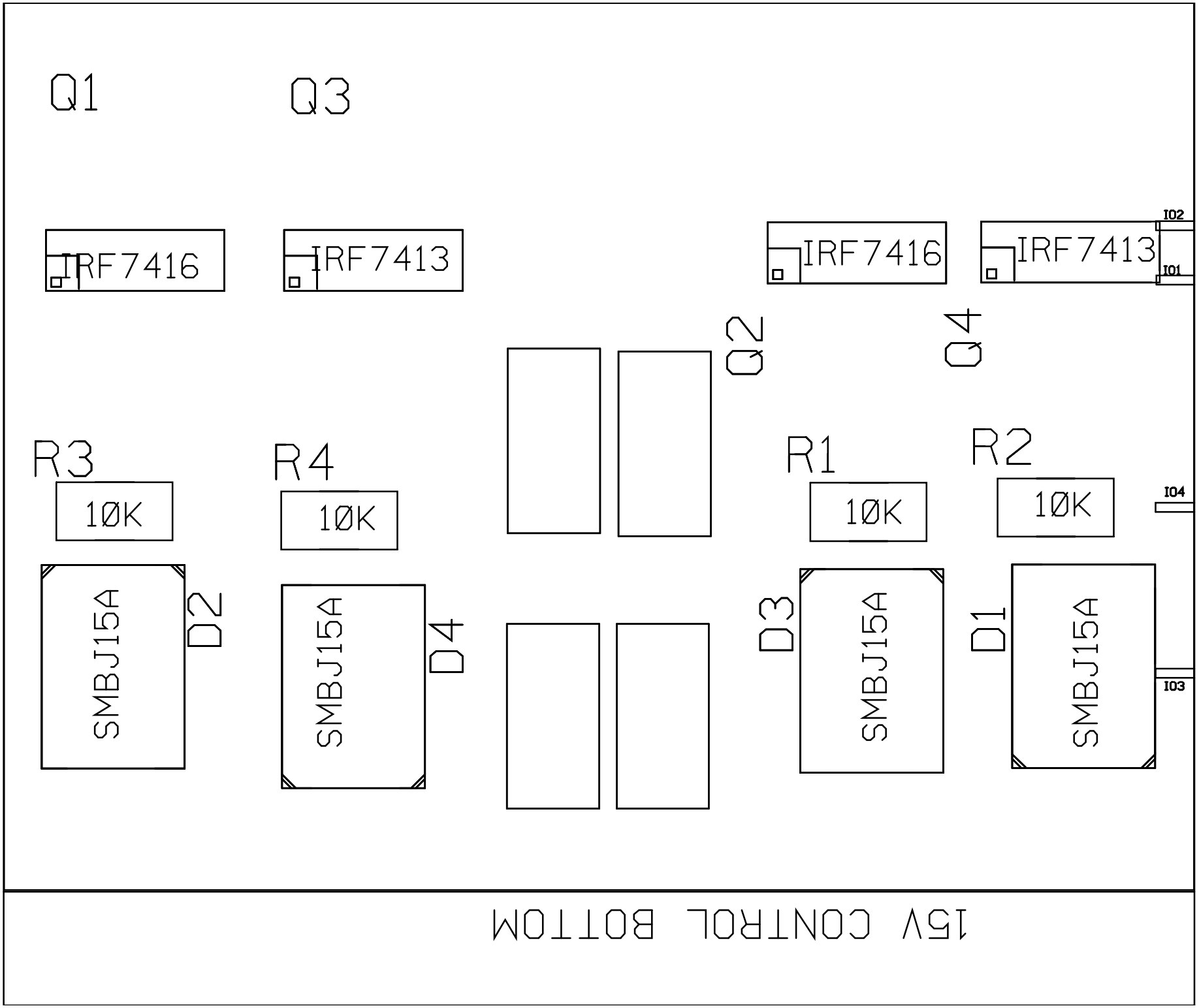
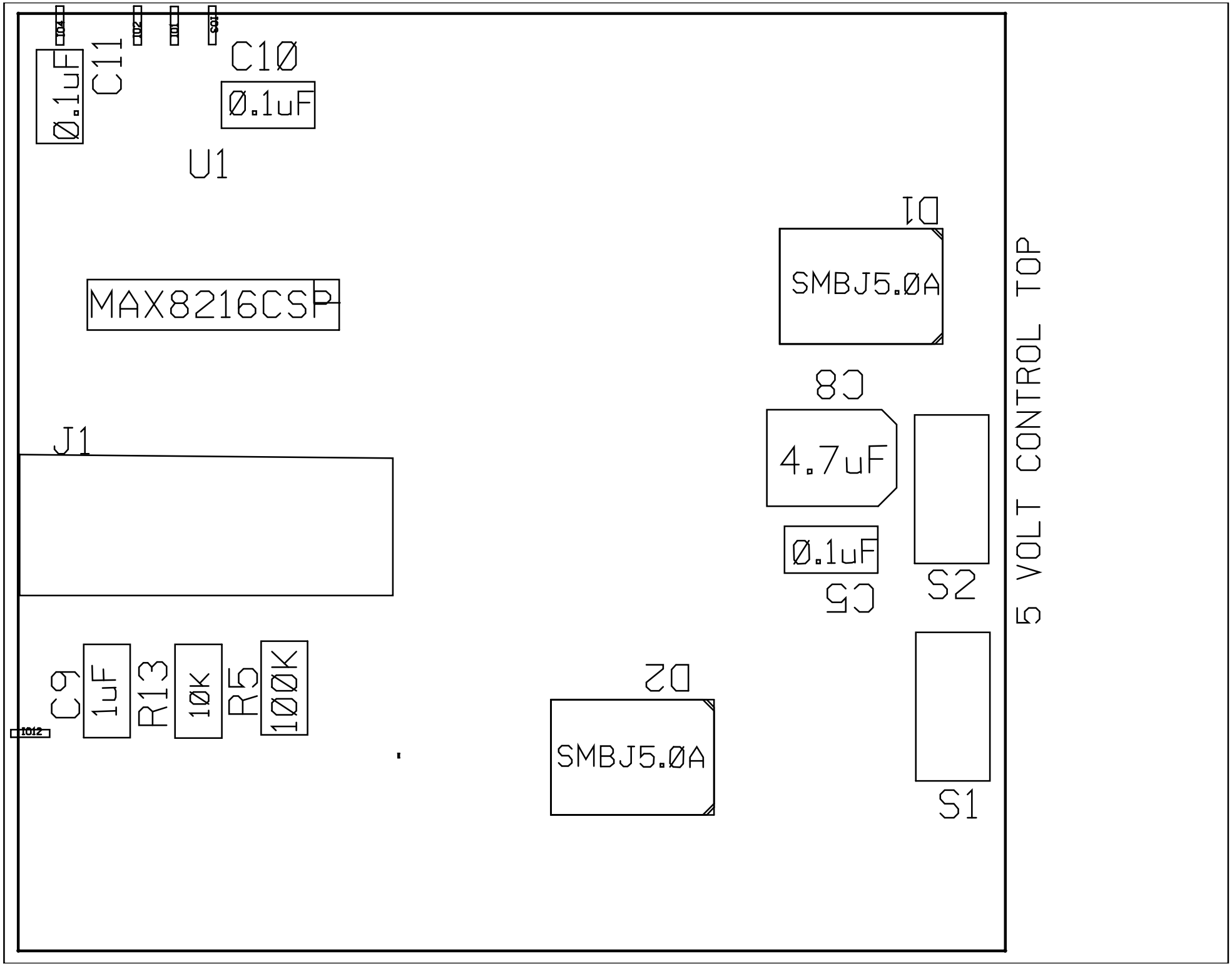
SMBJ15A
D7
2K
R7
2A
F2
SMBJ15A
D8
2K
R8
2A
F4
S1
S3
S2
S4
15V CON TOP
SMBJ15A
D5
29.4K
R11
R12
3.01K
F3
2A
SMBJ15A
D6
29.4K
R10
R9
16.2K
F1
2A
J05
J06
J07
J08


Q1
Q3
IRF7416
IRF7413
IRF7416
IRF7413
IO2
IO1
Q2
Q4
R3
10K
R4
10K
R1
10K
R2
10K
IO4
SMBJ15A
D2
SMBJ15A
D4
SMBJ15A
D3
SMBJ15A
D1
IO3
15V CONTROL BOTTOM


104
102
101
C11
0.1uF
C10
0.1uF
U1
D1
SMBJ5.0A
MAX8216CSP
C8
4.7uF
J1
0.1uF
C5
S2
5 VOLT CONTROL TOP
C9
1uF
R13
10K
R5
100K
1012
D2
SMBJ5.0A
S1

