

800~1600-Watts H-Class Audio Power Amplifier For 4~8-Ohms Loudspeaker

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*-----*
*
* Version   : r.1-hv-sis-hc
* Revision  : 2
* Designer  : Heru Himawan Tejo Laksono <heru.htl@gmail.com>
* URL       : http://www.matrix14-power-amp.66ghz.com/
* License   : GNU General Public License, V.3, June 2007
* Converted : Sunday, November 28, 2010 20:39:03
*
* This schematic comes with ABSOLUTELY NO WARRANTY; see the gpl3.txt that came within this schematic, which
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*
* COMMERCIAL BREAKS ...
*
* This SPICE3 netlist configured by gsch-packager V.0.1
*
* The gsch-packager is EDA tools in form of shell & PHP script running under GNU/Linux and UNIX variant
* OS'es, used to integrate the gEDA-gschem, gEDA-gnetlist, ngspice, a2ps, ps2pdf, CUPS/UNIX Printing, and
* several UNIX/LINUX based programs -- for compiling the gEDA-gschem schematic into professional electronics
* schematic diagrams for manufacturing purposes.
*
* The output of gsch-packager not only SPICE3 netlist, but, schematic in PDF, PNG, and Web/HTML presentation
* view.
*
* The gsch-packager can be purchased in US $30 (Rp 275000) from:
*
*   Heru Himawan Tejo Laksono
*   JL. K. S. Tubun, Karang Salam RT 002 RW 005
*   Purwokerto - 53152
*   Jawa Tengah - INDONESIA
*
* Thank you in advance for your supports.
*-----*

.model GREEN_LED D
+ Is=1e-10      N=5.45      Cj0=3p      M=0.5
+ Vj=0.7        Fc=0.5      Rs=0.1      Tt=4.0u
+ Kf=0.0        Af=1.0      Bv=5        Ibv=10u
+ Xti=3.0       Eg=1.11     Trs=0.0     Ttt1=0.0
+ Ttt2=0.0      Tm1=0.0     Tm2=0.0     Tnom=26.85

.model BLUE_LED D
+ Is=1e-10      N=6.68      Cj0=3p      M=0.5
+ Vj=0.7        Fc=0.5      Rs=0.1      Tt=4.0u
+ Kf=0.0        Af=1.0      Bv=5        Ibv=10u
+ Xti=3.0       Eg=1.11     Trs=0.0     Ttt1=0.0
+ Ttt2=0.0      Tm1=0.0     Tm2=0.0     Tnom=26.85

.model RED_LED D
+ Is=1e-10      N=4.09      Cj0=3p      M=0.5
+ Vj=0.7        Fc=0.5      Rs=0.1      Tt=4.0u

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+ Kf=0.0          Af=1.0          Bv=5          Ibv=10u
+ Xti=3.0          Eg=1.11         Trs=0.0         Ttt1=0.0
+ Ttt2=0.0         Tm1=0.0         Tm2=0.0         Tnom=26.85

.model BF422 NPN
+ IS=7.974E-15     NF=0.993        ISE=2.266E-16   NE=1.18
+ BF=122           IKF=0.01029     VAF=25.51       NR=0.999
+ ISC=4.33E-12     NC=1.397          BR=6.235        IKR=0.02746
+ VAR=19.43        RB=1           IRB=1E-06       RBM=0.5
+ RE=0.3814        RC=0.439          XTB=0           EG=1.11
+ XTI=3            CJE=1.742E-11     VJE=0.4581      MJE=0.3092
+ TF=7.073E-10     XTF=289.5          VTF=6.144       ITF=0.1495
+ PTF=0            CJC=5.045E-12     VJC=0.197       MJC=0.1947
+ XCJC=0.1041      TR=1E-08           CJS=0           VJS=0.75
+ MJS=0.333        FC=0.8555         KF=0            AF=1

.model BF423 PNP
+ IS=9.124E-15     NF=0.9904          ISE=1.672E-15   NE=1.527
+ BF=198.2         IKF=0.13           VAF=465.9       NR=0.99
+ ISC=2.139E-13    NC=1.08           BR=1.256        IKR=0.1
+ VAR=13           RB=5           IRB=1E-06       RBM=0.5
+ RE=0.635         RC=1.42          XTB=0           EG=1.11
+ XTI=3            CJE=1.447E-11     VJE=0.8484      MJE=0.3884
+ TF=1.38E-09      XTF=21.78         VTF=2           ITF=0.065
+ PTF=0            CJC=8.483E-12     VJC=0.6298      MJC=0.4561
+ XCJC=0.619       TR=1E-32          CJS=0           VJS=0.75
+ MJS=0.333        FC=0.99           KF=0            AF=1

.model MJE340 NPN
+ IS=1.03431e-13   BF=172.974         NF=0.939811     VAF=27.3487
+ IKF=0.0260146    ISE=4.48447e-11    NE=1.61605      BR=16.6725
+ NR=0.796984      VAR=6.11596        IKR=0.10004     ISC=9.99914e-14
+ NC=1.99995       RB=1.47761         IRB=0.2         RBM=1.47761
+ RE=0.0001        RC=1.42228         XTB=2.70726     XTI=1
+ EG=1.206         CJE=1e-11          VJE=0.75        MJE=0.33
+ TF=1e-09         XTF=1             VTF=10          ITF=0.01
+ CJC=1e-11        VJC=0.75           MJC=0.33        XCJC=0.9
+ FC=0.5           CJS=0             VJS=0.75        MJS=0.5
+ TR=1e-07         PTF=0             KF=0            AF=1

.model MJE350 PNP
+ IS=6.01619e-15   BF=157.387         NF=0.910131     VAF=23.273
+ IKF=0.0564808    ISE=4.48479e-12    NE=1.58557      BR=0.1
+ NR=1.03823       VAR=4.14543        IKR=0.0999978   ISC=1.00199e-13
+ NC=1.98851       RB=0.1            IRB=0.202965    RBM=0.1
+ RE=0.0710678     RC=0.355339        XTB=1.03638     XTI=3.8424
+ EG=1.206         CJE=1e-11          VJE=0.75        MJE=0.33
+ TF=1e-09         XTF=1             VTF=10          ITF=0.01
+ CJC=1e-11        VJC=0.75           MJC=0.33        XCJC=0.9
+ FC=0.5           CJS=0             VJS=0.75        MJS=0.5
+ TR=1e-07         PTF=0             KF=0            AF=1

.model MJ15003 NPN
+ IS=1e-09         BF=226.431         NF=0.85          VAF=43.4348
+ IKF=10           ISE=1e-08          NE=1.79698      BR=1.65466
+ NR=1.5           VAR=434.348        IKR=4.42319     ISC=5.49997e-09
+ NC=3.18751       RB=43.922         IRB=0.1         RBM=0.1
+ RE=0.0001        RC=0.20765        XTB=0.746102    XTI=1

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+ EG=1.05          CJE=9.62276e-08    VJE=0.505131    MJE=0.650363
+ TF=9.99972e-09   XTF=1.35733        VTF=0.996711    ITF=0.999802
+ CJC=1.22855e-09  VJC=0.95          MJC=0.23        XCJC=0.803115
+ FC=0.638728      CJS=0             VJS=0.75        MJS=0.5
+ TR=1e-07         PTF=0             KF=0            AF=1

