMaxC
Half	15	16	Half
Enable	17	18	Enable
Enable	19	20	Enable
Enable	21	22	Enable
GND	23	24	GND
GND	25	26	GND

Motors

power by KICAD PCB design software  
 (c)2008 Gerhard Burger  
 www.burger-web.com  
 Based on ARM7 LPC2148  
 Title: AKKON USB CNC Controller Board V1.5  
 Size: A3 Date: 17 jun 2008 Rev:  
 KiCad E.D.A. EESchema (2007-11-29-c) Sheet: 1/1

**Part list**  
**AKKON USB Controller Board V1.5**

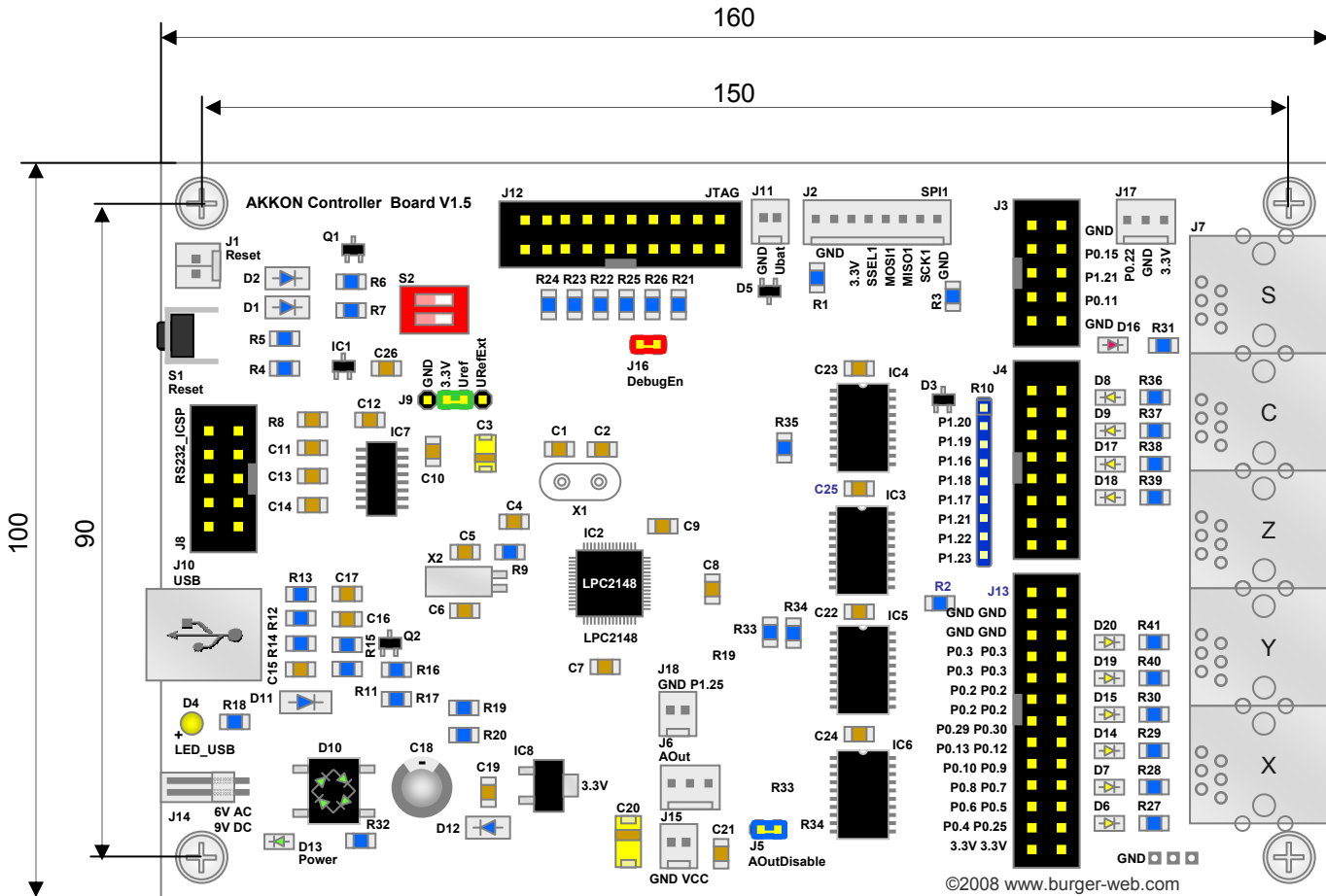
No.	Count	Value	Case	Description	Designator
1	5	RJ45	RJ45	ETHERNET1X5	J7
2	1	USB Type B	USB Type B	connector	J10
3	2	IDC10	IDC10	Connector 10	J3, J8
4	1	IDC16	IDC16	Connector 16	J4
5	1	IDC20	IDC20	connector	J12
6	1	IDC26	IDC26	connector	J13
7	4	PSS2G	PSS2G	connector	J1, J11, J15, J18
8	1	PSS2W	PSS2W	connector	J14
9	1	PSS2W-Cable		cable for power suply	J14
10	2	PSS3G	PSS3G	connector	J6, J17
11	1	PSS8G	PSS8G	Connector 8	J2
12	1	Switch 3055	SWITCH 3055	switch	S1
13	1	Dip Switch 2*2	DIPSWITCH2	dip switch	S2
14	4	M3*8		screw	optional
15	4	distance part M3*10mm			optional
16	2	SIP2	SIP2	AOutDisable	J5, J16
17	1	SIP4	SIP4	connector	J9
18	3	Jumper		Jumper	J5, J9, J16
19	1	12MHz	HC49	quarz	X1
20	1	32768Hz	OSZILLATOR3	quarz	X2
21	1	LPC2148	SOT314-2	Micro controller	IC2
22	4	74LV245 or 74HC245	SOL-20	Line driver	IC3-IC6
23	1	MAX3232CSE	SO-16	RS232 line driver	IC7
24	1	LM1117	SOT223	voltage regulator	IC8