5 VOLT CONTROLBOTTOM

U5

F1
2A

PS2703-2

C2
0.1uF

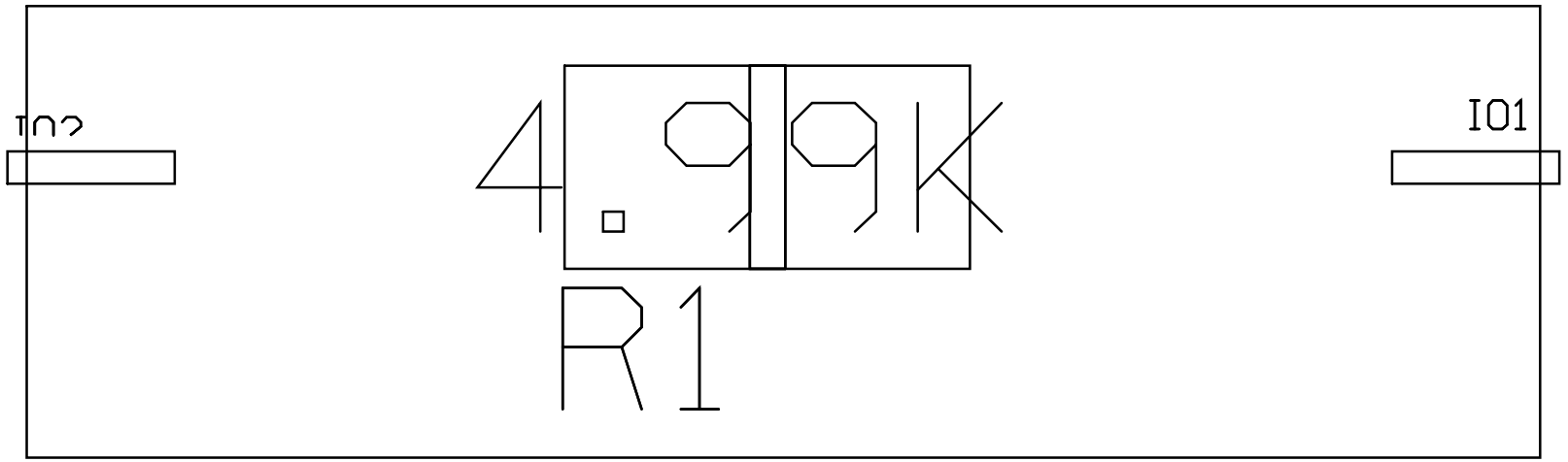
R10
768

R9
768

Q1

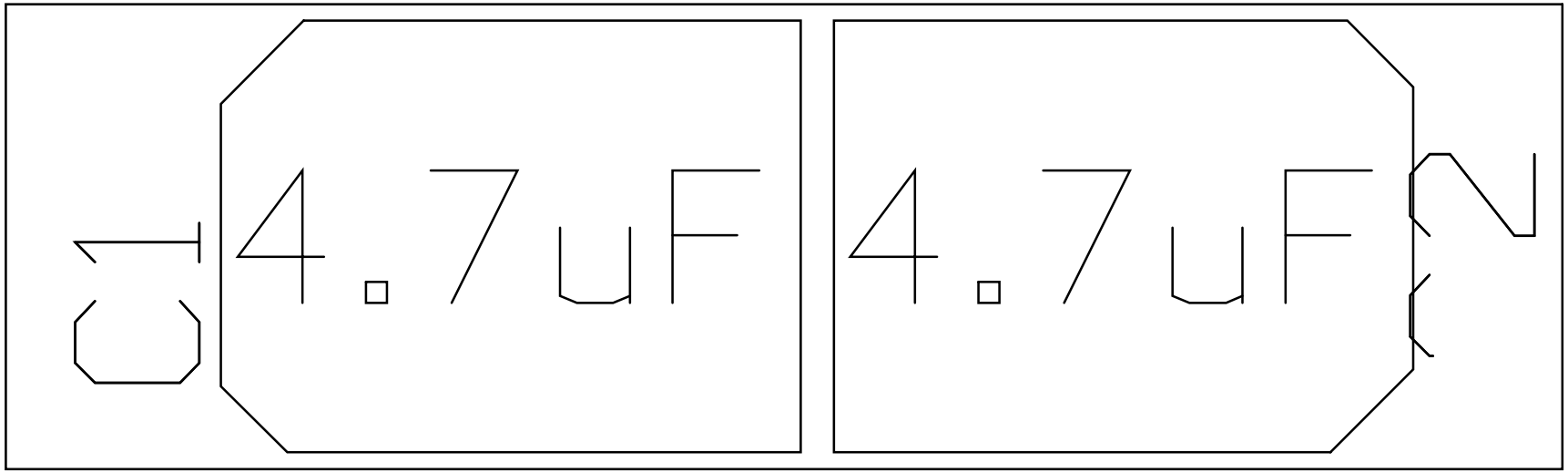
IRF7416

R11
10K



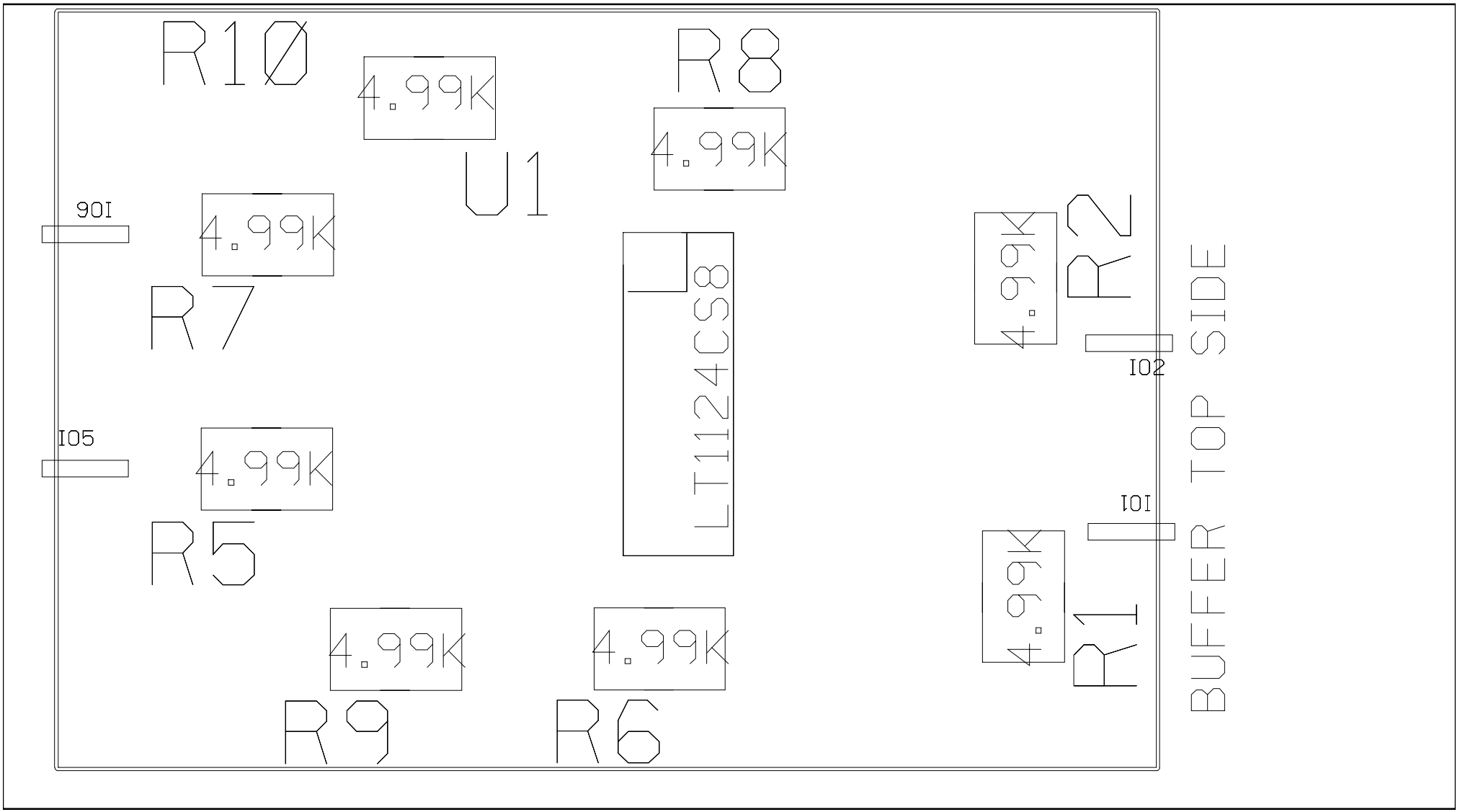
BUFFER FILTER

TOP SIDE

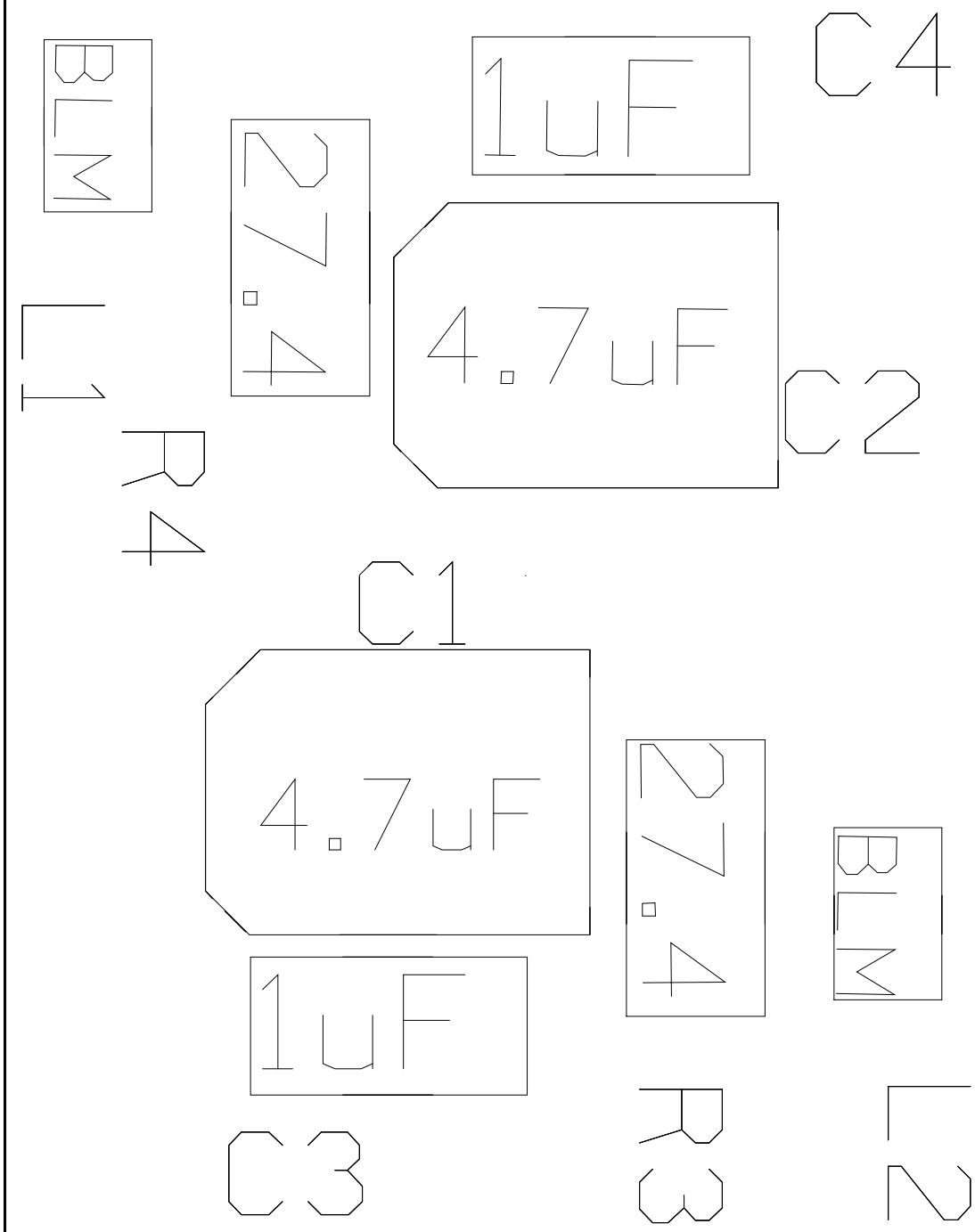


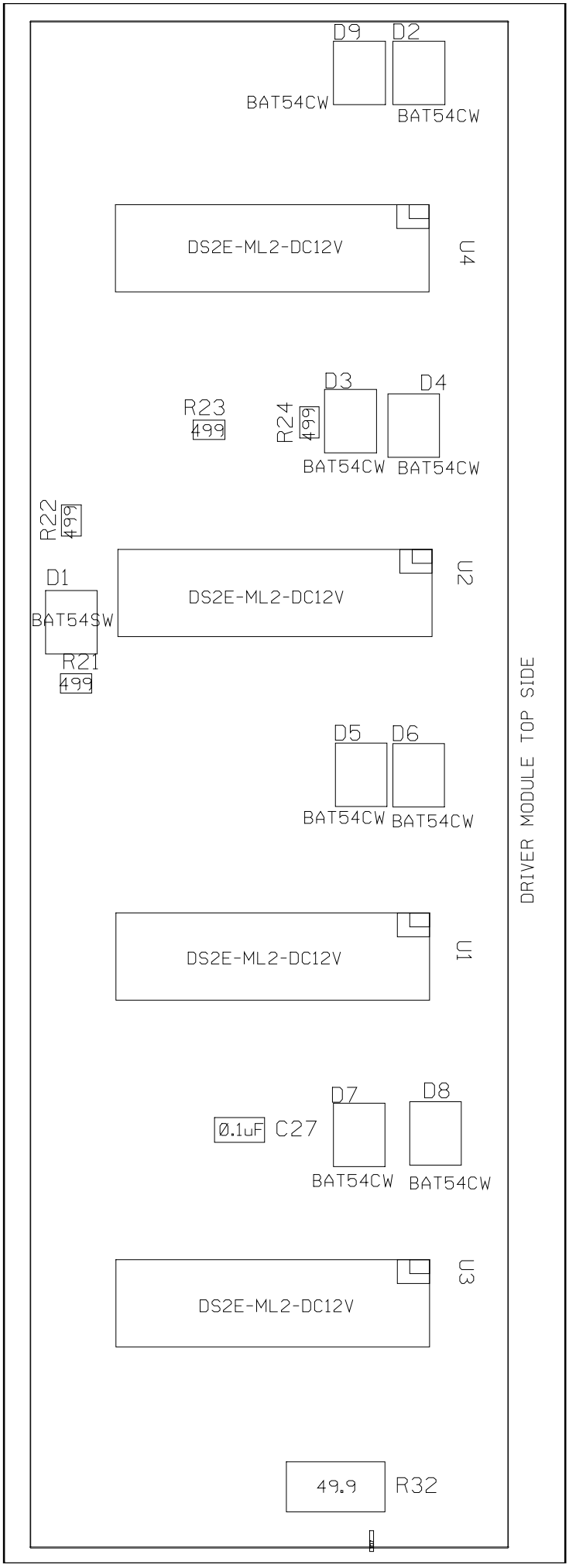
BUFFER FILTER

BOTTOM SIDE

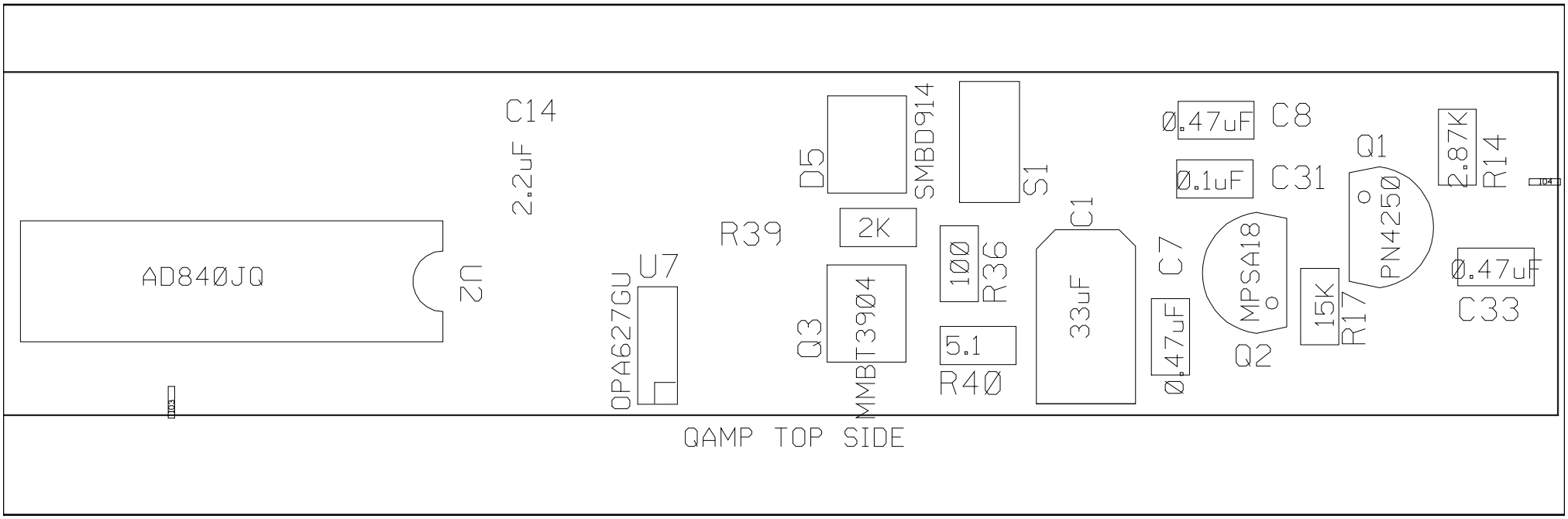

R10
4.99K
U1
R8
4.99K
90I
4.99K
R7
LT1124CS8
4.99K
R2
102
105
4.99K
R5
101
4.99K
R1
4.99K
4.99K
R9
R6
BUFFER TOP SIDE

BUFFER BOTTOM SIDE

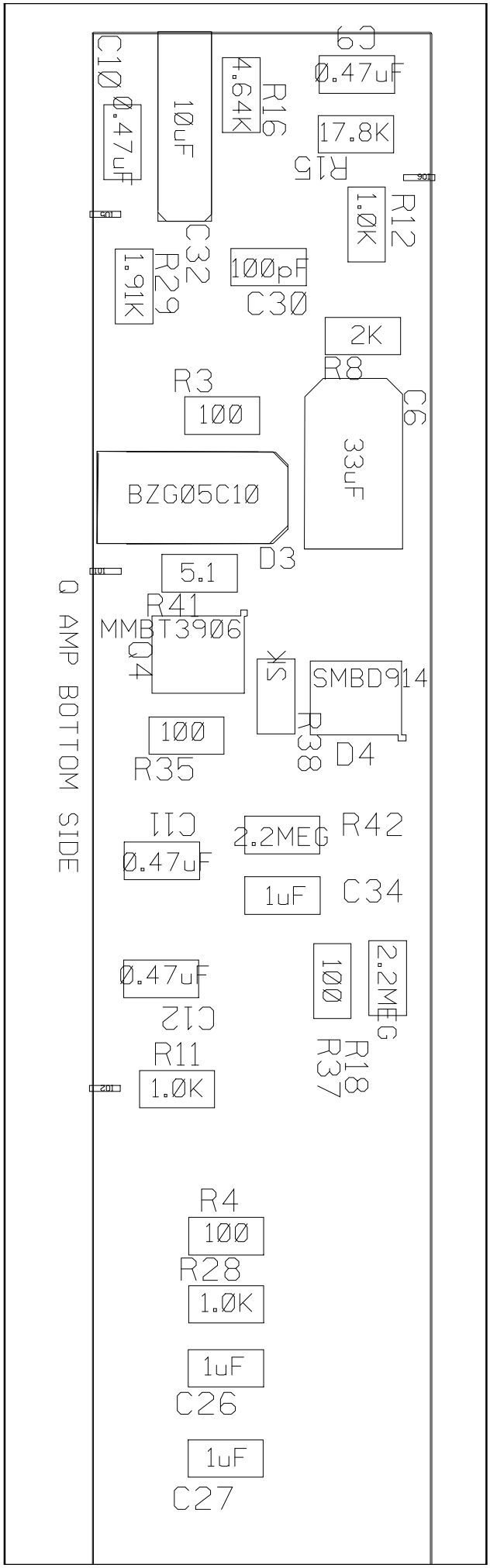


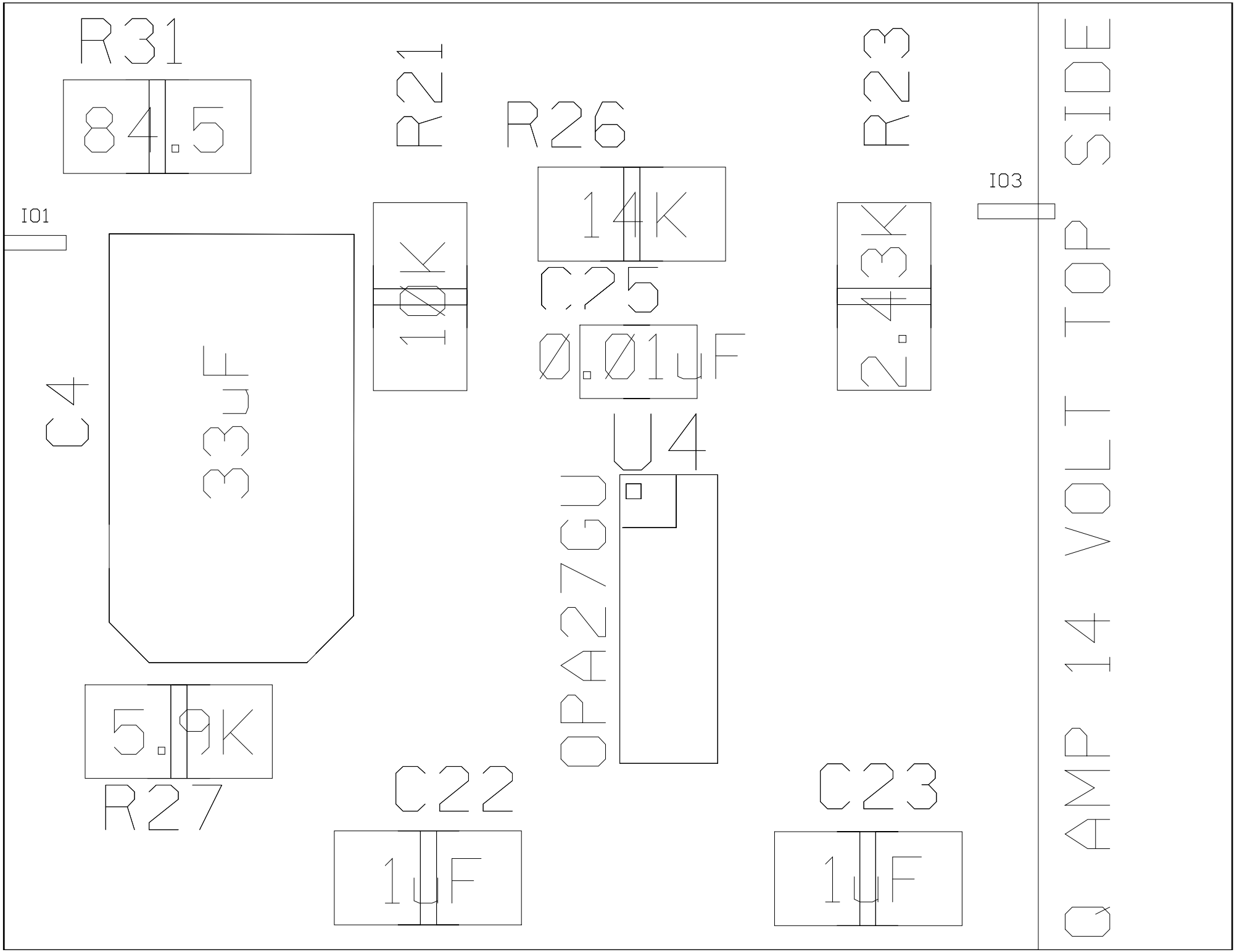

D9
D2
BAT54CW
BAT54CW
DS2E-ML2-DC12V
U4
R23
499
R24
499
D3
D4
BAT54CW
BAT54CW
R22
499
D1
BAT54SW
DS2E-ML2-DC12V
U2
R21
499
D5
D6
BAT54CW
BAT54CW
DRIVER MODULE TOP SIDE
DS2E-ML2-DC12V
U1
0.1uF
C27
D7
D8
BAT54CW
BAT54CW
DS2E-ML2-DC12V
U3
49.9
R32

DRIVER MODULE BOTTOM SIDE
L9
BLM
C24
1uF
C19
1uF
L3
BLM
R8
27.4
4.7uF
4.7uF
27.4
R9
R5
C4
C11
C13
1uF
10K
C25
0.1uF
OPA27GU
1uF
C20
20K
R6
10K
U12
R4
6.8K
R2
357
R17
6.8K
R1
357
R16
R19
511
715
R20
511
R18
C31
3.3pF
C32
3.3pF
U10
AD829JR
10pF
C30
U9
AD829JR
C29
10pF
R12
C7
4.7uF
C6
4.7uF
R11
R14
C9
4.7uF
C8
4.7uF
R13
1UF
1UF
1UF
1UF
C15
C14
C17
C16
BLM
L6
BLM
L5
BLM
L8
L10
BLM
L4
BLM
L7
C23
1UF
C18
1UF
R7
27.4
4.7uF
4.7uF
27.4
R10
R25
4.99K
R29
2K
3.32K
R27
C5
C10
U13
OPA627GU
R26
4.99K
C34
100pF
R30
2K
R28
3.32K
L1
BLM
1uF
C21
U14
4.7uF
C1
BUF634F
1uF
C22
4.7uF
C2
BLM
L2
C12
4.7uF
C26
0.1uF
C33
4.7uF
20
R31
U15
U5
MC14504B
MM74C244WM
C28
0.1uF
U6
MC14504B
R3
20
C3
4.7uF

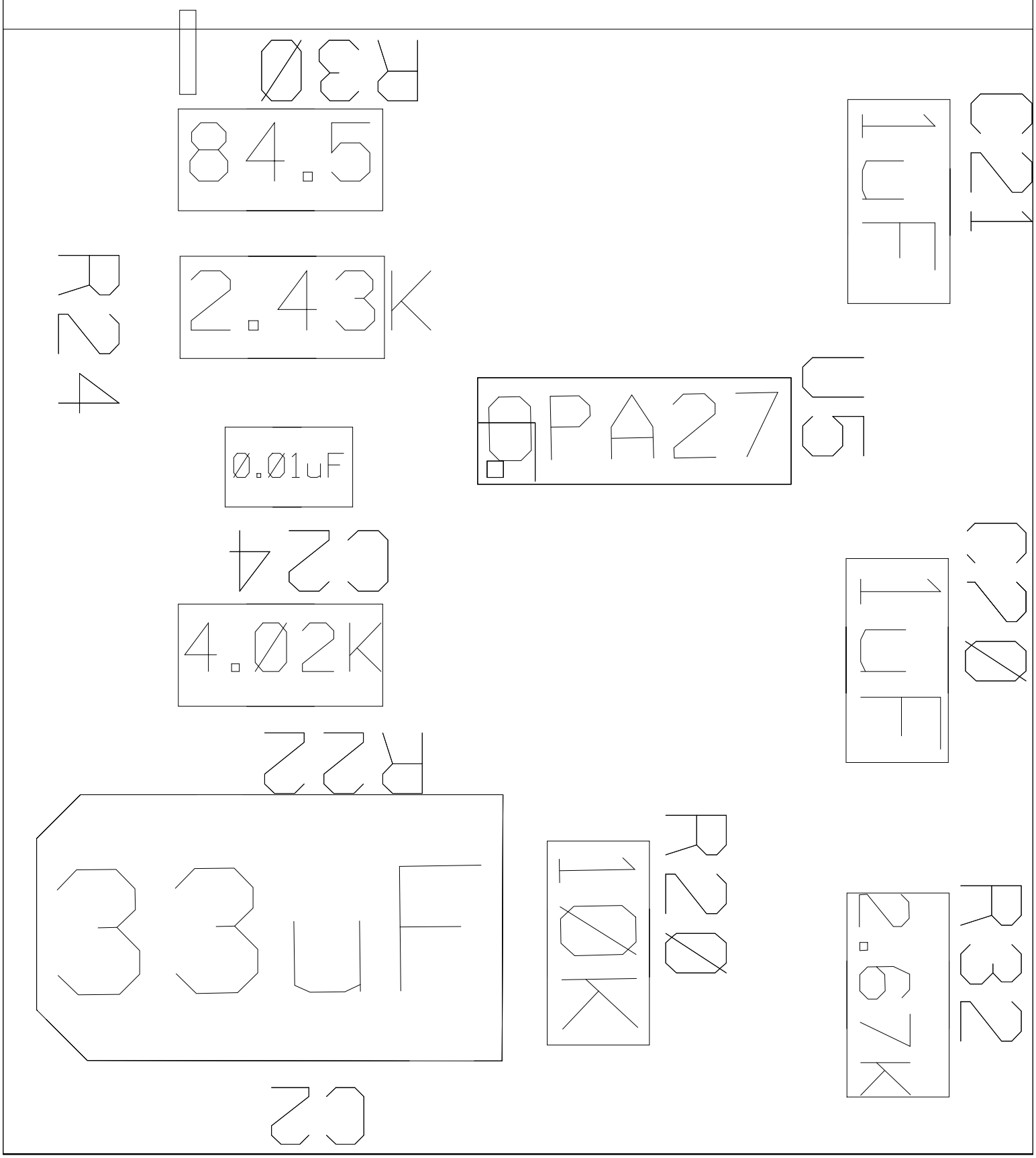


C14
2.2uF
AD840JQ
U2
U7
OPA627GU
R39
D5
SMBD914
2K
Q3
MMBT3904
100
R36
5.1
R40
S1
C1
33uF
C7
0.47uF
0.47uF
C8
0.1uF
C31
MPSA18
Q2
15K
R17
Q1
PN4250
2.87K
R14
0.47uF
C33
QAMP TOP SIDE

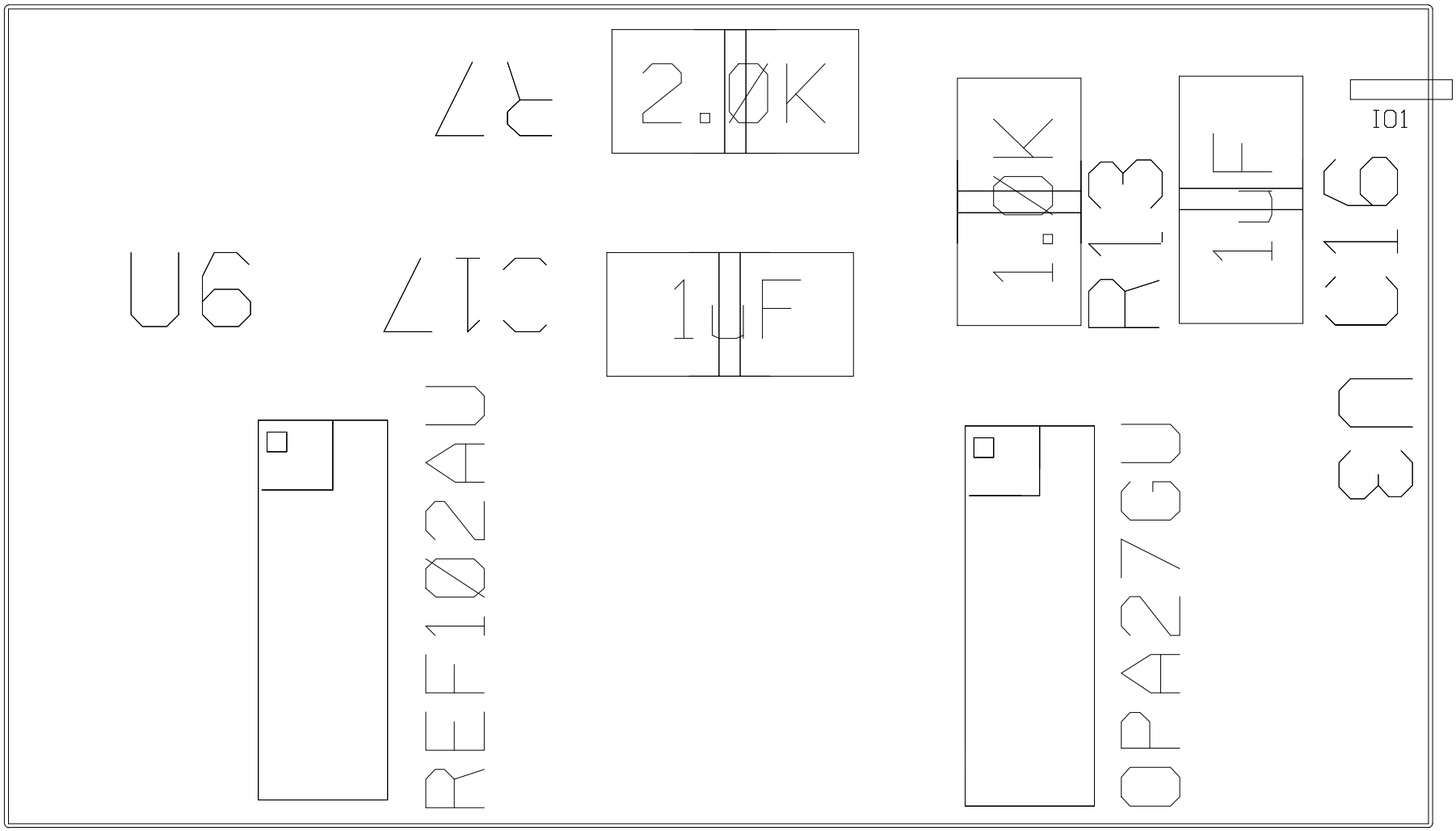

C9
0.47uF
C10
0.47uF
10uF
4.64K
R16
17.8K
R15
1.0K
R12
C32
1.91K
R29
100pF
C30
2K
R8
R3
100
C6
33uF
BZG05C10
D3
5.1
R41
MMBT3906
Q4
SMBD914
R38
D4
100
R35
C11
0.47uF
2.2MEG
R42
1uF
C34
0.47uF
C12
100
2.2MEG
R18
R37
R11
1.0K
R4
100
R28
1.0K
1uF
C26
1uF
C27
Q AMP BOTTOM SIDE