.model MJ15004 PNP
+ IS=1e-09          BF=226.431          NF=0.85          VAF=43.4348
+ IKF=10            ISE=1e-08          NE=1.79698       BR=1.65466
+ NR=1.5            VAR=434.348        IKR=4.42319      ISC=5.49997e-09
+ NC=3.18751        RB=43.922          IRB=0.1          RBM=0.1
+ RE=0.0001         RC=0.20765         XTB=0.746102     XTI=1
+ EG=1.05          CJE=9.99946e-08    VJE=0.4          MJE=0.658304
+ TF=9.99976e-09   XTF=1.3573        VTF=0.996475     ITF=0.99985
+ CJC=1.22854e-09  VJC=0.95          MJC=0.23        XCJC=0.803124
+ FC=0.761291      CJS=0             VJS=0.75        MJS=0.5
+ TR=1e-07         PTF=0             KF=0            AF=1

.model MUR1560 D
+ IS=1.22946e-07   RS=0.0276435       N=2              EG=1.3
+ XTI=4            BV=600             IBV=0.00001      CJO=5.43205e-10
+ VJ=0.4           M=0.373483        FC=0.5           TT=7.14134e-08
+ KF=0            AF=1

.model 1N4002 D
+ IS=1.22478e-08   RS=0.0414786       N=1.83369        EG=0.6
+ XTI=0.05         BV=100             IBV=5e-08        CJO=1e-11
+ VJ=0.7           M=0.5              FC=0.5           TT=1e-09
+ KF=0            AF=1

.model 1N5402 D
+ IS=2.61339e-12   RS=0.0110501       N=1.20576        EG=0.6
+ XTI=3.1271       BV=200             IBV=1e-05        CJO=1e-11
+ VJ=0.7           M=0.5              FC=0.5           TT=1e-09
+ KF=0            AF=1

.model 1N4004 D
+ IS=76.9p         RS=42m             N=1.45           EG=1.11
+ XTI=3.0          BV=400             IBV=5u           CJO=39.8p
+ VJ=0.7           M=0.333           FC=0.5           TT=4.32u
+ KF=0            AF=1

.model D10A04 D
+ IS=844n          RS=2.06m           N=2.06           EG=1.1
+ XTI=3.0          BV=400             IBV=10.0u        CJO=277p
+ VJ=0.7           M=0.333           FC=0.5           TT=4.32u
+ KF=0            AF=1

.model RELAY_24V SW
+ VT=24           VH=0              RON=0.001         ROFF=10000k

.model 1N5400 D
+ IS=63n           RS=14.1m           N=1.7            EG=1.11
+ XTI=3.0          BV=50              IBV=10u          CJO=125p
+ VJ=0.7           M=0.5              FC=0.5           TT=4.32u
+ KF=0            AF=1

.model 1N4740 D

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```
+ Is=2.91E-15      N=1.27      Rs=2.71      Cj0=6.89E-11
+ Vj=0.75          M=0.33      Fc=0.5       Tt=5.01E-8
+ Bv=9.937         Ibv=0.025   Af=1        Kf=0

.model 1N4738 D
+ Is=1.06E-15      N=1.27      Rs=1.41      Cj0=9.28E-11
+ Vj=0.75          M=0.33      Fc=0.5       Tt=5.01E-8
+ Bv=8.16          Ibv=0.031   Af=1        Kf=0

.model BC547B NPN
+ IS=7.443e-11     BF=1343.59    NF=1.42606    VAF=80.4901
+ IKF=0.427163     ISE=2.4623e-10    NE=2.73946    BR=62.79
+ NR=1.5           VAR=1.0092    IKR=4.27163    ISC=2.4623e-10
+ NC=1.9119        RB=0.1      IRB=0.1       RBM=0.1
+ RE=0.579065      RC=3.01102   XTB=0.1       XTI=2.25359
+ EG=1.05          CJE=7.34106e-12 VJE=0.586136  MJE=0.33309
+ TF=5.7202e-10    XTF=4.45797  VTF=26.03     ITF=0.487193
+ CJC=4.04665e-12  VJC=0.95     MJC=0.343664  XCJC=0.799994
+ FC=0.8           CJS=0        VJS=0.75     MJS=0.5
+ TR=1e-07         PTF=0        KF=0          AF=1

.model BC557B PNP
+ IS=1.68077e-12   BF=3385      NF=1.2121     VAF=196.745
+ IKF=1.30809      ISE=1.76095e-13 NE=1.56412    BR=99.5231
+ NR=1.23271       VAR=0.978236 IKR=10         ISC=1.76095e-13
+ NC=1.21727       RB=17.2944   IRB=0.1       RBM=0.1
+ RE=0.354597      RC=1.77298   XTB=0.100946  XTI=1
+ EG=1.05          CJE=1.13417e-11 VJE=0.654776  MJE=0.23
+ TF=5.99604e-10   XTF=1000     VTF=3935.03   ITF=31.8969
+ CJC=9.54039e-12  VJC=0.4      MJC=0.408114  XCJC=0.910091
+ FC=0.8           CJS=0        VJS=0.75     MJS=0.5
+ TR=1e-07         PTF=0        KF=0          AF=1

.model BD139 NPN
+ IS=1e-09          BF=222.664    NF=0.85       VAF=36.4079
+ IKF=0.166126     ISE=5.03418e-09 NE=1.45313    BR=1.35467
+ NR=1.33751       VAR=142.931   IKR=1.66126   ISC=5.02557e-09
+ NC=3.10227       RB=26.9143   IRB=0.1       RBM=0.1
+ RE=0.000472454   RC=1.04109   XTB=0.727762  XTI=1.04311
+ EG=1.05          CJE=1e-11     VJE=0.75      MJE=0.33
+ TF=1e-09         XTF=1         VTF=10        ITF=0.01
+ CJC=1e-11        VJC=0.75     MJC=0.33      XCJC=0.9
+ FC=0.5           CJS=0        VJS=0.75     MJS=0.5
+ TR=1e-07         PTF=0        KF=0          AF=1

.model TIP31A NPN
+ IS=1e-09          BF=3656.16    NF=1.23899    VAF=10
+ IKF=0.0333653    ISE=1e-08     NE=2.29374    BR=0.1
+ NR=1.5           VAR=100       IKR=0.333653  ISC=1e-08
+ NC=1.75728       RB=6.15083   IRB=100       RBM=0.00113049
+ RE=0.0001        RC=0.0491489 XTB=50        XTI=1
+ EG=1.05          CJE=3.26475e-10 VJE=0.446174  MJE=0.464221
+ TF=2.06218e-09   XTF=15.0842  VTF=25.7317   ITF=0.001
+ CJC=3.07593e-10  VJC=0.775484 MJC=0.476498  XCJC=0.750493
+ FC=0.796407      CJS=0        VJS=0.75     MJS=0.5
+ TR=9.57121e-06   PTF=0        KF=0          AF=1
```

\*XX

\* 10K-LIN Sub-Circuit  
 \* Created: Sunday, November 28, 2010 20:39:02

```
.subckt 10K-LIN 1 2 3
*
*      |   |   |
*      |   +--- Ground
*      | +----- Output
*      +----- Input
```