25	1	MCP120T-315	SOT-23	Reset circuit (code SLUS)	IC1
26	1	BC847	SOT-23	transistor (code 1F)	Q1
27	1	BC856	SOT-23	transistor	Q2
28	1	BAS70 04	SOT-23	Schottkey diode (code 74)	D3
29	1	BAS70 05	SOT-23	Schottkey diode (code 75)	D5
30	1	BS40S	SO DIL	Diode bridge	D10
31	3	1N4148	D1206 or MELF	Diode	D1, D2, D12
32	1	SS14	DO-214	Schottkey diode	D11
33	1	Led yellow	Led	Led low currenct	LED
34	4	Led red	0805	Led red	D8, D9, D17, D18
35	8	Led green	0805	Led green	D4, D6-D7, D13-D16, D19-D20
36	1	470u/16V	radial s=3.5mm, D=8mm	Capacitor electrolytic	C18
37	6	18p	0805	Capacitor ceramic	C1, C2, C5, C6, C16, C17
38	17	100n	0805	Capacitor ceramic	C4, C7-C15, C19, C21-C26
39	1	10u/6.3V	3216 resp Case A	Capacitor tantalum	C3
40	1	47u	3528 rep. Case B	Capacitor tantalum	C20
41	10	10K	0805	resistor	R1, R8, R11, R16, R21-R26
42	4	4K7	0805	resistor	R2, R33-R35
43	1	100	0805	resistor	R3
44	3	22K	0805	resistor	R4, R5, R6
45	1	1K	0805	resistor	R7
46	1	0	0805	resistor	R9
47	1	4K7	SIP9	resistor	R10
48	2	33	0805	resistor	R12, R13
49	1	100K	0805	resistor	R14
50	1	1K5	0805	resistor	R15
51	1	3K3	0805	resistor	R17
52	2	390	0805	resistor	R18, R20
53	1	240	0805	resistor	R19
54	12	2K2 resp. 270ohm (10mA Led)	0805	resistor	R27-R32, R36-R41
55	1	Prited circuit board	Akkon Controller board		

No	Version	Date	Release notes
1	Version 1.0	29th of May 2008	first release
2	Version 1.1	22th of June 2008	improvement