R31
84.5
R21
10K
R26
14K
R23
2.43K
IO1
IO3
C4
33uF
C25
0.01uF
U4
OPA27GU
5.9K
R27
C22
1uF
C23
1uF
OAMP 14 VOLT TOP SIDE

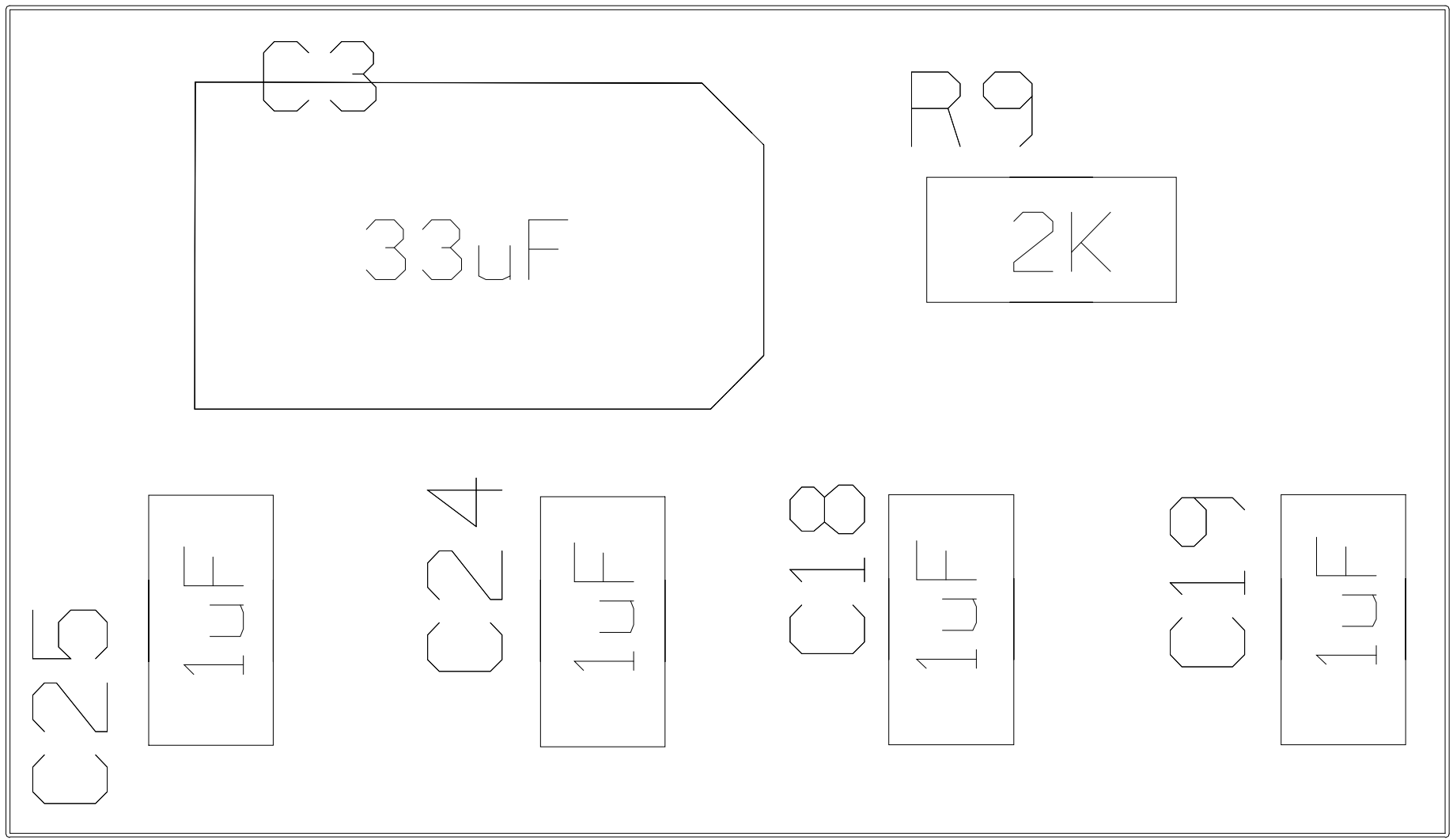
QAMP 14 VOLT BOT SIDE

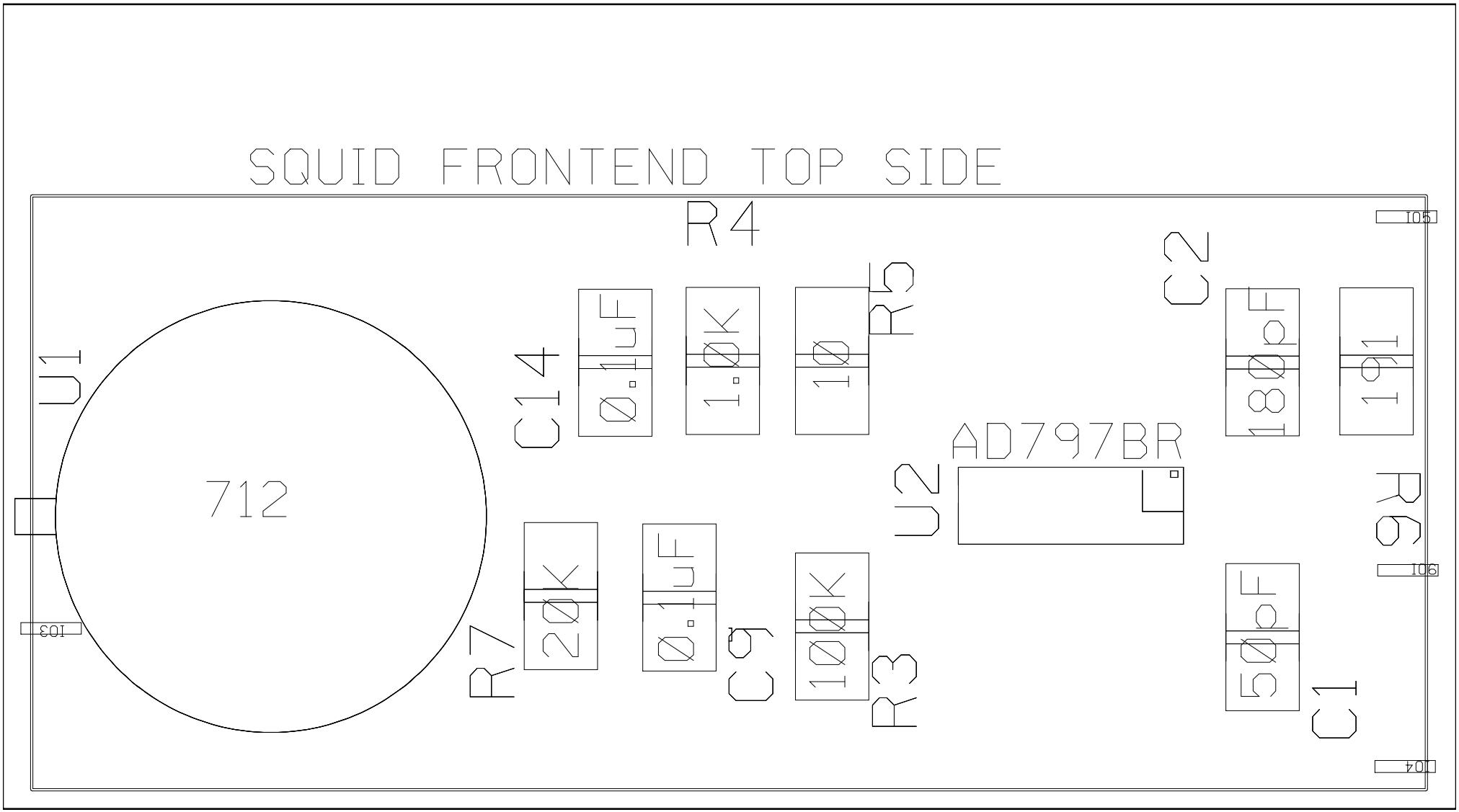


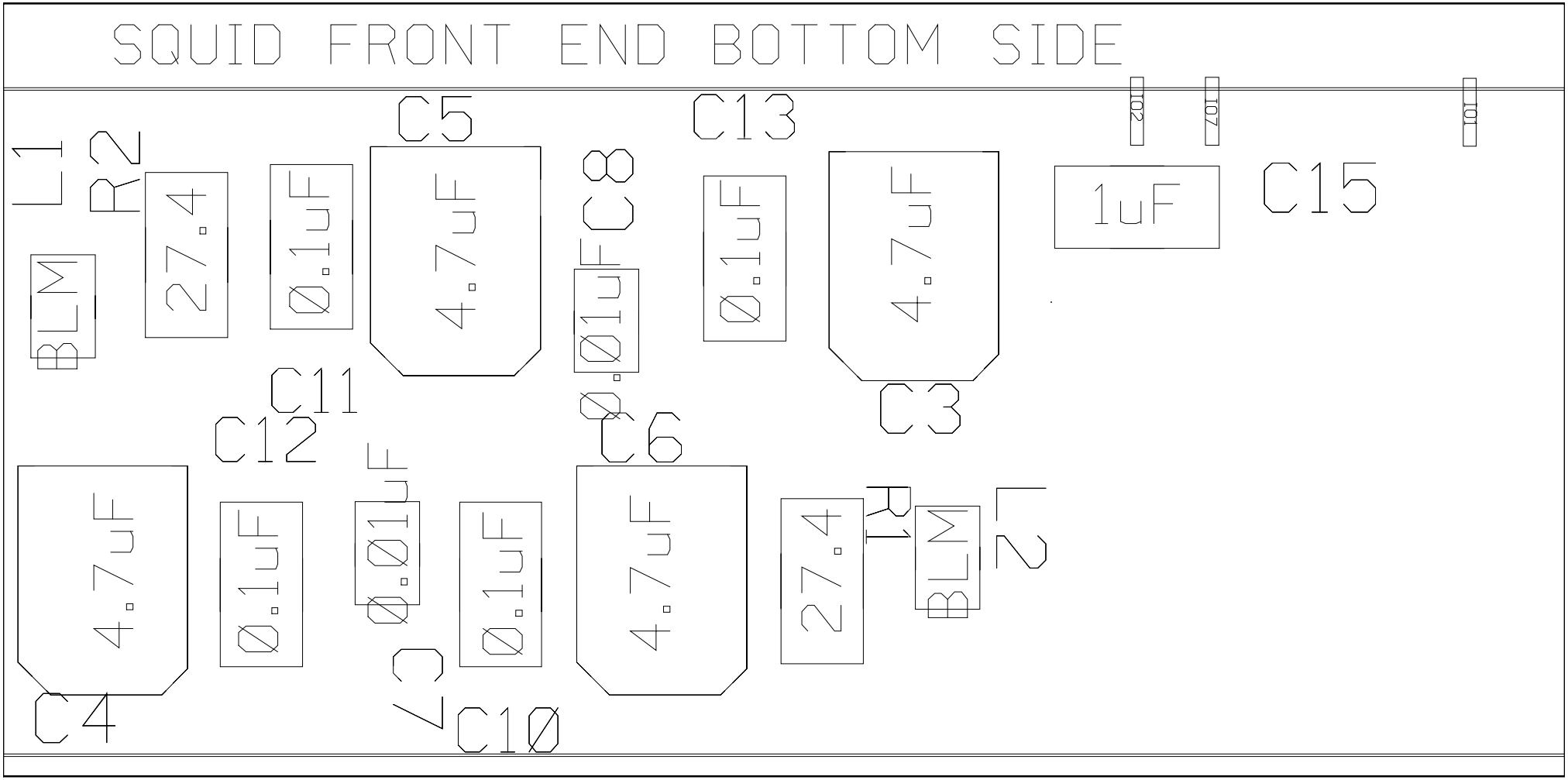
QAMP REFERENCE TOP

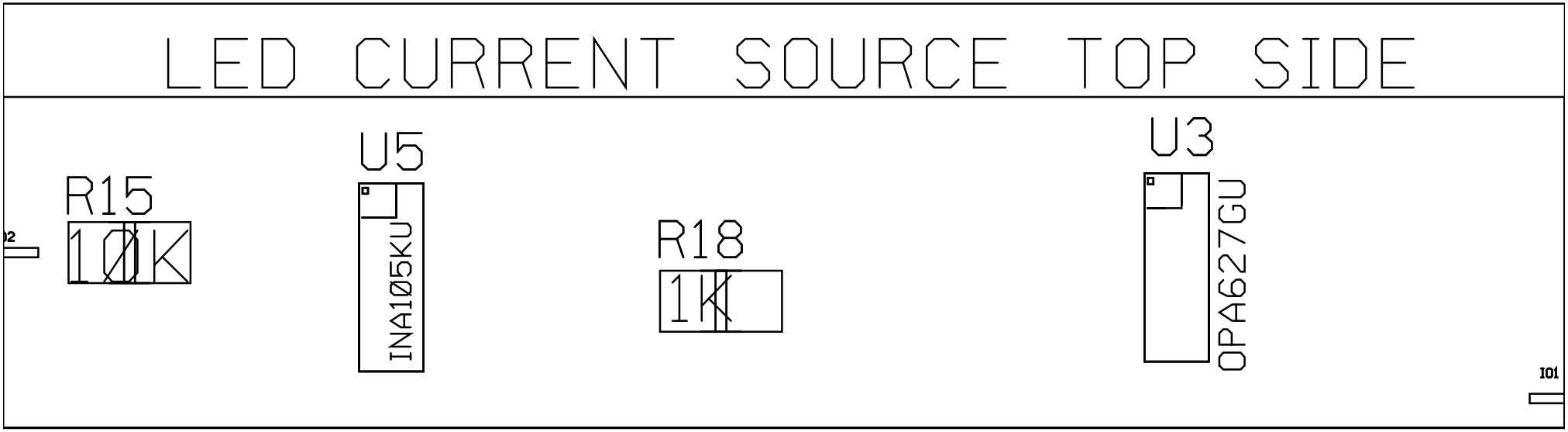


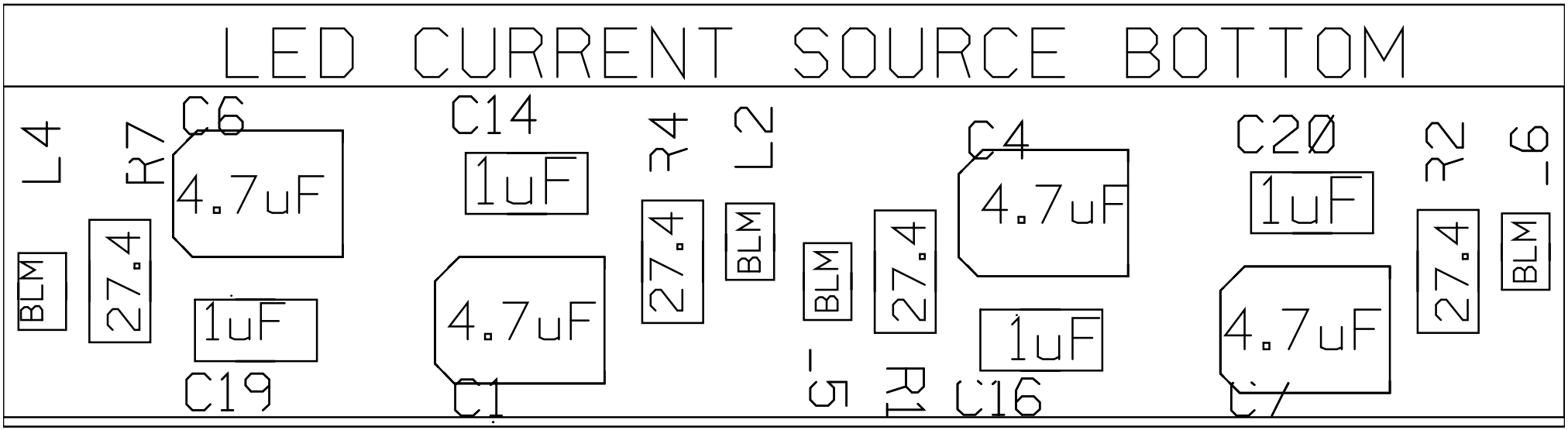
QAMP REFERENCE BOTTOM

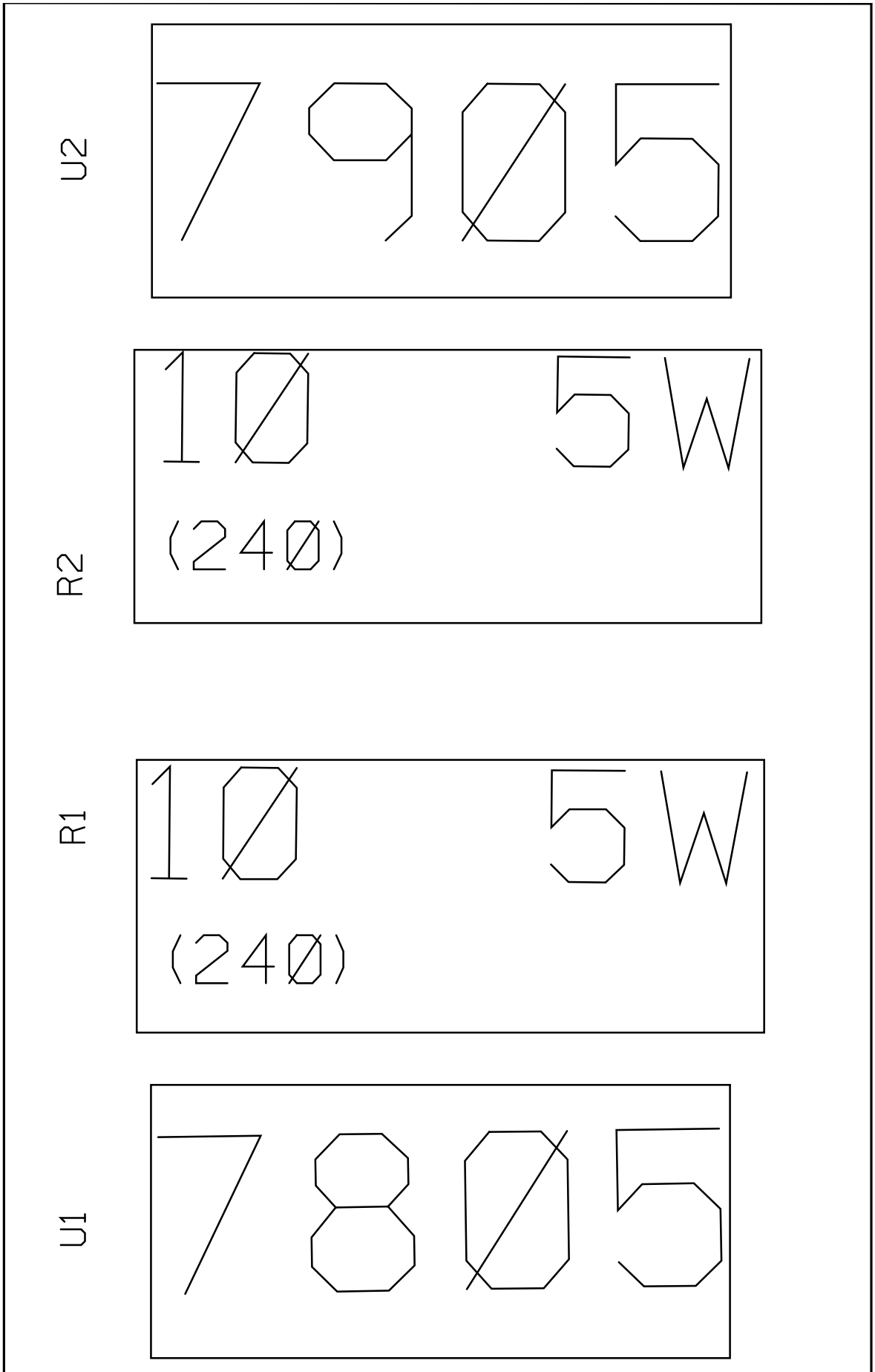



SQUID FRONTEND TOP SIDE
R4
C2
R5
U1
C14
0.1uF
1.0K
10
180pF
191
AD797BR
712
U2
R6
20K
0.1uF
100K
50pF
R7
C9
R3
C1
I05
I06
I03
I04


SQUID FRONT END BOTTOM SIDE
L1
BLM
R2
27.4
C5
4.7uF
0.1uF
C8
0.01uF
C13
0.1uF
4.7uF
C3
1uF
C15
TP2
TP7
TP1
C11
C12
C6
4.7uF
0.1uF
0.01uF
0.1uF
4.7uF
27.4
R1
BLM
L2
C4
C7
C10