```
*-----*
* Core of 10K-LIN Sub-Circuit
*-----*
* REFDES      | Net          | Net          | Net          | Net          | Net          | Part Values/Models/Parameters
*-----+-----+-----+-----+-----+-----+
R1             2             1             5k
R2             2             3             5k
```

```
*-----*
* End of 10K-LIN Sub-Circuit
*-----*

.ends
```

```
*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

\* 4558 Sub-Circuit  
 \* Created: Sunday, November 28, 2010 20:39:02

```
.subckt 4558 1 2 3 4 5
*
*      |   |   |   |
*      |   +--- output
*      | +----- negative supply
*      | +----- positive supply
*      | +----- inverting input
*      +----- non-inverting input
```

```
*-----*
* Internal Part Models of 4558 Sub-Circuit
*-----*
```

```
.model qnpn NPN
+ IS=7.443e-11      BF=1343.59      NF=1.42606      VAF=80.4901
+ IKF=0.427163     ISE=2.4623e-10  NE=2.73946     BR=62.79
+ NR=1.5           VAR=1.0092      IKR=4.27163     ISC=2.4623e-10
+ NC=1.9119        RB=0.1          IRB=0.1         RBM=0.1
+ RE=0.579065      RC=3.01102      XTB=0.1         XTI=2.25359
+ EG=1.05          CJE=7.34106e-12    VJE=0.586136    MJE=0.33309
+ TF=5.7202e-10    XTF=4.45797      VTF=26.03       ITF=0.487193
+ CJC=4.04665e-12  VJC=0.95         MJC=0.343664    XCJC=0.799994
+ FC=0.8           CJS=0            VJS=0.75        MJS=0.5
+ TR=1e-07         PTF=0           KF=0            AF=1
```

```
.model qpnp PNP
+ IS=1.68077e-12    BF=3385          NF=1.2121      VAF=196.745
+ IKF=1.30809      ISE=1.76095e-13  NE=1.56412     BR=99.5231
```

```

+ NR=1.23271      VAR=0.978236      IKR=10      ISC=1.76095e-13
+ NC=1.21727      RB=17.2944      IRB=0.1      RBM=0.1
+ RE=0.354597     RC=1.77298      XTB=0.100946  XTI=1
+ EG=1.05         CJE=1.13417e-11    VJE=0.654776  MJE=0.23
+ TF=5.99604e-10  XTF=1000      VTF=3935.03   ITF=31.8969
+ CJC=9.54039e-12 VJC=0.4       MJC=0.408114  XCJC=0.910091
+ FC=0.8         CJS=0         VJS=0.75      MJS=0.5
+ TR=1e-07       PTF=0         KF=0          AF=1

```

```

*-----*
* End of Internal Part Models
*-----*

```

```

*-----*
* Core of 4558 Sub-Circuit
*-----*
* REFDES      | Net      | Net      | Net      | Net      | Net      | Part Values/Models/Parameters
*-----*

```

```

C701          net2      net10      270p
Q701          net2      1          net1      qnpn
Q702          net3      2          net1      qnpn
Q703          net3      net3      net5      qnpn
Q704          net2      net3      net4      qnpn
Q705          net7      net6      3          qnpn
Q706          net1      net7      net6      qnpn
Q707          3          net2      net8      qnpn
Q708          net10     net8      net9      qnpn
Q709          net15     net14     net10     qnpn
Q710          net12     net15     net14     qnpn
Q711          net13     net11     3          qnpn
Q712          net12     net13     net11     qnpn
Q713          3          net12     net16     qnpn
Q714          4          net10     net17     qnpn
R701          4          net4      60
R702          4          net5      60
R703          net7      4          500k
R704          net6      3          530
R705          4          net8      860
R706          4          net9      60
R707          net15     net12     960
R708          net10     net14     390
R709          4          net13     220k
R710          net11     3          220
R711          5          net16     100
R712          net17     5          100

