**031**

*ECW20N20 VDMOS with subthreshold
.model ECW20N20 VDMOS (Rg=30 Vto={0.155-1.6m*(Tjp-25)}
+ Rs={0.12*(1+2.5m*(Tjp-25))} Kp={2.40/(1+7.4m*(Tjp-25))}
+ Ksubthres={0.09*(1+1m*(Tjp-25))} Mtriode=0.3 Rd=0.16 Lambda=3m
+ Cgdmax=200p Cgdmin=10p a=0.25 Cgs=1200p Cjo=2200p
+ m=0.7 VJ=2.5 IS=8.0E-6 N=2.4 mfg=IH151206)

*ECW20P20 VDMOS with subthreshold
.model ECW20P20 VDMOS (pchan Rg=30 Vto={-0.61+2.2m*(Tjp-25)}
+ Rs={0.17*(1+2.0m*(Tjp-25))} Kp={1.85/(1+8.4m*(Tjp-25))}
+ Ksubthres={0.105*(1+5m*(Tjp-25))} Mtriode=0.35 Rd=0.05 Lambda=5m
+ Cgdmax=430p Cgdmin=20p a=0.25 Cgs=1800p Cjo=2400p
+ m=0.7 VJ=2.5 IS=8.0E-6 N=2.4 mfg=IH151206)

.model LED_GREEN D(Is=8.2e-25 N=1.46 Rs=5.1 Eg=2.23 Tnom=27deg)

.MODEL BAV21 D (IS=4.31N RS=.491 N=2 BV=266 IBV=100N
+ CJO=1.5P VJ=.65 M=.233 TT=43.2N)

.MODEL KSA992 pnp (
+ IS=4.0544E-13   BF=365.1        NF=1
+ BR=0.20         NR=1.0          ISE=4.0544E-14
+ NE=1.5          ISC=1.0378E-13  NC=1.5
+ VAF=13          VAR=100         IKF=36.498
+ IKR=0.0225      RB=186          RBM=1.04
+ IRB=1.0125E-6   RE=0.0044       RC=0.048
+ CJE=2.3093E-11  VJE=0.855       MJE=0.4404
+ FC=0.5          CJC=6.8251E-12  VJC=0.64
+ MJC=0.2897      XTB=1.2849      EG=1.1603
+ XTI=3           TF=5.86e-10     XTF=4.0
+ ITF=0.024       VTF=4.0         TR=1.0e-8)

.MODEL KSA1381 pnp
+ IS = 5.5544E-14
+ BF = 148
+ BR = 1.592
+ ISE = 2.0546E-15
+ NE = 1.5
+ ISC = 3.24807E-10
+ NC = 2
+ VAF = 580
+ VAR = 100
+ IKF = 0.2163
+ IKR = 0.087544
+ RB = 10.18
+ RE = 0.0512
+ RC = 4.072
+ CJE = 9.572E-12
+ VJE = 0.748
+ MJE = 0.371
+ FC = 0.5
+ CJC = 1.147E-12
+ VJC = 0.541
+ MJC = 0.329
+ XTB = 0.907
+ EG = 0.62
+ XTI = 3

.MODEL KSC3503 NPN
+ IS=3.510E-14     BF=174.09       VAF=600
+ IKF=0.12325      ISE=2.2538E-13  NE=2.0
+ BR=0.64499       VAR=100         IKR=0.43102
+ ISC=6.4644E-10   NC=1.5          RE=0.048
+ RC=0.815         RB=8.134        RBM=0.034
+ IRB=3.0e-6       CJE=8.10E-12    MJE=0.401
+ VJE=0.75         CJC=8.20E-12    MJC=0.31
+ VJC=0.75         TF=9.995E-10    XTF=2
+ VTF=35           ITF=1           TR=1.0E-8
+ EG=0.84          XTB=2.5         FC=0.5

.MODEL KSC1845 npn (
+ IS=5.075431E-13  BF=620.7        NF=1
+ BR=0.365         NR=1            ISE=1.68107E-12
+ NE=2.0           ISC=1.8378E-12  NC=1.5
+ VAF=82.803       VAR=100         IKF=0.20596
+ IKR=0.0190546    RB=107          RBM=0.292
+ IRB=1.258925E-6  RE=0.15         RC=0.28
+ CJE=1.10447E-11  VJE=0.7300286   MJE=0.1619943
+ FC=0.5           CJC=5.625739E-12 VJC=0.45
+ MJC=0.3059045    XTB=1.7281      EG=1.1809
+ XTI=3            TF=1.108e-9     XTF=2.250
+ ITF=0.0044       VTF=4.0         TR=1.0e-8)

Input signals
***20kHz sine wave 100W/8R - SINE (0 2 20k)***
***Assym. step response - PULSE(0 1 0 100n 100n 50u 100u)***
***Symm. step response - PULSE(-1 1 0 100n 100n 50u 100u)***
***Total gain = 20x > 26dB***

Loudspeaker model
.include powcalc.sub

Parameters
.param Tjp=50C   - Temperature of MOSFETs
.four 20k V(Vout)
.options plotwinsize=0.options numdgt=12
.ac oct 10 10 1G
.tran 0 3000u 2500u 10n steady uic
;op 0 4000u 3500u 10n steady uic

Power calculator
U1

GND

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