Date:

# AKKON USB Controller Board

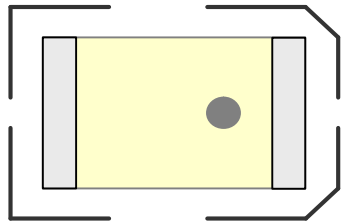
## Based on LPC2148 ARM7 micro controller



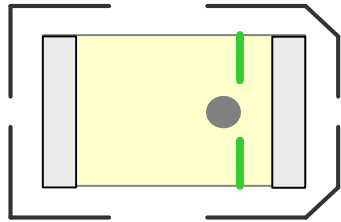
last update: 22th of June 2008

# Identification of diodes

Anode  Kathode



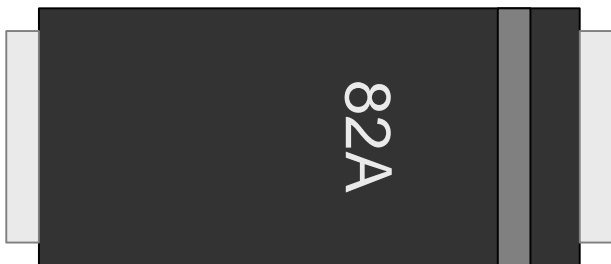
D20 etc.



D8 etc.



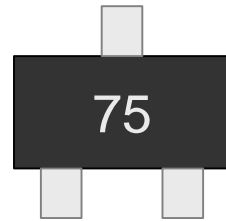
D1, D2,  
D12



D11

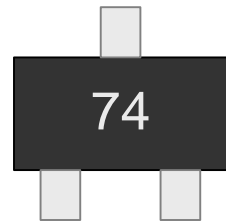


# Identification of transistors, diodes and ICs



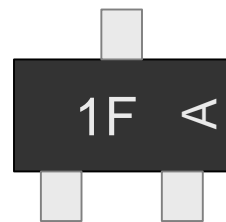
D5

BAS70-05



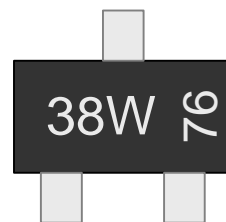
D3

BAS70-04



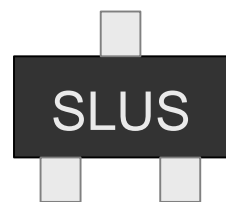
Q1

BC847



Q2

BC856



IC1

MCP120T-315



## Identification of resistors

**Case A: Resistors with three characters** indicate a resistor with 5% tolerancy. First two characters outline the resistor value, the third one outlines the number of following zeros of the resistor value.  
Example:

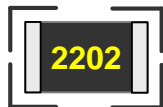


**Case B: Resistors with four characters** indicate a resistor with 1% tolerancy. First three numbers outline the resistor value. The fourth number outlines the number of following zeros of the resistor value.

**Case C: Exception, resistors with character R:** R indicates the decimal point



resistor, 5% tolerance,  $47 * 10 \exp(0) = 470\text{ohm}$  (Case A)



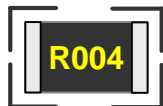
resistor, 1% tolerance,  $220 * 10 \exp(2) = 22\text{Kohm}$  (Case B)



resistor, 33,0ohm (Case C)



resistor, 0,47ohm (Case C)



resistor 0,004ohm (Case C)



resistor 4,7ohm (Case C)

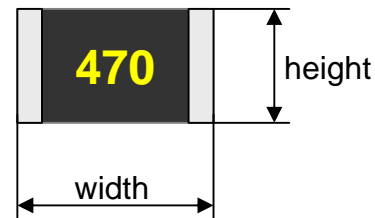
### Size of resistors:

first two values indicate width in mil, last two values height in mil (1mil = 0.254mm = [1Inch/1000])

### Examples:

Size 1206 Width: 12mil, Height: 06mil = 3.2mm \* 1.52mm

Size 0805 Width: 08mil, Height: 05mil = 2.0mm \* 1.27mm



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