```

```

*-----*
* End of 4558 Sub-Circuit
*-----*

```

```

.ends
*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

```

*-----*
* Main Circuit
*-----*
*

```

\* Cautions!

\* Some components are disabled with the associated nets also renamed with suffix (\_) (unless the associated nets being marked as common nets, e.g. 0/GND).

\*

\*-----+-----+-----+-----+-----+-----+-----\*

* REFDES	Net	Net	Net	Net	Net	Part Values/Models/Parameters
----------	-----	-----	-----	-----	-----	-------------------------------

\*-----+-----+-----+-----+-----+-----+-----\*

C101_1	vs	vref				100u
C101_2	vs	vref				33u
C102	nfb1	nfbn1				1000u
C103	nfb2	nfbn2				1000u
C104	diff_load_p	drv1_p				20p
C105	diff_load_n	drv1_n				20p
C106	out	sp_out				0.012u
C107	rco	sp_out				0.082u
* C1101_1	vs_	vref_				100u
* C1101_2	vs_	vref_				33u
* C1102	nfb1_	nfbn1_				1000u
* C1103	nfb2_	nfbn2_				1000u
* C1104	diff_load_p_	drv1_p_				20p
* C1105	diff_load_n_	drv1_n_				20p
* C1106	out_	sp_out_				0.012u
* C1107	rco_	sp_out_				0.082u
* C1201	hbtal_p_	hbtdrv_p_				330p
* C1202	lfindn_p_	rail_vcc_p				10u
* C1301	hbtal_n_	hbtdrv_n_				330p
* C1302	rail_vcc_n_	lfindp_n_				10u
C201	hbtal_p	hbtdrv_p				330p
C202	lfindn_p	rail_vcc_p				10u
C301	hbtal_n	hbtdrv_n				330p
C302	rail_vcc_n	lfindp_n				10u
C401	vac_lb_1	ul_vcc_p				0.01u
C402	vac_lb_2	ul_vcc_p				0.01u
C403	ul_vcc_n	vac_lb_1				0.01u
C404	ul_vcc_n	vac_lb_2				0.01u
C405_1	ul_vcc_p	0				6800u
C405_2	ul_vcc_p	0				6800u
C405_3	ul_vcc_p	0				6800u
C406_1	0	ul_vcc_n				6800u
C406_2	0	ul_vcc_n				6800u
C406_3	0	ul_vcc_n				6800u
C407	vac_l_1	lb_vcc_p				0.012u
C408	vac_l_2	lb_vcc_p				0.012u
C409	lb_vcc_n	vac_l_1				0.012u
C410	lb_vcc_n	vac_l_2				0.012u
C411	lb_vcc_p	0				10000u
C412	0	lb_vcc_n				10000u
C413	vac_r_1	rail_vcc_p				0.033u
C414	vac_r_2	rail_vcc_p				0.033u
C415	rail_vcc_n	vac_r_1				0.033u
C416	rail_vcc_n	vac_r_2				0.033u
C417_1	rail_vcc_p	0				10000u
C417_2	rail_vcc_p	0				10000u
C417_3	rail_vcc_p	0				10000u
C418_1	0	rail_vcc_n				10000u
C418_2	0	rail_vcc_n				10000u
C418_3	0	rail_vcc_n				10000u

C419	rbt_p	0	2.2u
C420	rbtdrv_p	rbts_p	330p
C421	lift_vcc_p	0	10000u
C422	0	rbt_n	2.2u
C423	rbts_n	rbtdrv_n	330p
C424	0	lift_vcc_n	10000u
C425	umr_vcc	0	2200u
C426	vac_op_1	uop_vcc_p	3300p
C427	uop_vcc_n	vac_op_1	3300p
C428	vac_op_2	uop_vcc_p	3300p
C429	uop_vcc_n	vac_op_2	3300p
C430	uop_vcc_p	0	2200u
C431	0	uop_vcc_n	2200u
C432	orb_p	0	10u
C433	op_vcc_p	0	1000u
C434	0	orb_n	10u
C435	0	op_vcc_n	1000u
C436	mrb	0	100u
C437	m_vcc	0	3300u
C438	vcc_rl_p	vcc_rl_n	2200u
C439	srh	vcc_rl_n	47u
C501	vin_plt	blainvp_a	22u
C502	blainvp_a	vin_nlt	22u
C503	blaout_b	preout_a	22u
C504	pctlin_p_a	pctlninvp_a	22u
C505	pctlinvp_a	pctlin_n_a	22u
C506	m_vcc	laout_a	10u
C601	vin_p2t	blainvp_b	22u
C602	blainvp_b	vin_n2t	22u
C603	blaout_b	preout_b	22u
C604	pctlin_p_b	pctlninvp_b	22u
C605	pctlinvp_b	pctlin_n_b	22u
C606	m_vcc	laout_b	10u
D101	drv1_p	tb1	1N4004
D102	tb1	tb2	1N4004
D103	tb2	tb3	1N4004
D104	tb3	tb4	1N4004
D105	tb4	tb5	1N4004
D106	tb5	drv1_n	1N4004
D107	drv_p	olsl_p	1N4004
D108	olsl_n	drv_n	1N4004
D109	out	lift_p	1N5402
D110	lift_n	out	1N5402
* D1101	drv1_p_	tb1_	1N4004
* D1102	tb1_	tb2_	1N4004
* D1103	tb2_	tb3_	1N4004
* D1104	tb3_	tb4_	1N4004
* D1105	tb4_	tb5_	1N4004
* D1106	tb5_	drv1_n_	1N4004
* D1107	drv_p_	olsl_p_	1N4004
* D1108	olsl_n_	drv_n_	1N4004
* D1109	out_	lift_p_	1N5402
* D1110	lift_n_	out_	1N5402
* D1201	hbtnfb_p_	hbtref_p_	1N4004
* D1202	0	hbtref_p_	1N4004
* D1203	lift_p_	hbtnfbt_p_	1N4004
* D1204	rail_vcc_p	lift_p_	MUR1560
* D1205	0	lift_p_	1N5402



* D1301	hbtref_n_	hbtnfb_n_		1N4004
* D1302	hbtref_n_	0		1N4004
* D1303	hbtnfbt_n_	lift_n_		1N4004
* D1304	lift_n_	rail_vcc_n		MUR1560
* D1305	lift_n_	0		1N5402
D201	hbtnfb_p	hbtref_p		1N4004
D202	0	hbtref_p		1N4004
D203	lift_p	hbtnfbt_p		1N4004
D204	rail_vcc_p	lift_p		MUR1560
D205	0	lift_p		1N5402
D206	lfindp_p	lfindn_p		BLUE_LED
D301	hbtref_n	hbtnfb_n		1N4004
D302	hbtref_n	0		1N4004
D303	hbtnfbt_n	lift_n		1N4004
D304	lift_n	rail_vcc_n		MUR1560
D305	lift_n	0		1N5402
D306	lfindp_n	lfindn_n		BLUE_LED
D401	vac_lb_1	ul_vcc_p		D10A04
D402	vac_lb_2	ul_vcc_p		D10A04
D403	ul_vcc_n	vac_lb_1		D10A04
D404	ul_vcc_n	vac_lb_2		D10A04
D405	vac_l_1	lb_vcc_p		D10A04
D406	vac_l_2	lb_vcc_p		D10A04
D407	lb_vcc_n	vac_l_1		D10A04
D408	lb_vcc_n	vac_l_2		D10A04
D409	lb_vcc_p	lift_vcc_p		D10A04
D410	lift_vcc_n	lb_vcc_n		D10A04
D411	vac_r_1	rail_vcc_p		D10A04
D412	vac_r_2	rail_vcc_p		D10A04
D413	rail_vcc_n	vac_r_1		D10A04
D414	rail_vcc_n	vac_r_2		D10A04
D415	lift_vcc_p	rbt_p		1N4004