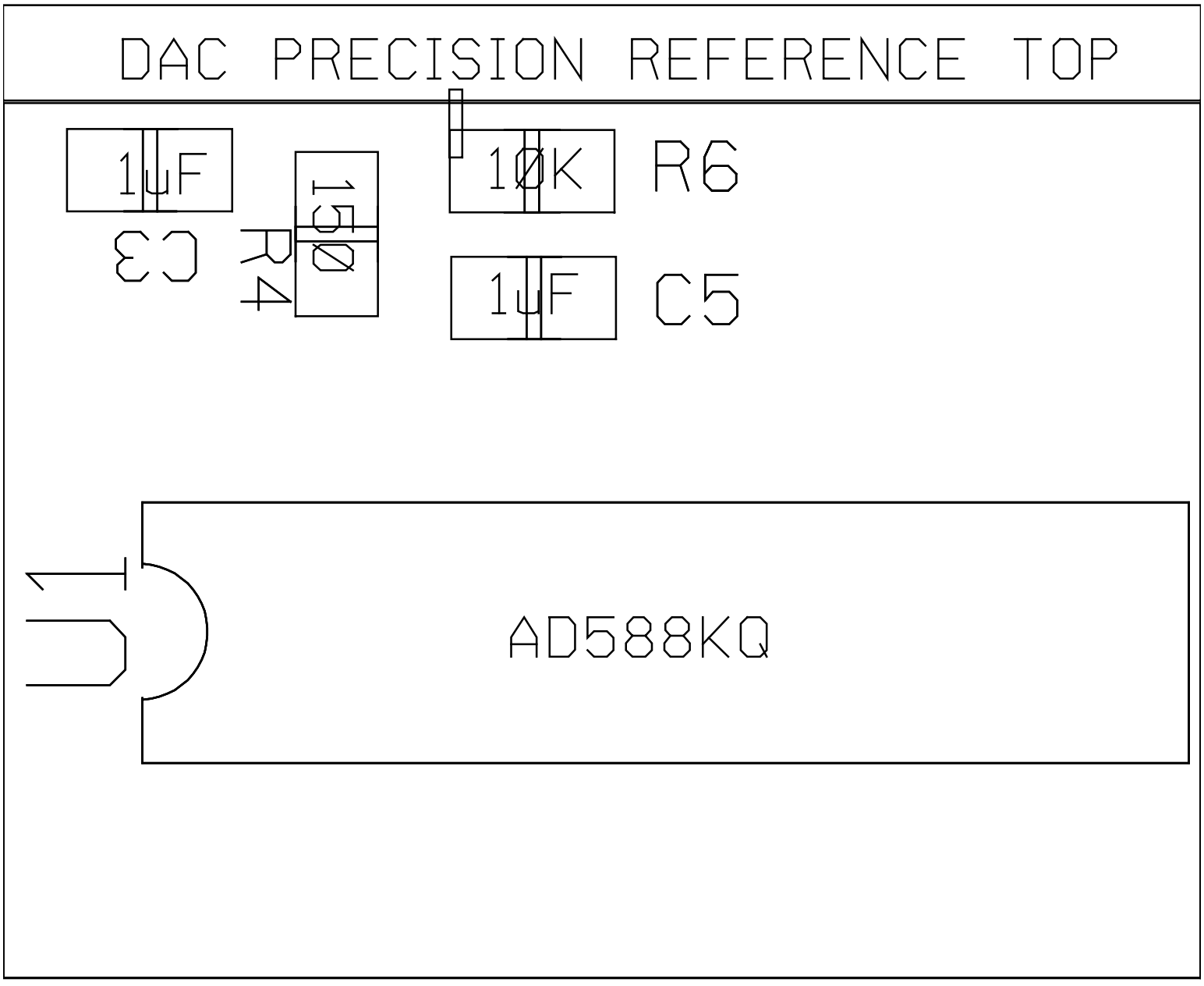

LED CURRENT SOURCE TOP SIDE
R15
10K
U5
INA105KU
R18
1K
U3
OPA627GU
102
101

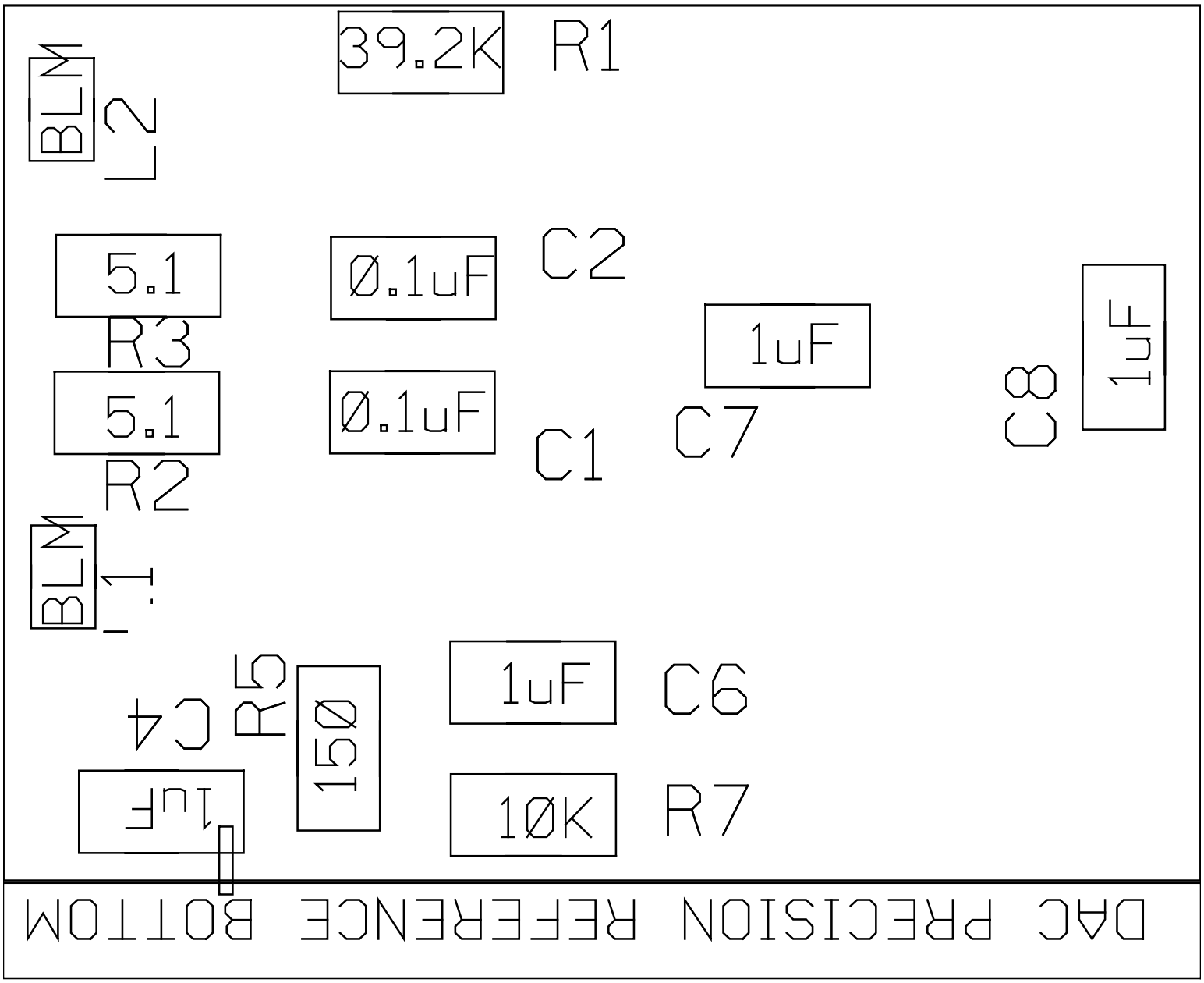

LED CURRENT SOURCE BOTTOM
L4
BLM
R7
27.4
C6
4.7uF
1uF
C19
C14
1uF
4.7uF
C1
R4
27.4
L2
BLM
G
BLM
R
27.4
C4
4.7uF
1uF
C16
C20
1uF
4.7uF
C7
R2
27.4
_6
BLM

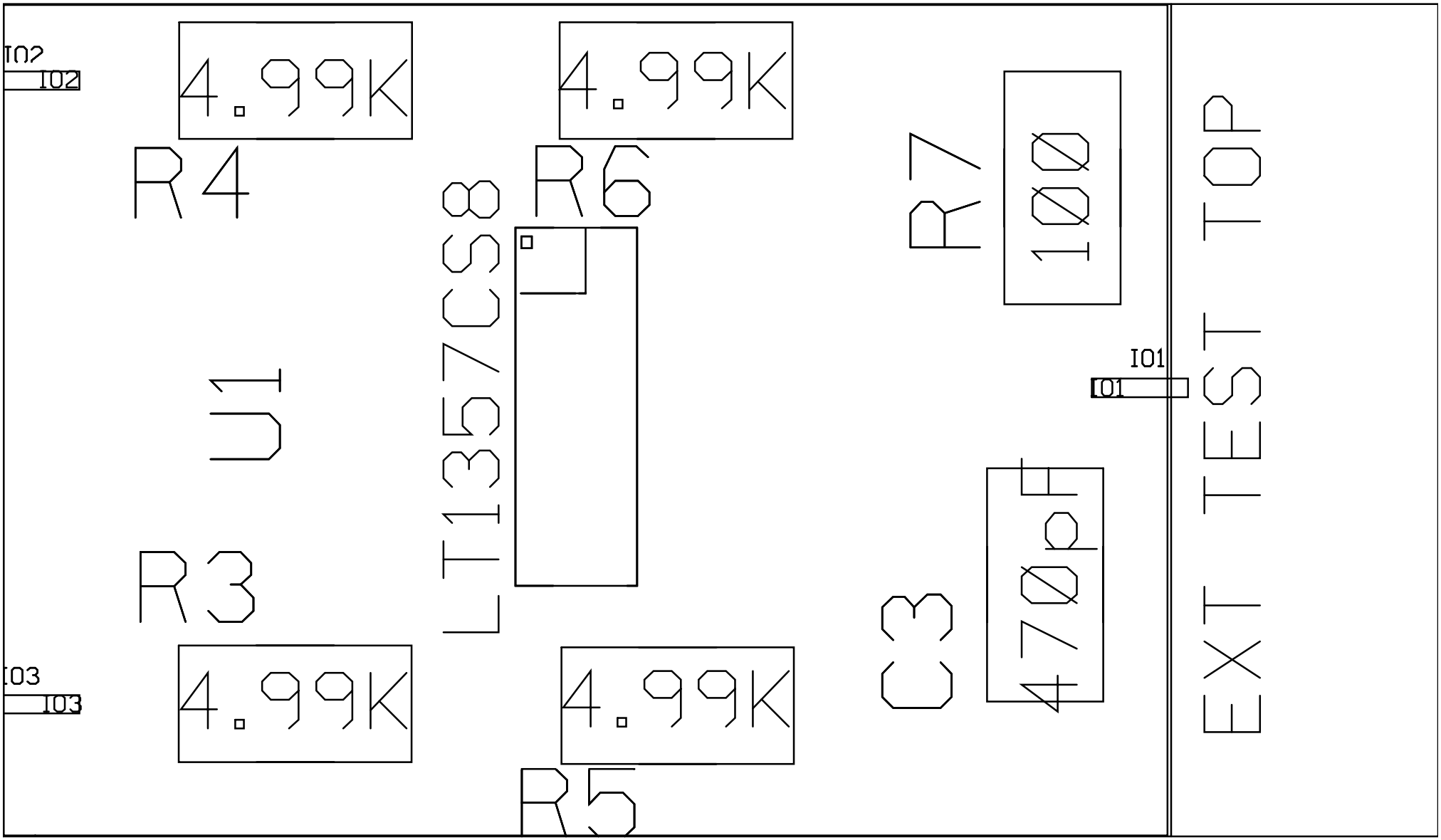


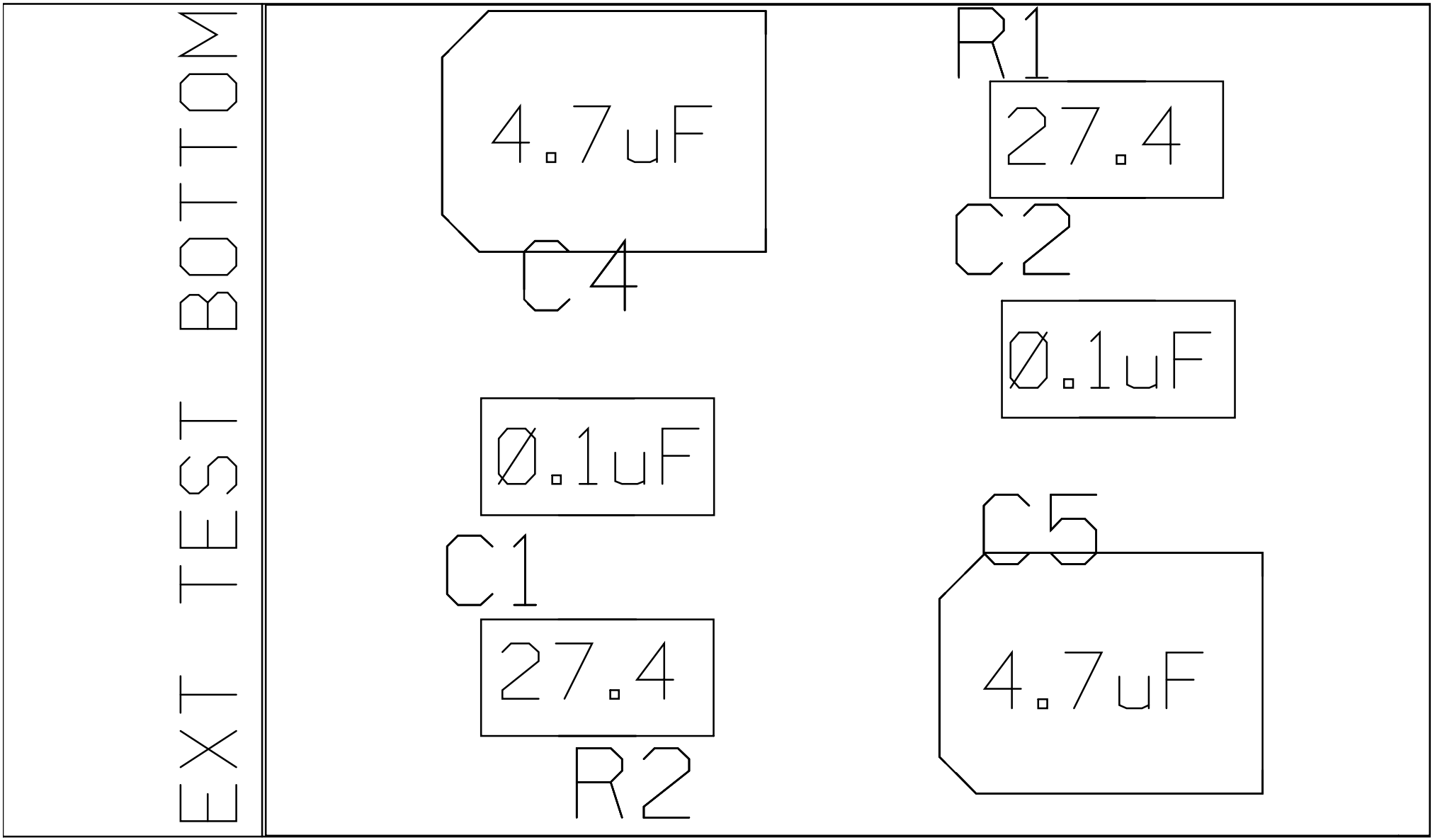
DAC 10 VOLT REFERENCE TOP
(DAC 5 VOLT)

(DAC 5V) DAC 10 VOLT REFERENCE BOTTOM


DAC PRECISION REFERENCE TOP
1µF
C3
150
R4
10K
R6
1µF
C5
U1
AD588KQ


39.2K
R1
BLM
L2
5.1
R3
Ø.1uF
C2
1uF
1uF
C8
5.1
R2
Ø.1uF
C1
C7
BLM
L1
C4
R5
150
1uF
C6
1uF
10K
R7
DAC PRECISION REFERENCE BOTTOM

