VCC
100K
100K
OSC.
TP1
100K
8
3
2
4
U1A
TL072
1
1uF
8K2
2
U2A
HEF4066
50 - 150pF
1nF
set 150 kHZ
2K7
1
1/3
50 kHz
TP2
1K
4.7mH
4X 1n5
2K5
set TP4
1uF
1M
150 kHz
TP3
1K
2.2mH
1nF
1nF
2K5
set TP4
1uF
1M
VCC
10K
VCC
10K
VCC
10K
U2C
HEF4066
8
6
9
U2B
HEF4066
4
5
3
U2D
HEF4066
12
11
10
100nF
OPEN = 150 KHz
CLOSED = 50 KHz
VCC
Rx = symm. clipping correction on TP4
10K
Rx
56K
10K
1uF
2K2
VCC
1uF
8
5
6
4
U1B
TL072
7
1N4148
1N4148
47
1uF
6K8
TP4
4Vtt
N1=160
N2=2x 8 (or 9)
23 mm MnZn toroid
preferred AL = 1500-2500
(3C85, 3F3 or dump 3H1)
Z = 400 : 1
N = 20 : 1
BUFFER 3X AMP

SHORT ESR TEST LEADS
TEST1
TEST2
0.2Vtt max.
470k / 1M
1W
2.2uF X2
275 V AC
(or 2x 1uF)
TP5
TP6
2X 1N4007
10
1/2 W
10
1/2 W
High voltage (mains) protected
100
1uF
68K
680
10nF
6K8
1N4148
15
15
20X GAIN BLOCK
VCC
10
BC560
BC550
270
Ry
10uF
Hirel tantal.
100
SET GAIN 20X
4Vtt
TP7
100
100nF
1N4148
1N4148
100nF
A
B
6k8
R1
10nF
R1 + R2 depend on meter!
external set max.
50 - 300 uA METER
5K
R2
Between A and B an OPAMP buffer can be placed
to support large 0.5 to 10 mA meters
Without it the meter forms a too heavy load
Ry only needed to force
a higher DC output current
and lower Z for a 0.5 mA meter (only)
For higher meter current use
the buffer AMP module with CA3130
(test between 100 and 330 ohm)
MC78xx with safety heatsink

Module to force a higher
meter output current
10nF
VCC
7
5
CA3130
A
3
2
6
B
47K
4
8
1
10nF

Suggestion meter R's

meter	R1	R2 potm
50uA	33K	22K
100uA	18K	10K
250uA	6K8	5K
500uA	3K3	2K2
1mA	1K8 2K2	1K 500
2mA	1K	500
10mA	180	250

Also depends on Ri

9V DC (or 10)
(or 7810)
VCC
U3
MC7809CT
3
OUT
GND
IN
1
2
1N4004
Adapter
power IN
14 to 20 V DC
AC not preferred
but allowed
47 -
100uF
Low ESR !
100nF
100nF
220 -
470uF
10nF

IMPROVED ESR METER WITH ENHANCED PERFORMANCE

Size	Document Number	REV
B	REVISIONS BY PE1ABR	D
Date: April 24, 2012	Sheet 1 of 1	

ESRMETER.SCH