D416	rbt_n	lift_vcc_n		1N4004
D417	vac_m_1	umr_vcc		1N5400
D418	vac_m_2	umr_vcc		1N5400
D419	vac_op_1	uop_vcc_p		1N4002
D420	vac_op_2	uop_vcc_p		1N4002
D421	uop_vcc_n	vac_op_1		1N4002
D422	uop_vcc_n	vac_op_2		1N4002
D423	0	orz_p		1N4740
D424	orz_n	0		1N4740
D425	0	mrz_p		1N4738
D426	vac_m_1	vcc_rl_p		1N4002
D427	vac_m_2	vcc_rl_p		1N4002
D428	vcc_rl_n	vac_m_1		1N4002
D429	vcc_rl_n	vac_m_2		1N4002
D430	vcc_rl_n	srz		1N4740
D431	srh	vcc_rl_p		1N4002
D432	srl	vcc_rl_p		1N4002
D501	sled_a	0		GREEN_LED
D601	sled_b	0		GREEN_LED
D701	pled	0		RED_LED
L101	out	sp_out		4.5uH
* L1101	out_	sp_out_		4.5uH
L401	0	SYSGND		15uH
Q101	diff_load_p	vref	dcmr_p	BF422
Q102	offset_null_p	nfb2	dcmr_p	BF422
Q103	diff_load_n	vref	dcmr_n	BF423

Q104	offset_null_n	nfb2	dcmr_n	BF423
Q105	offset_null_p	offset_null_p	lift_vcc_p	BF423
Q106	diff_load_p	offset_null_p	lift_vcc_p	BF423
Q107	offset_null_n	offset_null_n	lift_vcc_n	BF422
Q108	diff_load_n	offset_null_n	lift_vcc_n	BF422
Q109	dmref_p	dmfb_p	lift_vcc_n	BF422
Q110	mirror_p	dmref_p	dmfb_p	BF422
* Q1101	diff_load_p_	vref_	dcmr_p_	BF422
* Q1102	offset_null_p_	nfb2_	dcmr_p_	BF422
* Q1103	diff_load_n_	vref_	dcmr_n_	BF423
* Q1104	offset_null_n_	nfb2_	dcmr_n_	BF423
* Q1105	offset_null_p_	offset_null_p_	lift_vcc_p	BF423
* Q1106	diff_load_p_	offset_null_p_	lift_vcc_p	BF423
* Q1107	offset_null_n_	offset_null_n_	lift_vcc_n	BF422
* Q1108	diff_load_n_	offset_null_n_	lift_vcc_n	BF422
* Q1109	dmref_p_	dmfb_p_	lift_vcc_n	BF422
Q111	dmref_n	dmfb_n	lift_vcc_p	BF423
* Q1110	mirror_p_	dmref_p_	dmfb_p_	BF422
* Q1111	dmref_n_	dmfb_n_	lift_vcc_p	BF423
* Q1112	mirror_n_	dmref_n_	dmfb_n_	BF423
* Q1113	drv1_p_	diff_load_p_	sfb_p_	MJE350
* Q1114	drv1_n_	diff_load_n_	sfb_n_	MJE340
* Q1115	ols1_p_	ols_p_	out_	MJE340
* Q1116	ols1_n_	ols_n_	out_	MJE350
* Q1117	lift_p_	drv_p_	pbff_p_	MJE340
* Q1118	lift_n_	drv_n_	pbff_n_	MJE350
* Q1119_1	lift_p_	pbff_p_	buffer_p_	MJE340
* Q1119_2	lift_p_	pbff_p_	buffer_p_	MJE340
* Q1119_3	lift_p_	pbff_p_	buffer_p_	MJE340
Q112	mirror_n	dmref_n	dmfb_n	BF423
* Q1120_1	lift_n_	pbff_n_	buffer_n_	MJE350
* Q1120_2	lift_n_	pbff_n_	buffer_n_	MJE350
* Q1120_3	lift_n_	pbff_n_	buffer_n_	MJE350
* Q1121_1	lift_p_	buffer_p_	vep_p_1_	MJ15003
* Q1121_2	lift_p_	buffer_p_	vep_p_2_	MJ15003
* Q1121_3	lift_p_	buffer_p_	vep_p_3_	MJ15003
* Q1121_4	lift_p_	buffer_p_	vep_p_4_	MJ15003
* Q1121_5	lift_p_	buffer_p_	vep_p_5_	MJ15003
* Q1121_6	lift_p_	buffer_p_	vep_p_6_	MJ15003
* Q1122_1	lift_n_	buffer_n_	vep_n_1_	MJ15004
* Q1122_2	lift_n_	buffer_n_	vep_n_2_	MJ15004
* Q1122_3	lift_n_	buffer_n_	vep_n_3_	MJ15004
* Q1122_4	lift_n_	buffer_n_	vep_n_4_	MJ15004
* Q1122_5	lift_n_	buffer_n_	vep_n_5_	MJ15004
* Q1122_6	lift_n_	buffer_n_	vep_n_6_	MJ15004
Q113	drv1_p	diff_load_p	sfb_p	MJE350
Q114	drv1_n	diff_load_n	sfb_n	MJE340
Q115	ols1_p	ols_p	out	MJE340
Q116	ols1_n	ols_n	out	MJE350
Q117	lift_p	drv_p	pbff_p	MJE340
Q118	lift_n	drv_n	pbff_n	MJE350
Q119_1	lift_p	pbff_p	buffer_p	MJE340
Q119_2	lift_p	pbff_p	buffer_p	MJE340
Q119_3	lift_p	pbff_p	buffer_p	MJE340
* Q1201	hrtlmr_p_	hrtlmf_p_	lift_p_	BF423
* Q1202	hrtlmc_p_	hrtlmf_p_	hrtlmr_p_	MJE350
* Q1203	hrtls_p_	hrtlsb_p_	vep_p_1_	BF422
* Q1204	hbtal_p_	hbtref_p_	hbtnfb_p_	BF422

* Q1205	hbtamr_p_	hbtamf_p_	0	BF422
* Q1206	hbtmrr_p_	hbtamr_p_	hbtamf_p_	MJE340
* Q1207	hbtdrv_p_	hbtal_p_	hbtsfb_p_	MJE350
* Q1208_1	hbt_buffer_p_	hbtdrv_p_	lift_p_	MJE340
* Q1208_2	hbt_buffer_p_	hbtdrv_p_	lift_p_	MJE340
* Q1208_3	hbt_buffer_p_	hbtdrv_p_	lift_p_	MJE340
* Q1209_1	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
* Q1209_2	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
* Q1209_3	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
* Q1209_4	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
* Q1209_5	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
* Q1209_6	lift_p_	hbt_buffer_p_	lift_vcc_p	MJ15004
Q120_1	lift_n	pbff_n	buffer_n	MJE350
Q120_2	lift_n	pbff_n	buffer_n	MJE350
Q120_3	lift_n	pbff_n	buffer_n	MJE350
* Q1210	lfindn_p_	lfindb_p_	rail_vcc_p	BF422
Q121_1	lift_p	buffer_p	vep_p_1	MJ15003
Q121_2	lift_p	buffer_p	vep_p_2	MJ15003
Q121_3	lift_p	buffer_p	vep_p_3	MJ15003
Q121_4	lift_p	buffer_p	vep_p_4	MJ15003
Q121_5	lift_p	buffer_p	vep_p_5	MJ15003
Q121_6	lift_p	buffer_p	vep_p_6	MJ15003
Q122_1	lift_n	buffer_n	vep_n_1	MJ15004
Q122_2	lift_n	buffer_n	vep_n_2	MJ15004
Q122_3	lift_n	buffer_n	vep_n_3	MJ15004
Q122_4	lift_n	buffer_n	vep_n_4	MJ15004
Q122_5	lift_n	buffer_n	vep_n_5	MJ15004
Q122_6	lift_n	buffer_n	vep_n_6	MJ15004
* Q1301	hrtlmr_n_	hrtlmf_n_	lift_n_	BF422
* Q1302	hrtlmc_n_	hrtlmr_n_	hrtlmf_n_	MJE340