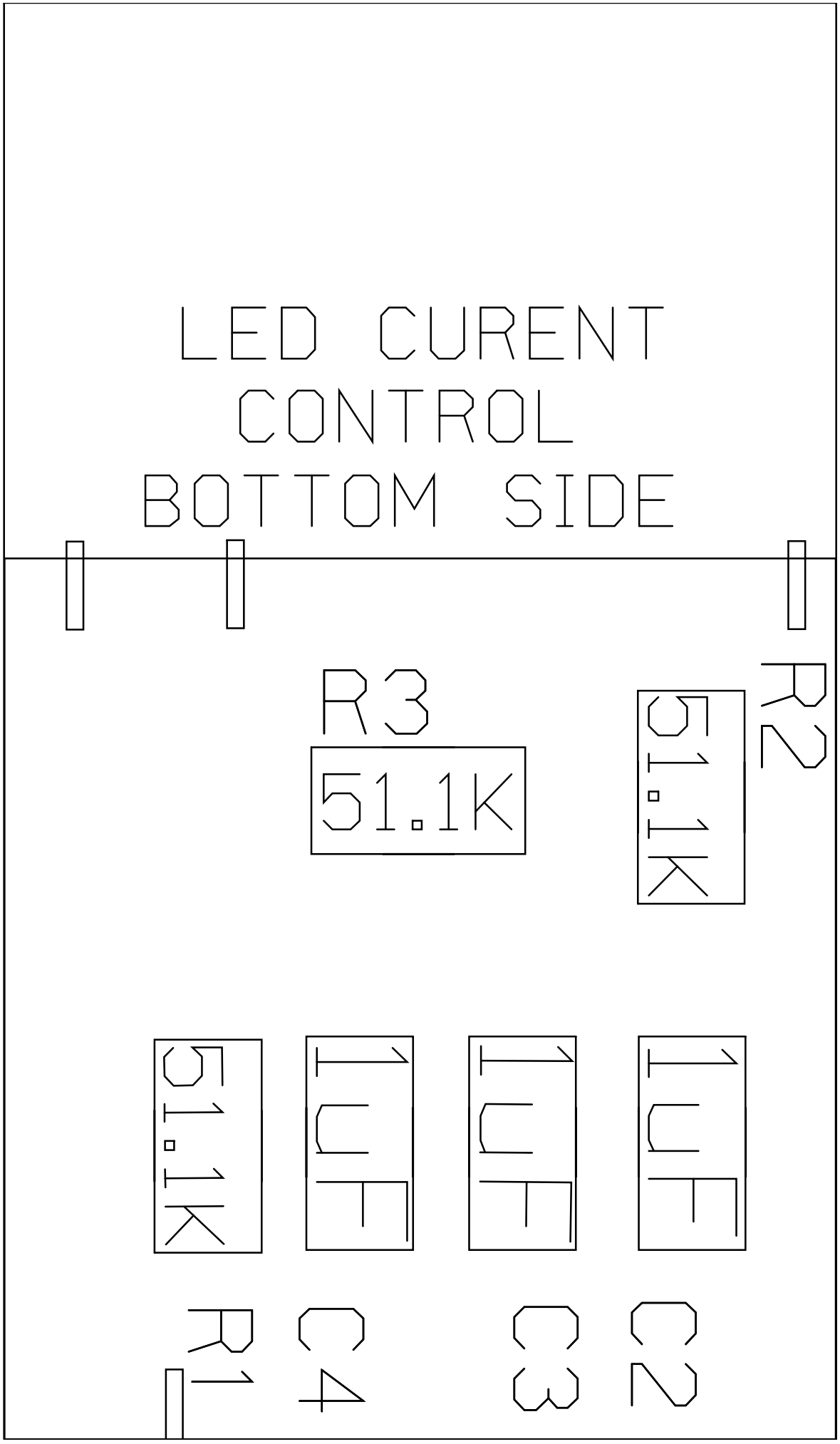

IO2
IO2
4.99K
R4
4.99K
R6
R7
100
IO1
IO1
EXT TEST TOP
LT1357CS8
U1
R3
470pF
C3
IO3
IO3
4.99K
4.99K
R5

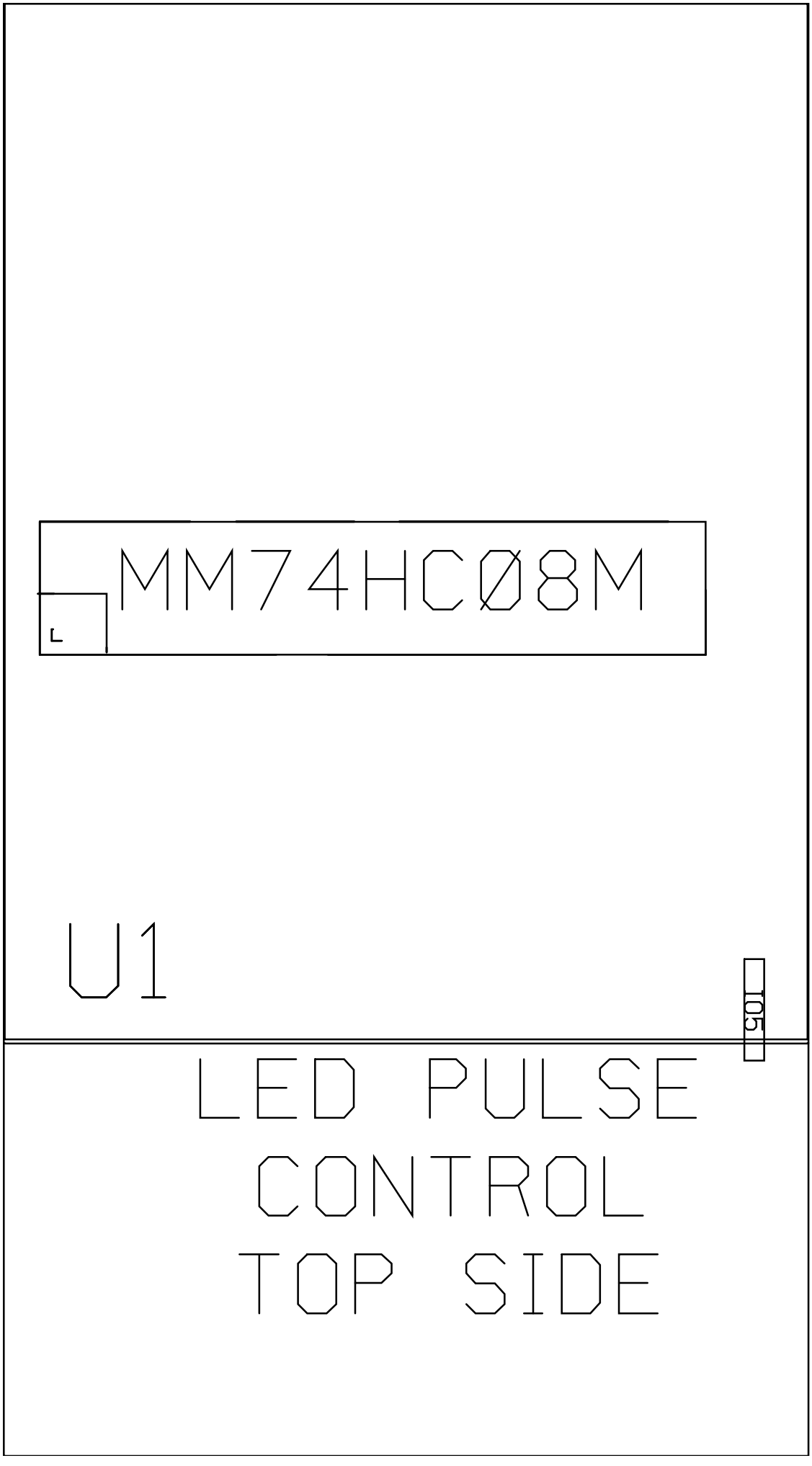

EXT TEST BOTTOM
4.7uF
C4
R1
27.4
C2
0.1uF
0.1uF
C1
C5
27.4
4.7uF
R2

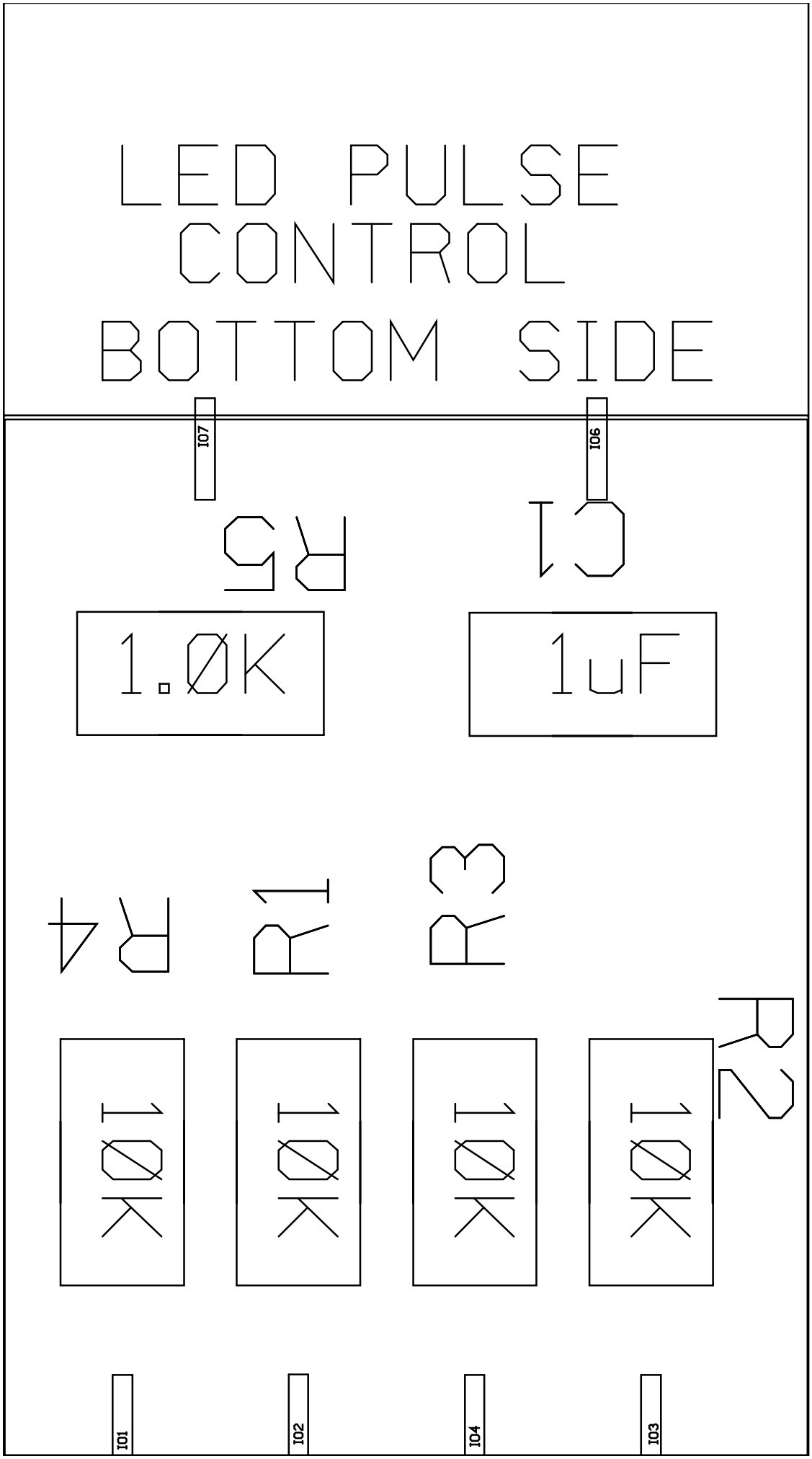
LED CURRENT
CONTROL
TOP SIDE

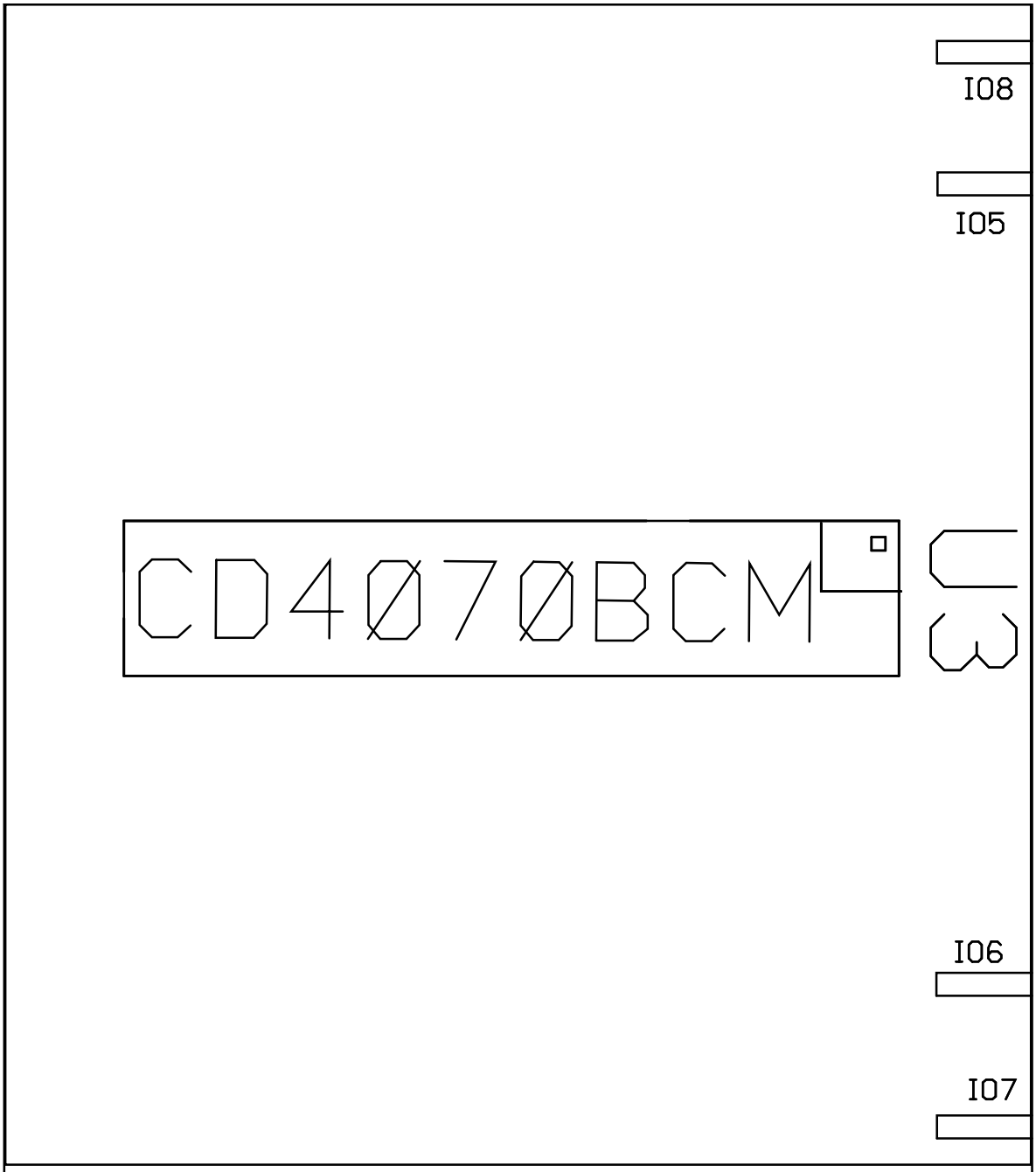
DG413DY

E1


LED CURENT
CONTROL
BOTTOM SIDE
R3
51.1K
R2
51.1K
R1
51.1K
R4
1.1K
R3
1.1K
R2
1.1K

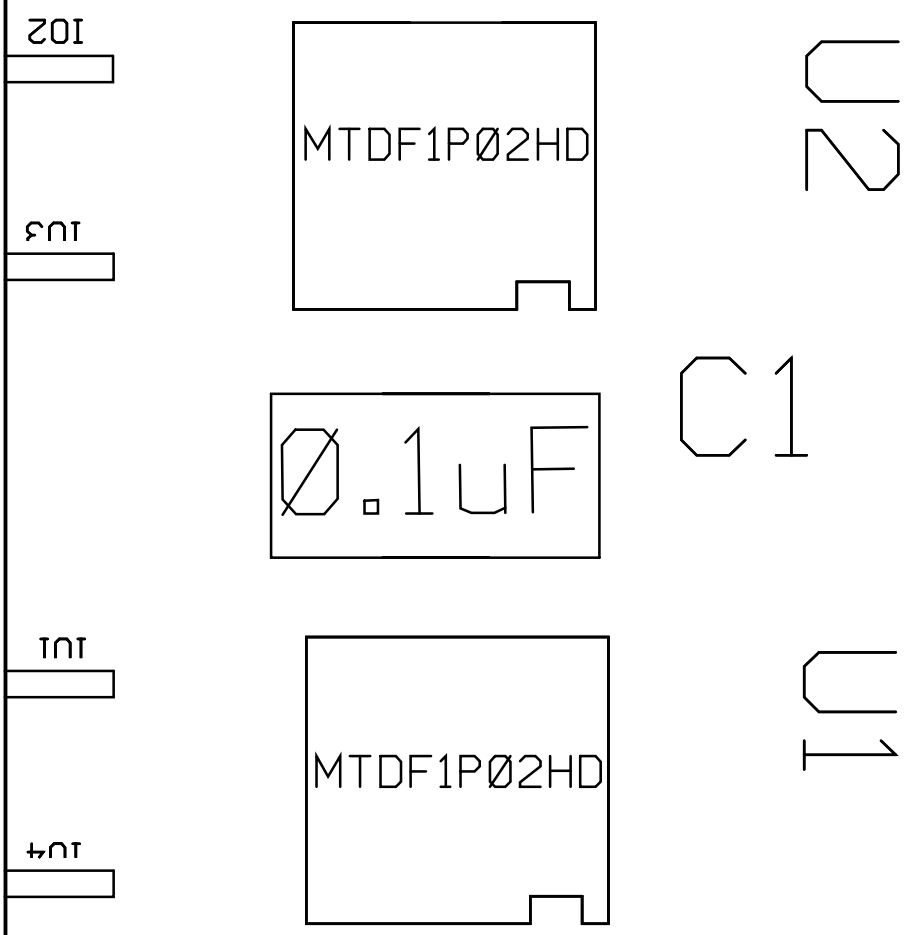

MM74HC08M
U1
LED PULSE
CONTROL
TOP SIDE

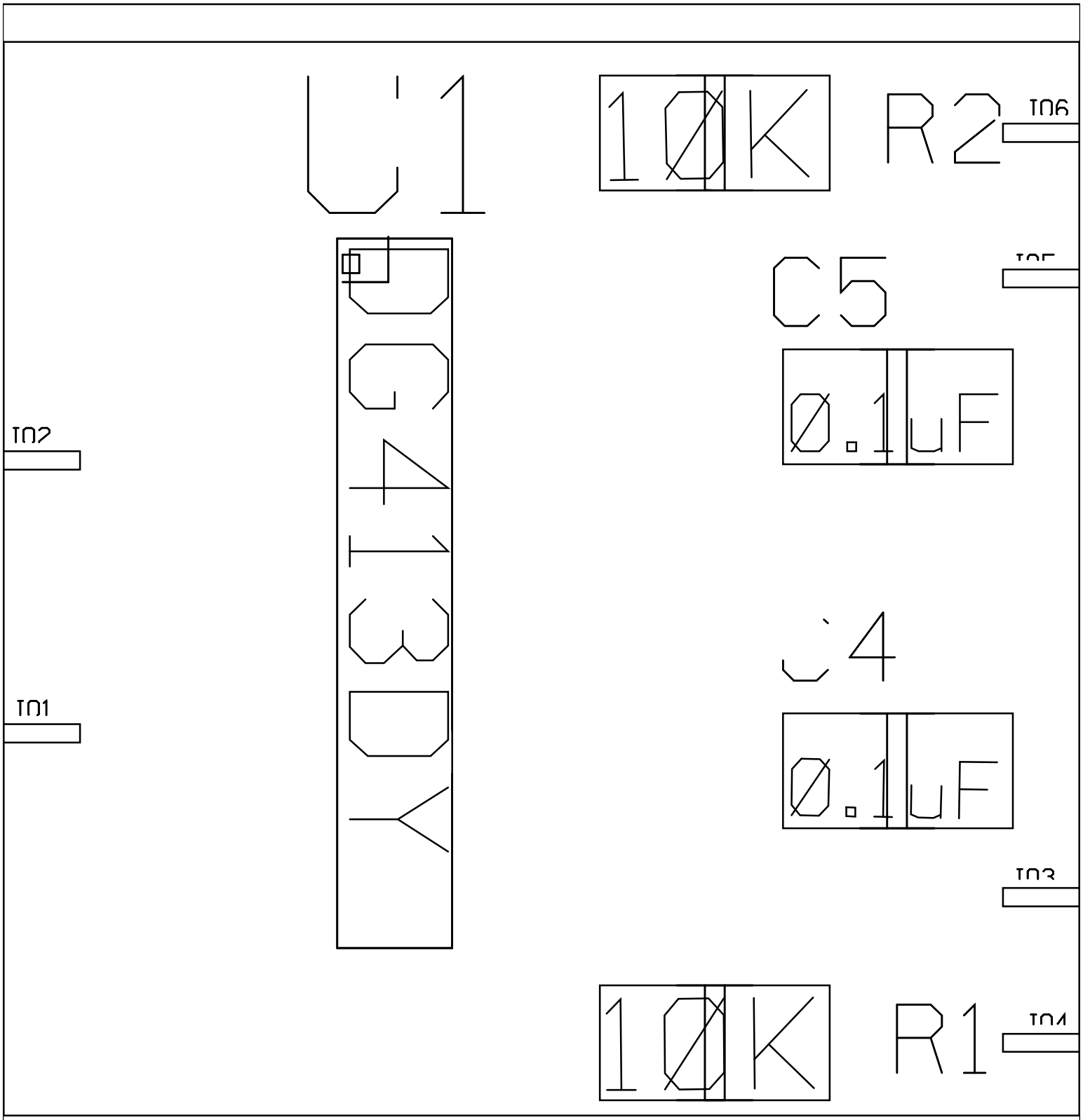

LED PULSE
CONTROL
BOTTOM SIDE
I07
I06
R5
C1
1.ØK
1uF
R4
R1
R3
R2
1ØK
1ØK
1ØK
1ØK
I01
I02
I04
I03



POLARITY CONTROL TOP

POLARITY CONTROL BOTTOM





QBIAS FE TOP SIDE

QBIAS FE
BOTTOM SIDE

R3
51.1K

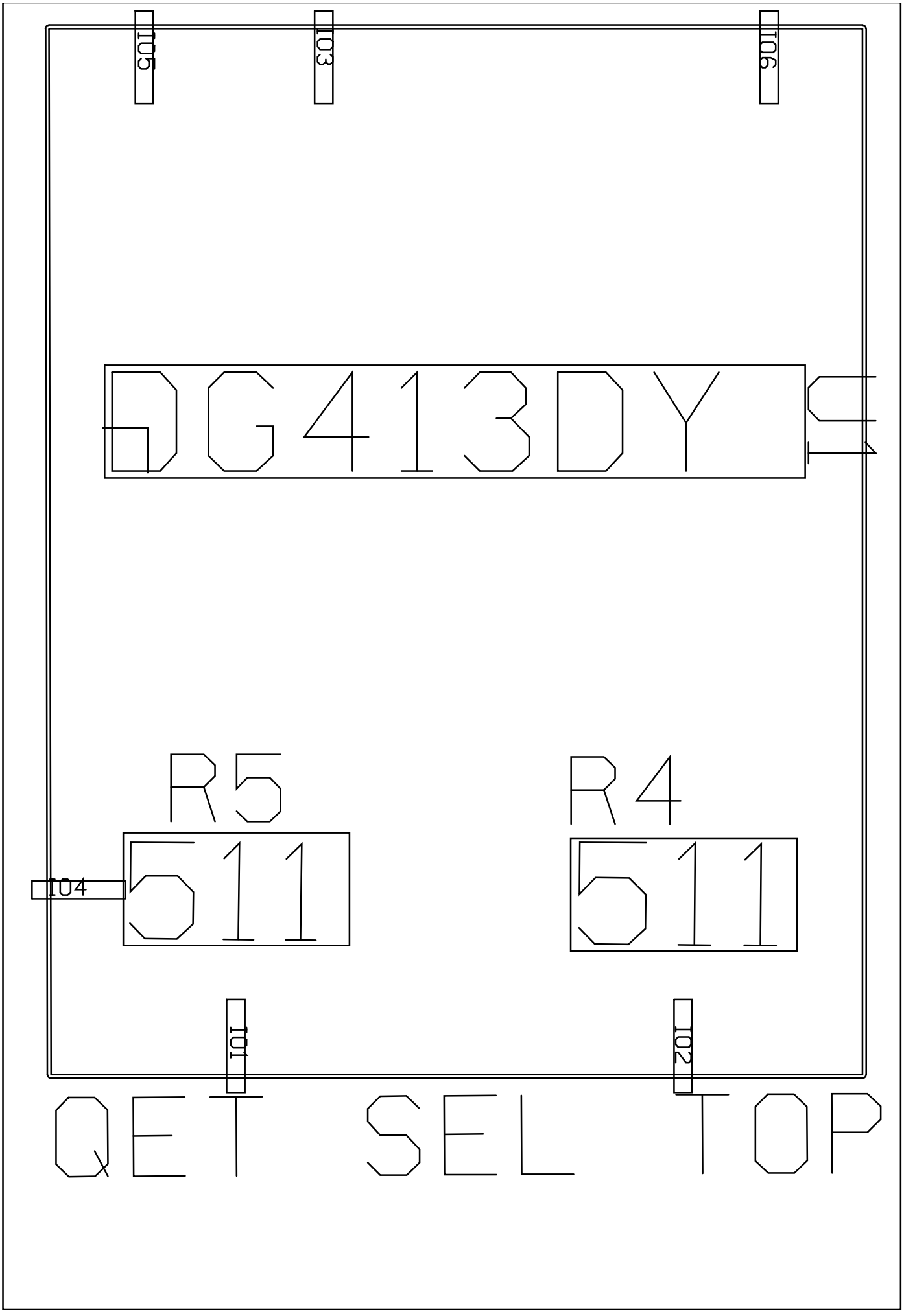
C1
1uF

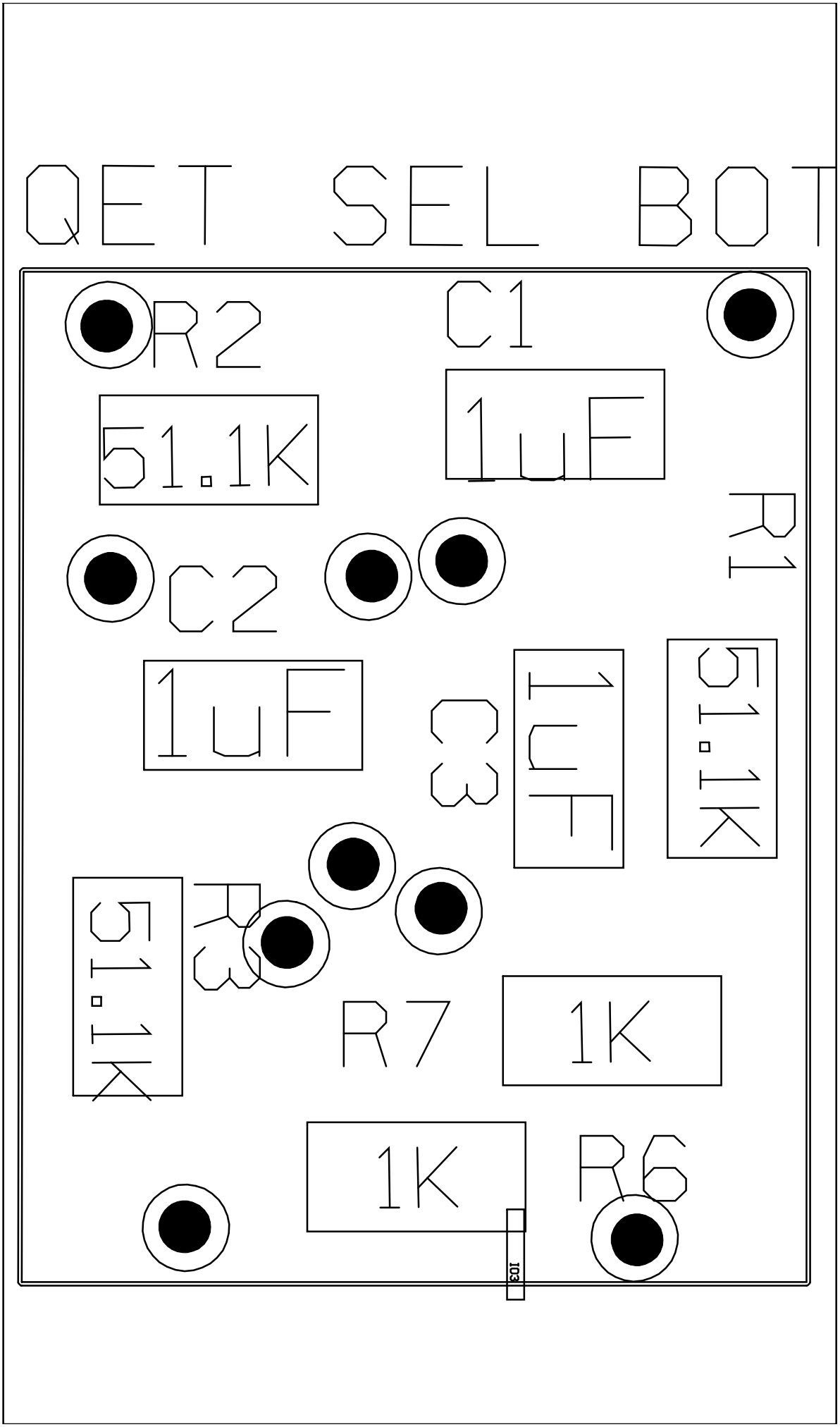
C3
1uF

C2