* Q1303	hrtls_n_	hrtlsb_n_	vep_n_1	BF423
* Q1304	hbtal_n_	hbtref_n_	hbtnfb_n_	BF423
* Q1305	hbtamr_n_	hbtamf_n_	0	BF423
* Q1306	hbtmrr_n_	hbtamr_n_	hbtamf_n_	MJE350
* Q1307	hbtdrv_n_	hbtal_n_	hbtsfb_n_	MJE340
* Q1308_1	hbt_buffer_n_	hbtdrv_n_	lift_n_	MJE350
* Q1308_2	hbt_buffer_n_	hbtdrv_n_	lift_n_	MJE350
* Q1308_3	hbt_buffer_n_	hbtdrv_n_	lift_n_	MJE350
* Q1309_1	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1309_2	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1309_3	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1309_4	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1309_5	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1309_6	lift_n_	hbt_buffer_n_	lift_vcc_n	MJ15003
* Q1310	lfindp_n_	lfindb_n_	rail_vcc_n	BF423
Q201	hrtlmr_p	hrtlmf_p	lift_p	BF423
Q202	hrtlmc_p	hrtlmr_p	hrtlmf_p	MJE350
Q203	hrtls_p	hrtlsb_p	vep_p_1	BF422
Q204	hbtal_p	hbtref_p	hbtnfb_p	BF422
Q205	hbtamr_p	hbtamf_p	0	BF422
Q206	hbtmrr_p	hbtamr_p	hbtamf_p	MJE340
Q207	hbtdrv_p	hbtal_p	hbtsfb_p	MJE350
Q208_1	hbt_buffer_p	hbtdrv_p	lift_p	MJE340
Q208_2	hbt_buffer_p	hbtdrv_p	lift_p	MJE340
Q208_3	hbt_buffer_p	hbtdrv_p	lift_p	MJE340
Q209_1	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004
Q209_2	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004
Q209_3	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004

Q209_4	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004
Q209_5	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004
Q209_6	lift_p	hbt_buffer_p	lift_vcc_p	MJ15004
Q210	lfindn_p	lfindb_p	rail_vcc_p	BF422
Q301	hrtlmr_n	hrtlmf_n	lift_n	BF422
Q302	hrtlmc_n	hrtlmr_n	hrtlmf_n	MJE340
Q303	hrtls_n	hrtlsb_n	vep_n_l	BF423
Q304	hbtal_n	hbtref_n	hbtnfb_n	BF423
Q305	hbtamr_n	hbtamf_n	0	BF423
Q306	hbtmrr_n	hbtamr_n	hbtamf_n	MJE350
Q307	hbtdrv_n	hbtal_n	hbtsfb_n	MJE340
Q308_1	hbt_buffer_n	hbtdrv_n	lift_n	MJE350
Q308_2	hbt_buffer_n	hbtdrv_n	lift_n	MJE350
Q308_3	hbt_buffer_n	hbtdrv_n	lift_n	MJE350
Q309_1	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q309_2	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q309_3	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q309_4	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q309_5	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q309_6	lift_n	hbt_buffer_n	lift_vcc_n	MJ15003
Q310	lfindp_n	lfindb_n	rail_vcc_n	BF423
Q401	rptl_p	rpts_p	rptsfb_p	BF422
Q402	rpto_p	rptl_p	ul_vcc_p	BF423
Q403	rbtdrv_p	rbts_p	lift_vcc_p	BF422
Q404	rdrv_p	rdiff_p	rsfb_p	BF423
Q405	rbff_p	rdrv_p	rpb_p	MJE340
Q406	rbff_p	rpb_p	lift_vcc_p	MJE340
Q407	lift_vcc_p	rbff_p	ul_vcc_p	MJ15004
Q408	rptl_n	rpts_n	rptsfb_n	BF423
Q409	rpto_n	rptl_n	ul_vcc_n	BF422
Q410	rbtdrv_n	rbts_n	lift_vcc_n	BF423
Q411	rdrv_n	rdiff_n	rsfb_n	BF422
Q412	rbff_n	rdrv_n	rpb_n	MJE350
Q413	rbff_n	rpb_n	lift_vcc_n	MJE350
Q414	lift_vcc_n	rbff_n	ul_vcc_n	MJ15003
Q415	uop_vcc_p	ordrv_p	orbff_p	BC547B
Q416	ordrv_p	oradj_p	orz_p	BC547B
Q417	uop_vcc_p	orbff_p	op_vcc_p	MJE340
Q418	uop_vcc_n	ordrv_n	orbff_n	BC557B
Q419	ordrv_n	oradj_n	orz_n	BC557B
Q420	uop_vcc_n	orbff_n	op_vcc_n	MJE350
Q421	umr_vcc	mrdrv_p	mrbbff_p	BD139
Q422	mrdrv_p	mradj_p	mrz_p	BC547B
Q423	umr_vcc	mrbbff_p	m_vcc	TIP31A
Q424	vcc_rl_p	srhb	srbbff	BD139
Q425	srl	srb	vcc_rl_n	TIP31A
Q501	ladrv_a	lat_a	SYSGND	BC547B
Q502	laout_a	lab_a	m_vcc	BC557B
Q601	ladrv_b	lat_b	SYSGND	BC547B
Q602	laout_b	lab_b	m_vcc	BC557B
R101	volout_a	vs		2.7k
R102_1	t2	vs		180
R102_2	SYSGND	t2		4.7
R103_1	SYSGND	t3		15k
R103_2	t3	vref		1k
R104_1	nfb1	out		8.2k
R104_2	nfb1	out		330k
R105	SYSGND	nfbn1		120

R106_1	nfb2	nfb1	8.2k
R106_2	nfb2	nfb1	330k
R107	SYSGND	nfbn2	120
R108	dcmr_n	mirror_n	4.7k
R109	dcmr_p	mirror_p	4.7k
* R1101	volout_a_	vs_	2.7k
* R1102_1	t2_	vs_	180
* R1102_2	SYSGND	t2_	4.7
* R1103_1	SYSGND	t3_	15k
* R1103_2	t3_	vref_	1k
* R1104_1	nfb1_	out_	8.2k
* R1104_2	nfb1_	out_	330k
* R1105	SYSGND	nfbn1_	120
* R1106_1	nfb2_	nfb1_	8.2k
* R1106_2	nfb2_	nfb1_	330k
* R1107	SYSGND	nfbn2_	120
* R1108	dcmr_n_	mirror_n_	4.7k
* R1109	dcmr_p_	mirror_p_	4.7k
R110_1	t4	SYSGND	15k
R110_2	dmref_p	t4	1k
* R1110_1	t4_	SYSGND	15k
* R1110_2	dmref_p_	t4_	1k
* R1111_1	t5_	dmfb_p_	120
* R1111_2	lift_vcc_n	t5_	3.9
* R1112_1	SYSGND	t6_	15k
* R1112_2	dmref_n_	t6_	1k
* R1113_1	t7_	dmfb_n_	120
* R1113_2	t7_	lift_vcc_p	3.9
* R1114_1	sfb_p_	lift_vcc_p	56
* R1114_2	sfb_p_	lift_vcc_p	820
* R1115	drv1_n_	drv1_p_	680
* R1116_1	lift_vcc_n	sfb_n_	820
* R1116_2	lift_vcc_n	sfb_n_	56
* R1117	drv1_p_	drv_p_	270
* R1118	ols_p_	vep_p_1_	3.3k
* R1119	out_	ols_p_	2.7k
R111_1	t5	dmfb_p	120
R111_2	lift_vcc_n	t5	3.9
* R1120	drv1_n_	drv_n_	270
* R1121	ols_n_	vep_n_1_	3.3k
* R1122	ols_n_	out_	2.7k
* R1123	out_	pbff_p_	200
* R1124	pbff_n_	out_	200
* R1125_1	buffer_p_	t8_	120
* R1125_2	t8_	out_	6.8
* R1126_1	buffer_n_	t9_	120
* R1126_2	t9_	out_	6.8
* R1127_11	out_	vep_p_1_	0.33
* R1127_12	out_	vep_p_1_	0.33
* R1127_21	out_	vep_p_2_	0.33
* R1127_22	out_	vep_p_2_	0.33
* R1127_31	out_	vep_p_3_	0.33
* R1127_32	out_	vep_p_3_	0.33
* R1127_41	out_	vep_p_4_	0.33
* R1127_42	out_	vep_p_4_	0.33
* R1127_51	out_	vep_p_5_	0.33
* R1127_52	out_	vep_p_5_	0.33
* R1127_61	out_	vep_p_6_	0.33

* R1127_62	out_	vep_p_6_	0.33
* R1128_11	out_	vep_n_1_	0.33
* R1128_12	out_	vep_n_1_	0.33
* R1128_21	out_	vep_n_2_	0.33
* R1128_22	out_	vep_n_2_	0.33
* R1128_31	out_	vep_n_3_	0.33
* R1128_32	out_	vep_n_3_	0.33
* R1128_41	out_	vep_n_4_	0.33
* R1128_42	out_	vep_n_4_	0.33
* R1128_51	out_	vep_n_5_	0.33
* R1128_52	out_	vep_n_5_	0.33
* R1128_61	out_	vep_n_6_	0.33
* R1128_62	out_	vep_n_6_	0.33
* R1129	out_	sp_out_	0.56
R112_1	SYSGND	t6	15k
R112_2	dmref_n	t6	1k
* R1130	0	rco_	27
R113_1	t7	dmfb_n	120
R113_2	t7	lift_vcc_p	3.9
R114_1	sfb_p	lift_vcc_p	56
R114_2	sfb_p	lift_vcc_p	820
R115	drv1_n	drv1_p	680
R116_1	lift_vcc_n	sfb_n	820
R116_2	lift_vcc_n	sfb_n	56
R117	drv1_p	drv_p	270
R118	ols_p	vep_p_1	3.3k
R119	out	ols_p	2.7k
R120	drv1_n	drv_n	270
* R1201	0	hrtlmr_p_	10k
* R1202	lift_p_	hrtlmf_p_	180
* R1203	hrtlmc_p_	hrtls_p_	2.7k
* R1204	hrtlsb_p_	hrtls_p_	2.7k
* R1205	out_	hrtlsb_p_	6.8k
* R1206	hrtls_p_	hbtref_p_	10k
* R1207	hbtnfbt_p_	hbtnfb_p_	750
* R1208	hbtamr_p_	hbtdrv_p_	10k
* R1209	0	hbtamf_p_	180
R121	ols_n	vep_n_1	3.3k
* R1210	hbtnfb_p_	hbtmrr_p_	2.7k
* R1211	hbtal_p_	lift_vcc_p	2.7k
* R1212	lift_vcc_p	hbtsfb_p_	27
* R1213	lift_p_	hbtdrv_p_	120
* R1214	lift_vcc_p	hbt_buffer_p_	120
* R1215	0	lift_p_	27k
* R1216	lift_p_	lfindb_p_	39k
* R1217	rail_vcc_p	lfindb_p_	15k
* R1218	lfindn_p_	lfindp_p_	22k
* R1219	lift_vcc_p	lfindp_p_	22k
R122	ols_n	out	2.7k
R123	out	pbff_p	200
R124	pbff_n	out	200
R125_1	buffer_p	t8	120
R125_2	t8	out	6.8
R126_1	buffer_n	t9	120
R126_2	t9	out	6.8
R127_11	out	vep_p_1	0.33
R127_12	out	vep_p_1	0.33
R127_21	out	vep_p_2	0.33

R127_22	out	vep_p_2	0.33
R127_31	out	vep_p_3	0.33
R127_32	out	vep_p_3	0.33
R127_41	out	vep_p_4	0.33
R127_42	out	vep_p_4	0.33
R127_51	out	vep_p_5	0.33
R127_52	out	vep_p_5	0.33
R127_61	out	vep_p_6	0.33
R127_62	out	vep_p_6	0.33
R128_11	out	vep_n_1	0.33
R128_12	out	vep_n_1	0.33
R128_21	out	vep_n_2	0.33
R128_22	out	vep_n_2	0.33
R128_31	out	vep_n_3	0.33
R128_32	out	vep_n_3	0.33
R128_41	out	vep_n_4	0.33
R128_42	out	vep_n_4	0.33
R128_51	out	vep_n_5	0.33
R128_52	out	vep_n_5	0.33
R128_61	out	vep_n_6	0.33
R128_62	out	vep_n_6	0.33
R129	out	sp_out	0.56
R130	0	rco	27
* R1301	hrtlmr_n_	0	10k
* R1302	hrtlmf_n_	lift_n_	180
* R1303	hrtlmc_n_	hrtls_n_	2.7k
* R1304	hrtls_n_	hrtlsb_n_	2.7k
* R1305	hrtlsb_n_	out_	6.8k
* R1306	hrtls_n_	hbtref_n_	10k
* R1307	hbtnfb_n_	hbtnfbt_n_	750
* R1308	hbtdrv_n_	hbtamr_n_	10k
* R1309	hbtamf_n_	0	180
* R1310	hbtnfb_n_	hbtmrr_n_	2.7k
* R1311	lift_vcc_n	hbtal_n_	2.7k
* R1312	lift_vcc_n	hbtsfb_n_	27
* R1313	lift_n_	hbtdrv_n_	120
* R1314	lift_vcc_n	hbt_buffer_n_	120
* R1315	lift_n_	0	27k
* R1316	lift_n_	lfindb_n_	39k
* R1317	lfindb_n_	rail_vcc_n	15k
* R1318	lfindn_n_	lfindp_n_	22k
* R1319	lift_vcc_n	lfindn_n_	22k
R201	0	hrtlmr_p	10k
R202	lift_p	hrtlmf_p	180
R203	hrtlmc_p	hrtls_p	2.7k
R204	hrtlsb_p	hrtls_p	2.7k
R205	out	hrtlsb_p	6.8k
R206	hrtls_p	hbtref_p	10k
R207	hbtnfbt_p	hbtnfb_p	750
R208	hbtamr_p	hbtdrv_p	10k
R209	0	hbtamf_p	180
R210	hbtnfb_p	hbtmrr_p	2.7k
R211	hbtal_p	lift_vcc_p	2.7k
R212	lift_vcc_p	hbtsfb_p	27
R213	lift_p	hbtdrv_p	120
R214	lift_vcc_p	hbt_buffer_p	120
R215	0	lift_p	27k
R216	lift_p	lfindb_p	39k

R217	rail_vcc_p	lfindb_p	15k
R218	lfindn_p	lfindp_p	22k
R219	lift_vcc_p	lfindp_p	22k
R301	hrtlmr_n	0	10k
R302	hrtlmf_n	lift_n	180
R303	hrtlmc_n	hrtls_n	2.7k
R304	hrtls_n	hrtlsb_n	2.7k
R305	hrtlsb_n	out	6.8k
R306	hrtls_n	hbtref_n	10k
R307	hbtnfb_n	hbtnfnt_n	750
R308	hbtdrv_n	hbtamr_n	10k
R309	hbtamf_n	0	180
R310	hbtnfb_n	hbtmrr_n	2.7k
R311	lift_vcc_n	hbtal_n	2.7k
R312	lift_vcc_n	hbtsfb_n	27
R313	lift_n	hbtdrv_n	120
R314	lift_vcc_n	hbt_buffer_n	120
R315	lift_n	0	27k
R316	lift_n	lfindb_n	39k
R317	lfindb_n	rail_vcc_n	15k
R318	lfindn_n	lfindp_n	22k
R319	lift_vcc_n	lfindn_n	22k
R401	ul_vcc_p	0	270k
R402	0	ul_vcc_n	270k
R403	lb_vcc_p	0	200k
R404	0	lb_vcc_n	200k
R405	rail_vcc_p	0	100k
R406	0	rail_vcc_n	100k
R407	lift_vcc_p	rpts_p	47k
R408	rptsfb_p	0	47k
R409	ul_vcc_p	rptl_p	15k
R410	rpto_p	0	47k
R411	rbt_p	rbts_p	12k
R412	rdiff_p	rbtdrv_p	12k
R413	rpto_p	rdiff_p	3.9k