1uF

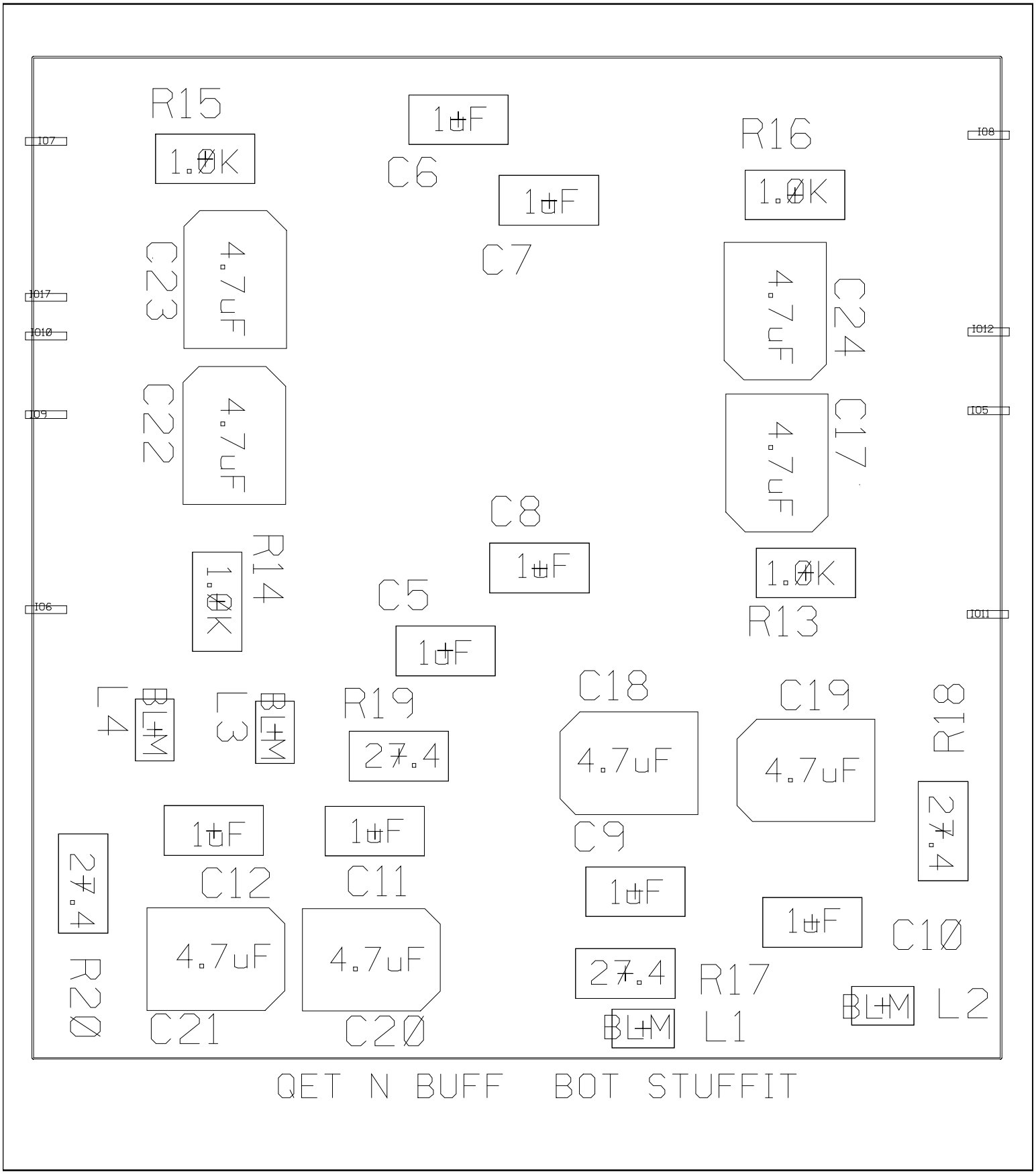
R4
51.1K

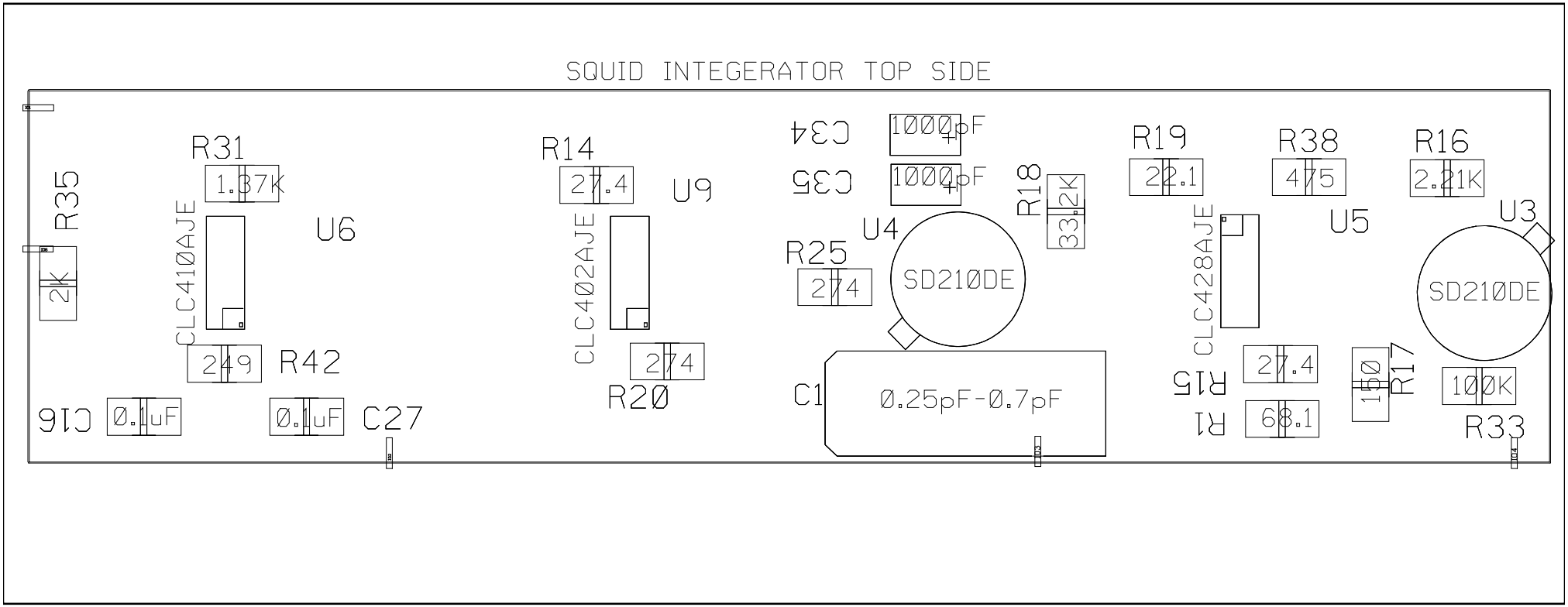
R5
51.1K

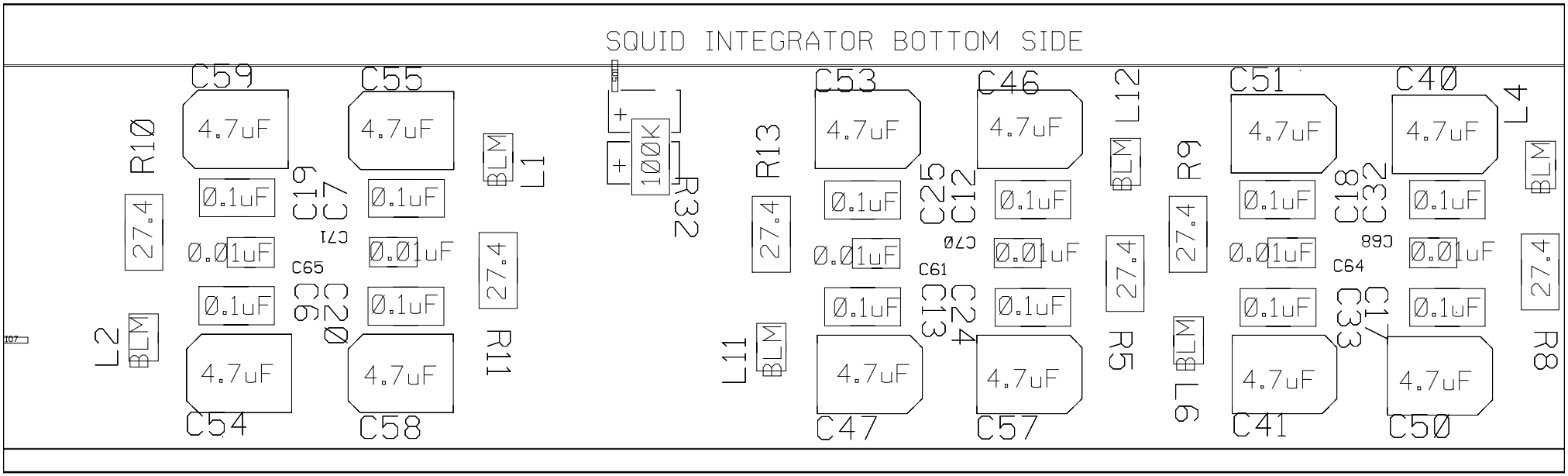

105
103
106
DG413DY
R5
511
104
R4
511
101
102
QET SEL TOP

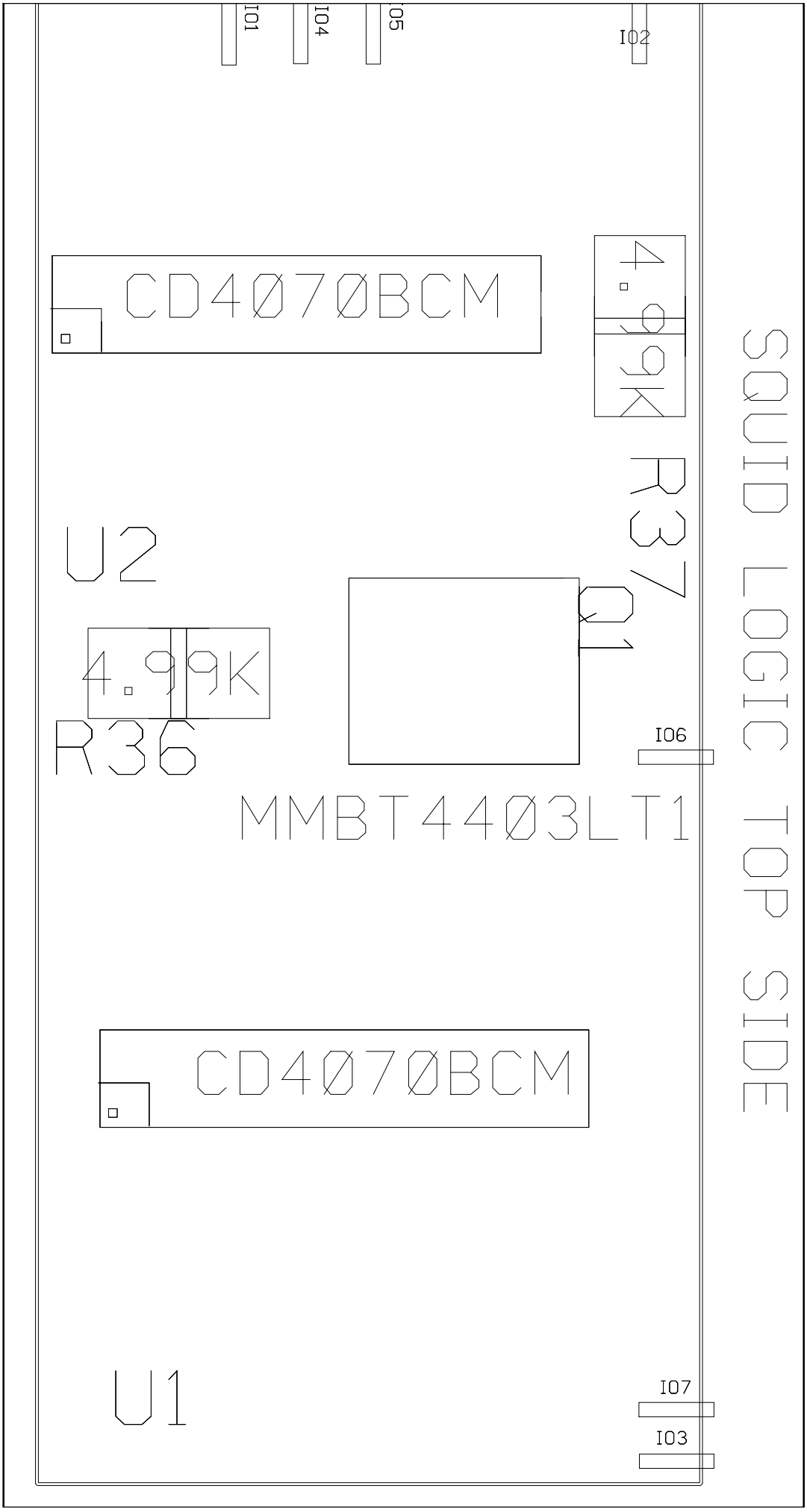

QET SEL BOT
R2
51.1K
C1
1uF
R1
C2
1uF
3
1uF
51.1K
51.1K
R7
1K
1K
R6
103

U1
DG189P
R3
10K
1uF
C15
1uF
10K
C16
R4
1uF
LT1124CS8
C3
U3
U4
C2
1uF
LT1124CS8
R2
C14
10K
1uF
C13
1uF
10K
R1
U2
DG189P
4.99K
R12
10K
R8
10K
R7
4.99K
R11
10K
R6
R9
4.99K
R5
10K
4.99K
R10
C4
C1
1uF
1uF
QET N BUFF TOP STUFFIT

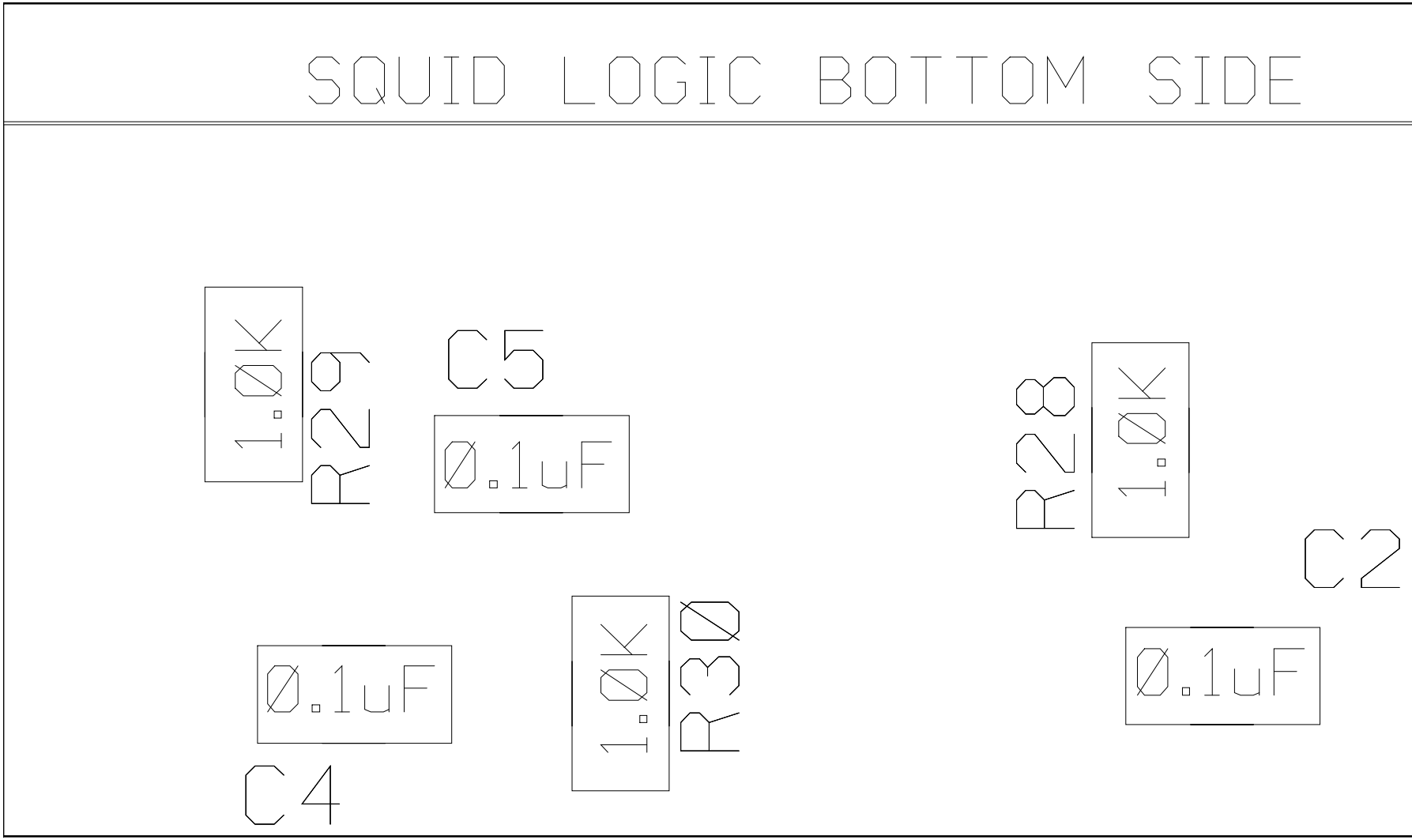

R15
1.0K
C6
1uF
C7
1uF
R16
1.0K
I07
I08
I017
I010
I012
I09
I05
I06
I011
C23
4.7uF
C22
4.7uF
C24
4.7uF
C17
4.7uF
C8
1uF
R14
1.0K
C5
1uF
R13
1.0K
L4
BLM
L3
BLM
R19
27.4
C18
4.7uF
C19
4.7uF
R18
27.4
1uF
1uF
C9
1uF
1uF
C10
27.4
C12
4.7uF
C11
4.7uF
27.4
R17
BLM
L1
BLM
L2
R20
C21
C20
QET N BUFF BOT STUFFIT

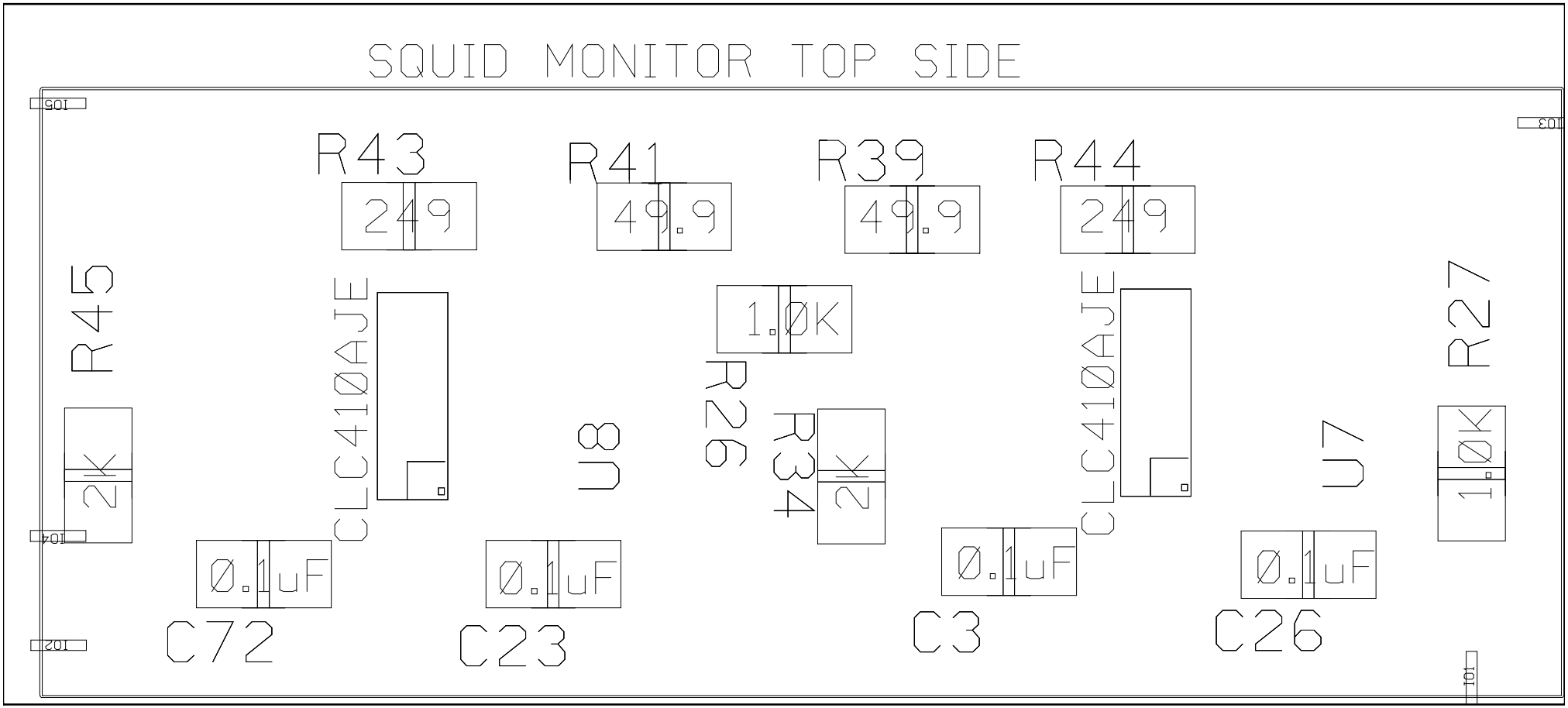

SQUID INTEGERATOR TOP SIDE
R31
1.37K
R35
2K
U6
CLC410AJE
249
R42
C16
0.1uF
0.1uF
C27
R14
27.4
U9
CLC402AJE
274
R20
C34
1000pF
C35
1000pF
R18
33.2K
U4
R25
274
SD210DE
C1
0.25pF-0.7pF
R19
22.1
R38
475
R16
2.21K
U5
CLC428AJE
U3
SD210DE
R15
27.4
R1
68.1
150
R17
100K
R33


SQUID INTEGRATOR BOTTOM SIDE
C59
C55
C53
C46
C51
C40
4.7uF
0.1uF
0.01uF
R10
27.4
L2
BLM
C19
C7
C71
C65
C6
C20
L1
R11
R32
100K
R13
L11
C25
C12
C70
C61
C13
C24
L12
R5
R9
L6
C18
C32
C68
C64
C33
C17
L4
R8
C54
C58
C47
C57
C41
C50

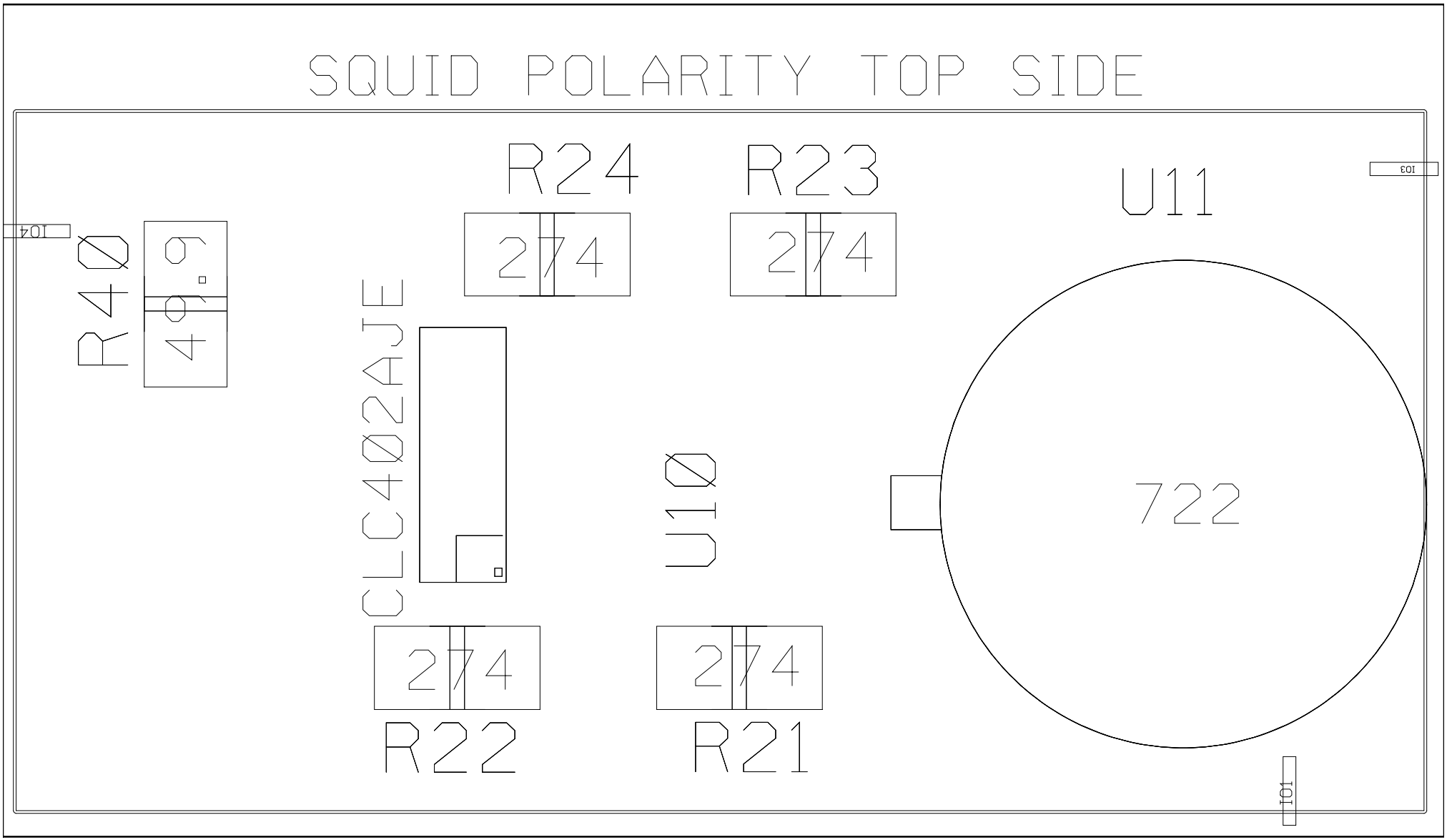

IO1
IO4
IO5
IO2
CD4070BCM
4.99K
R37
SQUID LOGIC TOP SIDE
U2
Q1
4.99K
R36
IO6
MMBT4403LT1
CD4070BCM
U1
IO7
IO3

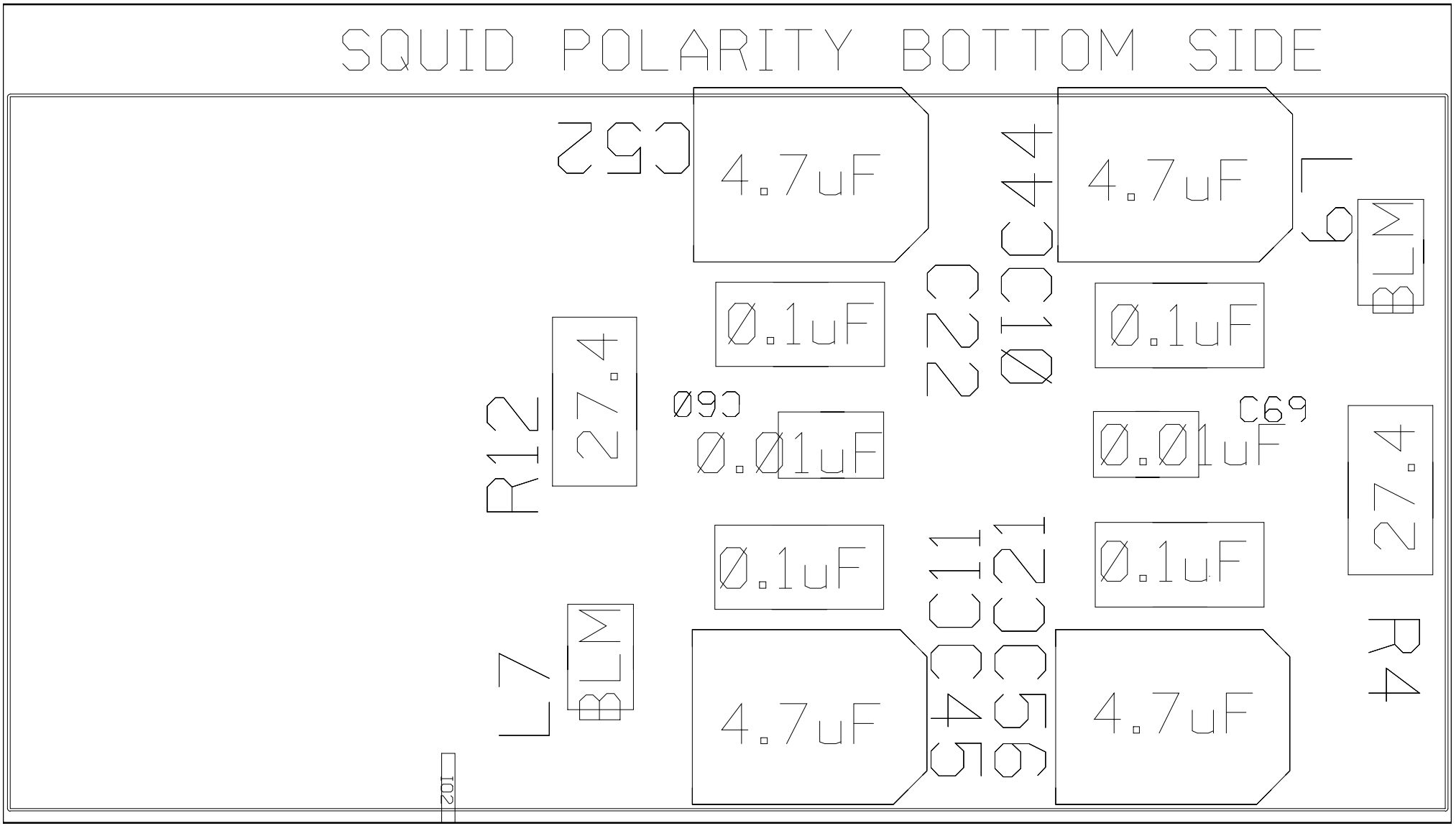
SQUID LOGIC BOTTOM SIDE

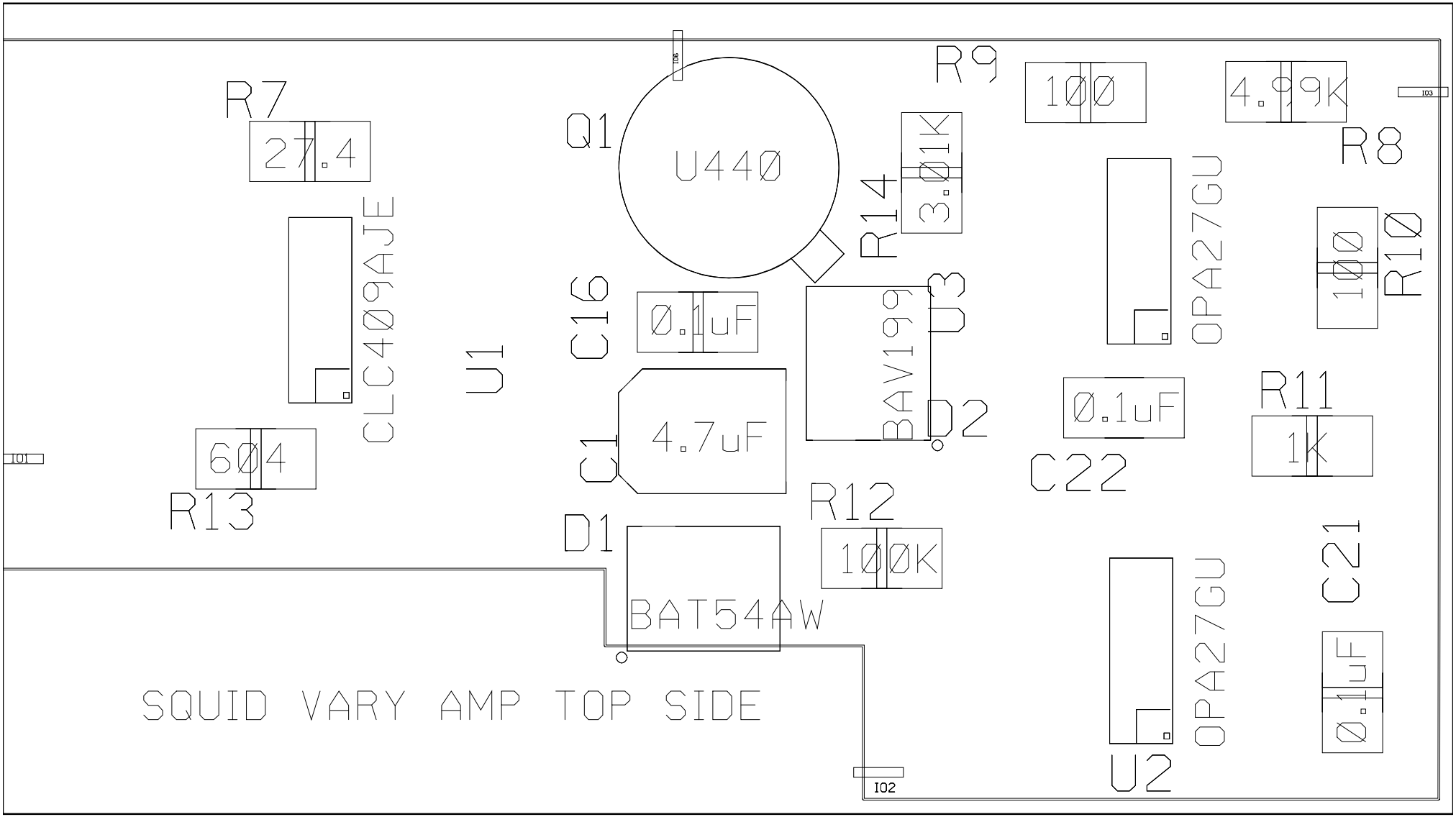



SQUID MONITOR TOP SIDE
R43
249
R41
49.9
R39
49.9
R44
249
R45
2K
CLC410AJE
U8
1.0K
R26
R34
2K
CLC410AJE
U7
R27
1.0K
0.1uF
C72
0.1uF
C23
0.1uF
C3
0.1uF
C26