R414	rpto_p	rsfb_p	120
R415	rdrv_p	lift_vcc_p	1.2k
R416	rpb_p	lift_vcc_p	330
R417	ul_vcc_p	rbff_p	150
R418	rpts_n	lift_vcc_n	47k
R419	0	rptsfb_n	47k
R420	rptl_n	ul_vcc_n	15k
R421	0	rpto_n	47k
R422	rbts_n	rbt_n	12k
R423	rdiff_n	rbtdrv_n	12k
R424	rpto_n	rdiff_n	3.9k
R425	rpto_n	rsfb_n	120
R426	rdrv_n	lift_vcc_n	1.2k
R427	rpb_n	lift_vcc_n	330
R428	ul_vcc_n	rbff_n	150
R429	uop_vcc_p	0	15k
R430	0	uop_vcc_n	15k
R431	uop_vcc_p	orb_p	2.2k
R432	orb_p	ordrv_p	5.1k
R433	op_vcc_p	orbff_p	120
R434	op_vcc_p	oradj_p	10k
R435	oradj_p	0	27k
R436	op_vcc_p	orz_p	10k



R437	uop_vcc_n	orb_n	2.2k
R438	orb_n	ordrv_n	5.1k
R439	op_vcc_n	orbff_n	120
R440	op_vcc_n	oradj_n	10k
R441	oradj_n	0	27k
R442	op_vcc_n	orz_n	10k
R443	umr_vcc	mr_b	120
R444	mr_b	mrdrv_p	270
R445	m_vcc	mr_bff_p	27
R446	m_vcc	mradj_p	560
R447	mradj_p	0	1.8k
R448	m_vcc	mrz_p	560
R449	vcc_rl_p	srz	2.2k
R450	srz	srh	10k
R451	srh	srhb	22k
R452	sr_bff	vcc_rl_n	330
R453	sr_bff	sr_b	390
R454	vac_main_1	vac_main_dls1	1.8
R455	vac_main_1	vac_main_dls2	2.7
R456	vac_main_1	vac_main_dls3	8.2
R457	vac_main_1	vac_main_dls4	10
R458	vac_main_0	0	10000k
R501	vin_p1	vin_plt	15k
R502	vin_n1	vin_nlt	15k
R503	SYSGND	blainvp_a	15k
R504	blainvp_a	blaout_a	15k
R505	blaout_b	blaout_a	120
R506	SYSGND	preout_a	100k
R507	pctlin_p_b	vin077_b	15k
R508	vin077_b	vinlp0_b	4.7k
R509	vinlp4_b	vinlp0_b	10k
R510	pctlin_p_a	SYSGND	2200k
R511	SYSGND	pctlin_n_a	15k
R512	SYSGND	pctlninvp_a	15k
R513	pctlinvp_a	upctlout_a	15k
R514	pctlaout_a	upctlout_a	2.7k
R515	SYSGND	pctlaout_a	39k
R516	lat_a	upctlout_a	5.1k
R517	SYSGND	lat_a	15k
R518	ladrv_a	m_vcc	15k
R519	ladrv_a	lab_a	4.7k
R520	sled_a	laout_a	3.3k
R521	0	sled_a	100k
R601	vin_p2	vin_p2t	15k
R602	vin_n2	vin_n2t	15k
R603	SYSGND	blainvp_b	15k
R604	blainvp_b	blaout_b	15k
R605	blaout_b	blaout_b	120
R606	SYSGND	preout_b	100k
R607	pctlin_p_a	vin077_a	15k
R608	vin077_a	vinlp0_a	4.7k
R609	vinlp4_a	vinlp0_a	10k
R610	pctlin_p_b	SYSGND	2200k
R611	SYSGND	pctlin_n_b	15k
R612	SYSGND	pctlninvp_b	15k
R613	pctlinvp_b	upctlout_b	15k
R614	pctlaout_b	upctlout_b	2.7k
R615	SYSGND	pctlaout_b	39k

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R616          lat_b          upctlout_b          5.1k
R617          SYSGND         lat_b              15k
R618          ldrv_b         m_vcc              15k
R619          ldrv_b         lab_b              4.7k
R620          sled_b         laout_b            3.3k
R621          0              sled_b            100k
R701          pled          m_vcc              6.8k
R_VIRTUAL1    blaout_a      vin077_a          1
R_VIRTUAL2    blaout_b      vin077_b          1
R_VIRTUAL3    vac_main_d1   vac_main_0    32
R_VIRTUAL_LOAD sp_out      0                  8
SW401         vac_main_1    vac_main_d1    vcc_rl_p    srl    RELAY_24V
V_ac_l1       vac_l_1      vac_r_1      dc 0 ac 0 sin(13.2 31.7 55 0 0 90)
V_ac_l2       vac_r_2      vac_l_2      dc 0 ac 0 sin(13.2 31.7 55 0 0 90)
V_ac_lb1      vac_lb_1     vac_l_1     dc 0 ac 0 sin(8.8 21.2 55 0 0 90)
V_ac_lb2      vac_l_2     vac_lb_2    dc 0 ac 0 sin(8.8 21.2 55 0 0 90)
V_ac_m1       vac_m_1      0          dc 0 ac 0 sin(5 12 55 0 0 90)
V_ac_m2       0           vac_m_2      dc 0 ac 0 sin(5 12 55 0 0 90)
V_ac_main     vac_main_0   vac_main_1   dc 0 ac 0 sin(0 240 55 0 0 90)
V_ac_op1      vac_op_1     vac_m_1     dc 0 ac 0 sin(2.5 6 55 0 0 90)
V_ac_op2      vac_m_2      vac_op_2     dc 0 ac 0 sin(2.5 6 55 0 0 90)
V_ac_rl       vac_r_1      0          dc 0 ac 0 sin(13.1 32.5 55 0 0 90)
V_ac_r2       0           vac_r_2     dc 0 ac 0 sin(13.1 32.5 55 0 0 90)
V_src_n_a     SYSGND       vin_n1      dc 0 ac 0 sin(0 0.77 20 0 0)
V_src_n_b     SYSGND       vin_n2      dc 0 ac 0 sin(0 0.77 20 0 0)
V_src_p_a     vin_p1       SYSGND       dc 0 ac 0 sin(0 0.77 20 0 0)
V_src_p_b     vin_p2       SYSGND       dc 0 ac 0 sin(0 0.77 20 0 0)
XRV101        pctlaout_a   volout_a     SYSGND      10K-LIN
XRV1101       pctlaout_b   volout_b     SYSGND      10K-LIN
XU501A        blainvp_a    blainvp_a    op_vcc_p    op_vcc_n    blaout_a    4558
XU501B        pctlninvp_a  pctlinvp_a   op_vcc_p    op_vcc_n    upctlout_a  4558
XU601A        blainvp_b    blainvp_b    op_vcc_p    op_vcc_n    blaout_b    4558
XU601B        pctlninvp_b  pctlinvp_b   op_vcc_p    op_vcc_n    upctlout_b  4558

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*-----*
* End of Main Circuit
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.control
tran 0.1ms 199.5ms 148.25ms 250ms
run
plot sp_out lift_p lift_n rail_vcc_p rail_vcc_n lift_vcc_p lift_vcc_n
.endc

.end

```