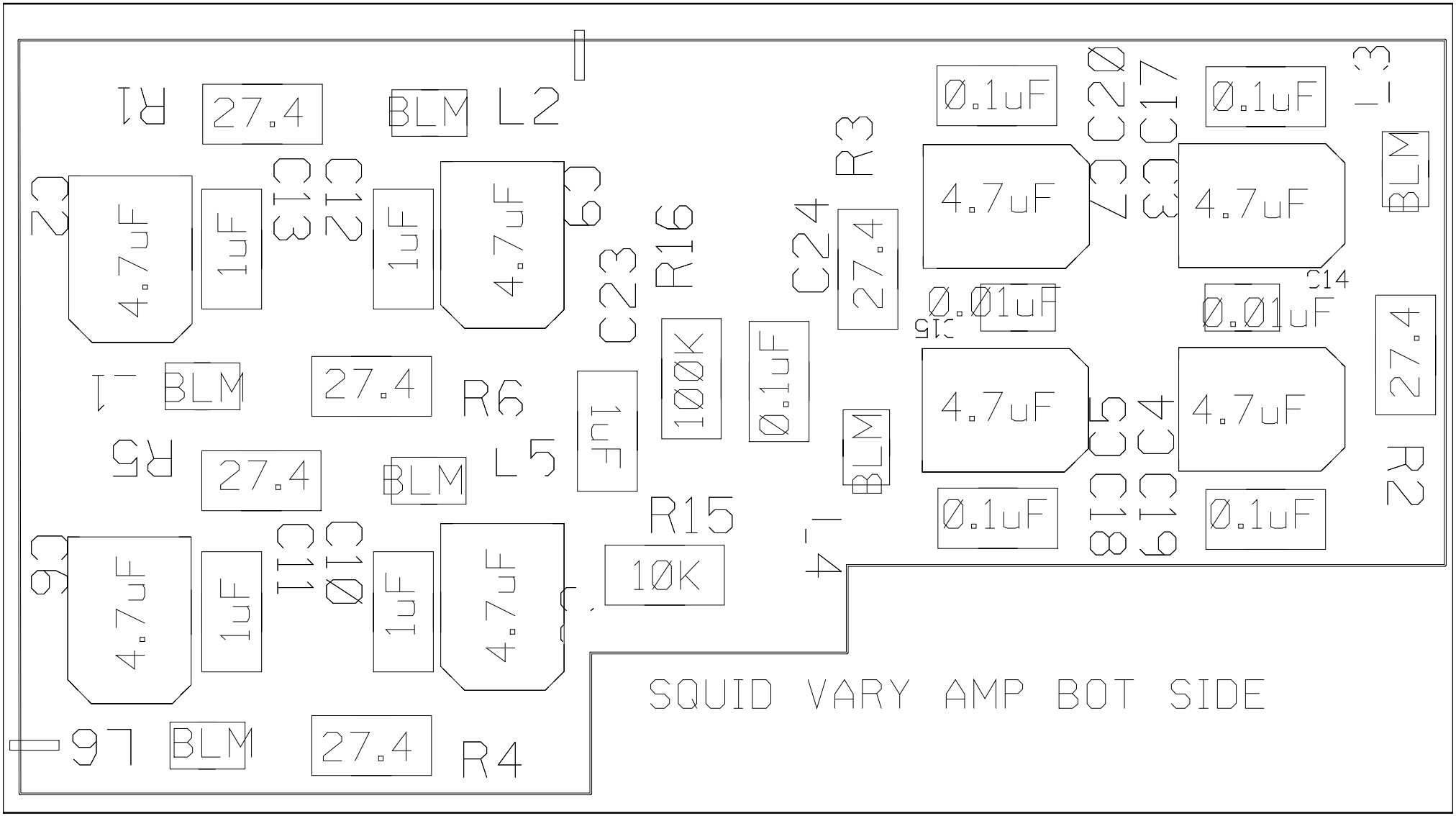
SQUID MONITOR BOTTOM SIDE

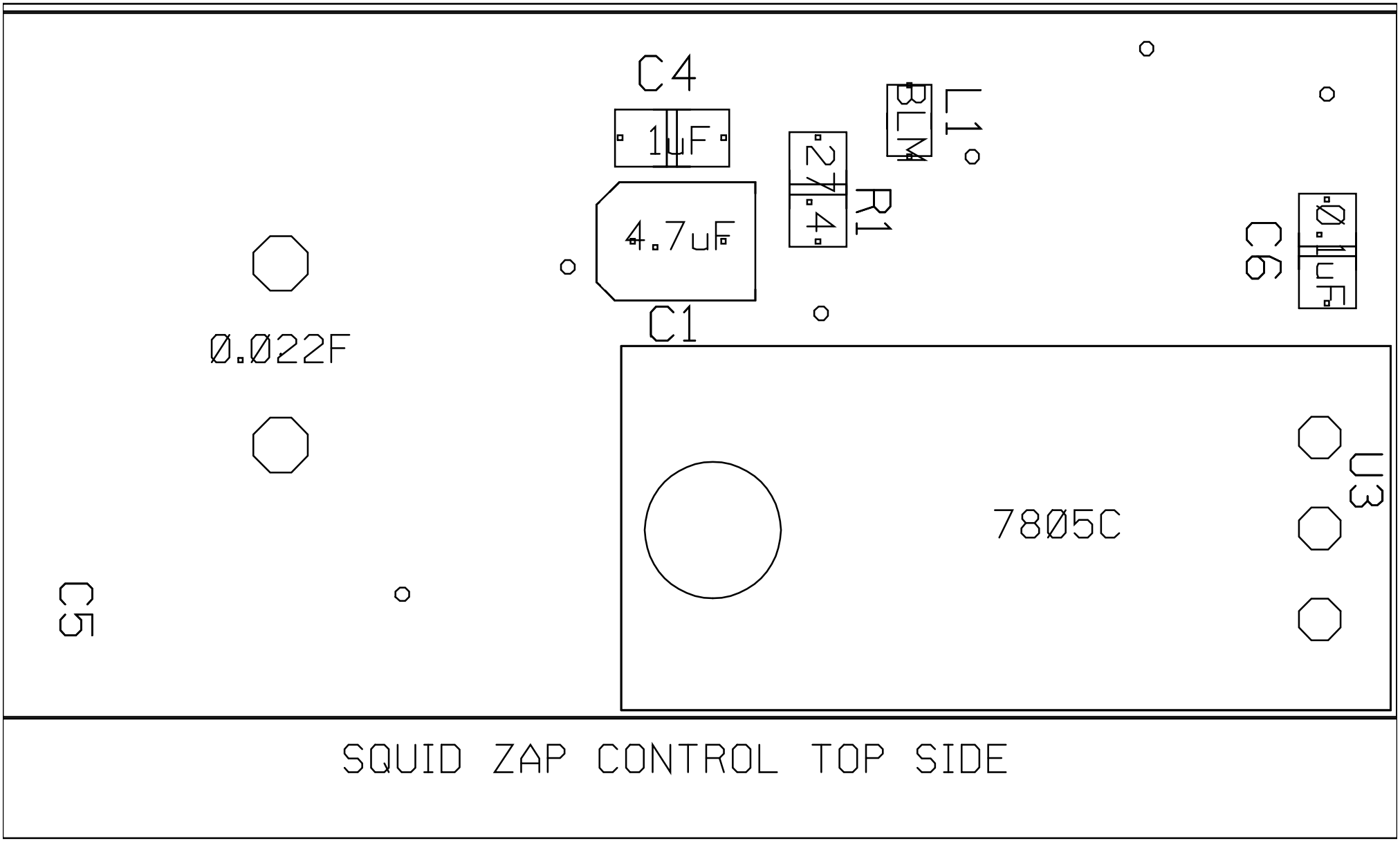

SQUID POLARITY TOP SIDE
R24
R23
U11
R40
49.9
274
274
CLC402AJE
U10
722
274
274
R22
R21
J04
J03
J01


SQUID POLARITY BOTTOM SIDE
C52
4.7uF
C44
4.7uF
L6
BLM
0.1uF
0.1uF
C23
C10
R12
27.4
C90
0.01uF
0.01uF
C69
27.4
0.1uF
0.1uF
C11
C21
L7
BLM
4.7uF
C5
C6
4.7uF
R4
J102

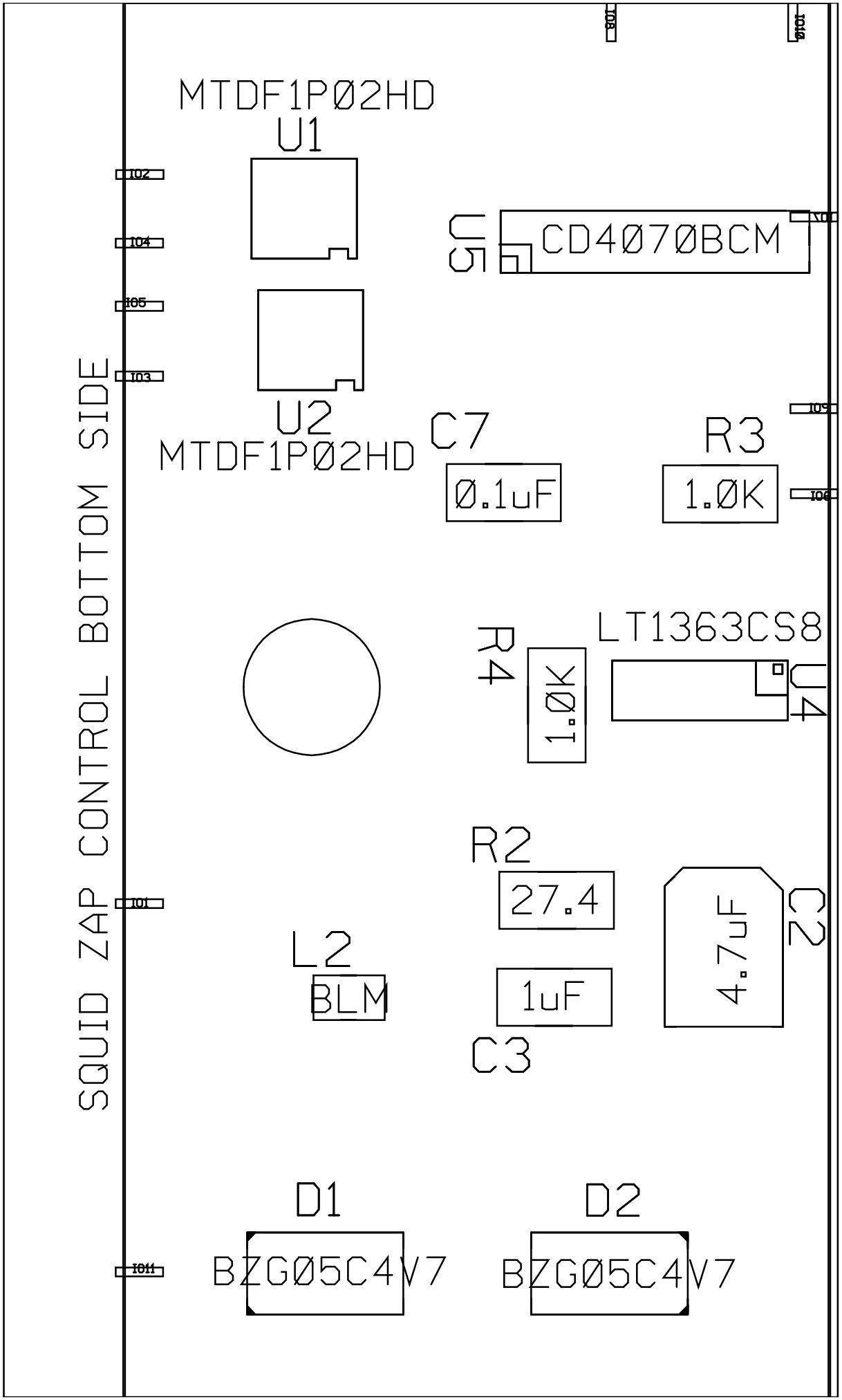


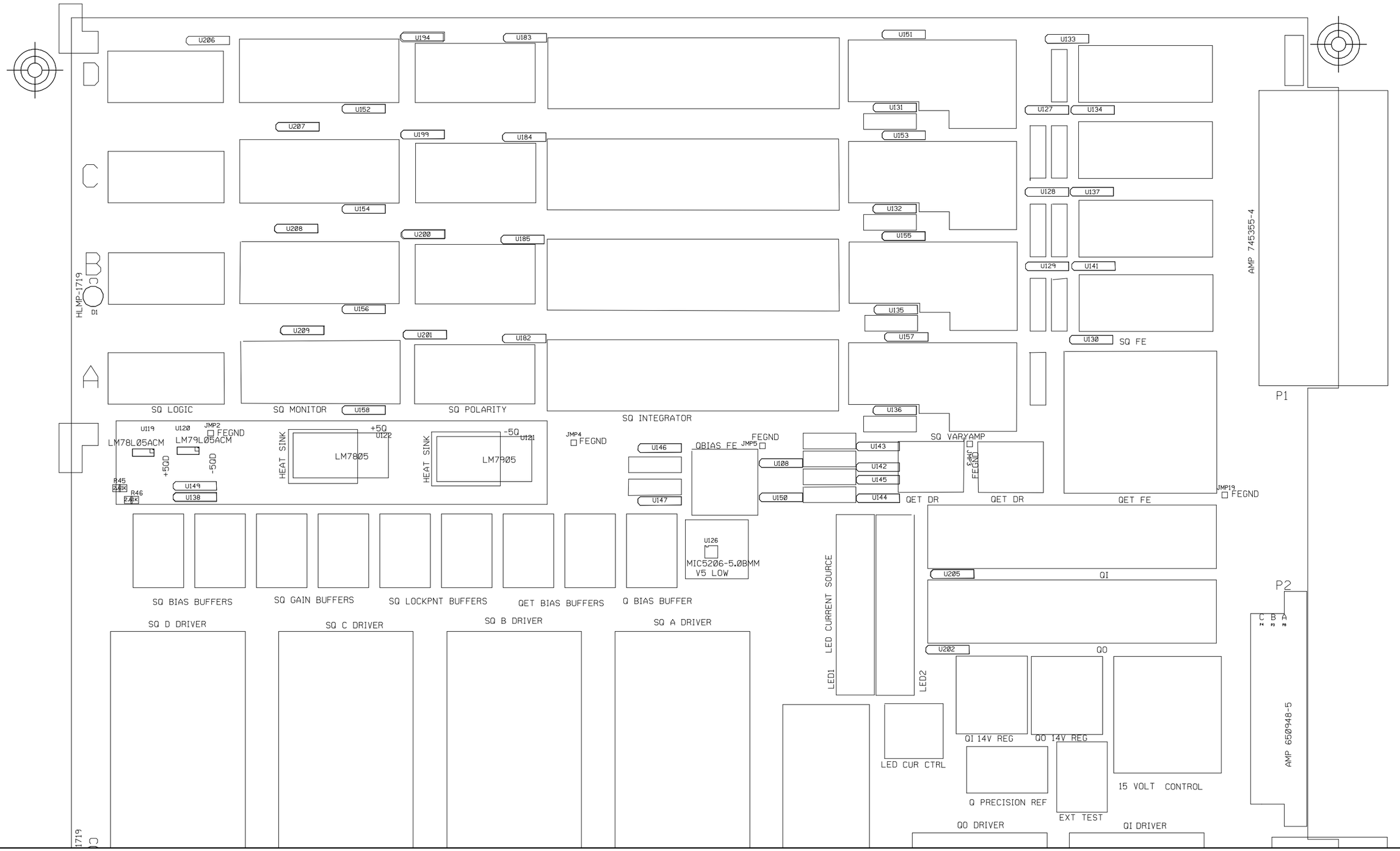
SQUID VARY AMP TOP SIDE

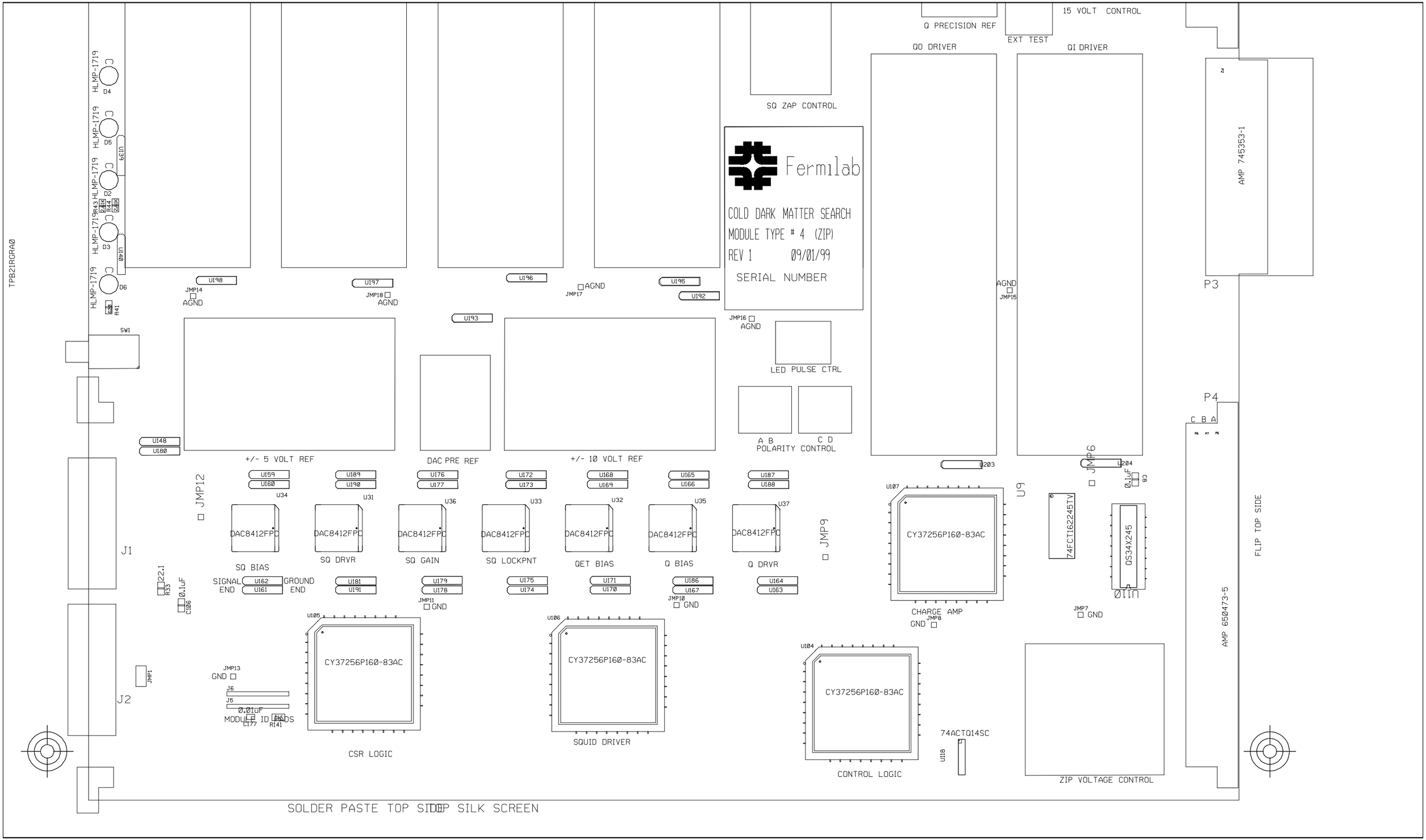

R1
27.4
BLM
L2
C2
4.7uF
1uF
C13
C12
1uF
4.7uF
C9
C23
R16
C24
R3
27.4
0.1uF
C20
C17
0.1uF
L3
4.7uF
4.7uF
BLM
0.01uF
0.01uF
C14
C15
27.4
L1
BLM
27.4
R6
1uF
100K
0.1uF
4.7uF
C5
C4
4.7uF
R5
27.4
BLM
L5
BLM
R2
R15
0.1uF
C18
C19
0.1uF
C6
4.7uF
1uF
C11
C10
1uF
4.7uF
10K
L4
SQUID VARY AMP BOT SIDE
L9
BLM
27.4
R4



SQUID ZAP CONTROL TOP SIDE


SQUID ZAP CONTROL BOTTOM SIDE
MTDF1P02HD
U1
U2
MTDF1P02HD
U5
CD4070BCM
C7
0.1uF
R3
1.0K
R4
1.0K
LT1363CS8
U4
R2
27.4
C2
4.7uF
L2
BLM
1uF
C3
D1
BZG05C4V7
D2
BZG05C4V7


U206
U194
U183
U151
U133
U152
U131
U127
U134
U207
U199
U184
U153
U154
U128
U137
U208
U200
U185
U132
U155
U156
U129
U141
U209
U201
U182
U135
U157
U130
SQ FE
HLMP-1719
D1
SQ LOGIC
SQ MONITOR
U158
SQ POLARITY
SQ INTEGRATOR
U136
AMP 745355-4
P1
U119
U120
JMP2
FEGND
LM78L05ACM
LM79L05ACM
+5Q
-5Q
HEAT SINK
LM7805
U122
U121
JMP4
FEGND
U146
QBIAS FE
JMP5
FEGND
U143
U108
U142
U145
U150
U144
SQ VARYAMP
JMP3
FEGND
QET DR
QET DR
QET FE
JMP19
FEGND
R45
2.61K
R46
2.61K
U149
U138
U147
U126
MIC5206-5.0BMM
V5 LOW
U205
QI
P2
C B A
U202
QO
LED CURRENT SOURCE
LED1
LED2
QI 14V REG
QO 14V REG
AMP 650948-5
LED CUR CTRL
15 VOLT CONTROL
Q PRECISION REF
EXT TEST
SQ BIAS BUFFERS
SQ GAIN BUFFERS
SQ LOCKPNT BUFFERS
QET BIAS BUFFERS
Q BIAS BUFFER
SQ D DRIVER
SQ C DRIVER
SQ B DRIVER
SQ A DRIVER
QO DRIVER
QI DRIVER



Fermilab
COLD DARK MATTER SEARCH
MODULE TYPE # 4 (ZIP)
REV 1 09/01/99
SERIAL NUMBER
TPB21RGRA0
HLMP-1719
D4
D5
D2
D3
D6
U139
U140
R43
R44
R41
SW1
U198
JMP14
AGND
U197
JMP18
AGND
U196
AGND
JMP17
U195
U192
U193
JMP16
AGND
SQ ZAP CONTROL
Q PRECISION REF
EXT TEST
15 VOLT CONTROL
QO DRIVER
QI DRIVER
AGND
JMP15
AMP 745353-1
P3
P4
C B A
LED PULSE CTRL
A B
C D
POLARITY CONTROL
+/- 5 VOLT REF
DAC PRE REF
+/- 10 VOLT REF
U148
U180
U159
U160
U189
U190
U176
U177
U172
U173
U168
U169
U165
U166
U187
U188
U203
U204
JMP6
0.1uF
R3
JMP12
U34
U31
U36
U33
U32
U35
U37
DAC8412FPC
SQ BIAS
SQ DRVR
SQ GAIN
SQ LOCKPNT
QET BIAS
Q BIAS
Q DRVR
JMP9
U107
CY37256P160-83AC
CHARGE AMP
U9
74FCT162245TV
QS34X245
U110
FLIP TOP SIDE
AMP 650473-5
J1
22.1
R33
0.1uF
C106
SIGNAL END
GROUND END
U162
U161
U181
U191
U179
U178
U175
U174
U171
U170
U186
U167
U164
U163
JMP11
GND
JMP10
GND
JMP8
GND
JMP7
GND
U105
CY37256P160-83AC
CSR LOGIC
U106
CY37256P160-83AC
SQUID DRIVER
U104
CY37256P160-83AC
CONTROL LOGIC
74ACTQ14SC
U118
ZIP VOLTAGE CONTROL
J2
JMP1
JMP13
GND
J6
J5
0.01uF
MODULE ID PADS
C177
R141
SOLDER PASTE TOP SIDE
TOP SILK SCREEN

SQ FE

SQ INTEGRATOR

SQ POLARITY

SQ MONITOR

SQ LOGIC

VARYAMP

QET FE

QET DR

QET DR

FEGND

QBIAS FE

FEGND

FEGND

FEGND

Q BIAS BUFFER

QET BIAS BUFFERS

SQ LOCKPNT BUFFERS

SQ GAIN BUFFERS

SQ BIAS BUFFERS

LED CURRENT SOURCE

QO 14V REG

QI 14V REG

LED CUR CNTR

15 VOLT CONTROL

Q PRECISION REF

EXT TEST

15

15 VOLT CONTROL

EXT TEST

Q PRECISION REF

LED CUR CNTR

SQ ZAP CONTROL

SQ A DRIVER

SQ B DRIVER

SQ C DRIVER

SQ D DRIVER

25 13

14 1

P3

AGND

LED PULSE CNTR

C D
POLARITY CONTROL

A B

+/- 10 VOLT REF

DAC PRE REF

+/- 5 VOLT REF

P4

A B C

QI DRIVER

QO DRIVER

GND

ZIP VOLTAGE CONTROL

ICM7555CBA

MAX1483CSA

MMX74C244WM

3 6

1 4

9 10

1 2

LSB

MODULE SERIAL #

MSB

MODULE REVISION # 1

MODULE TYPE #4

SERIAL NUMBER

BOTTOM SIDE SILK SCREEN

SOLDER PASTE TOP SIDE