

11/12/2006

### EVA and RSS of DC Differential Amplifier

From Command Window:

Differential Amplifier

RSS	NOM	EVA
19.2430	20.0000	18.6238
20.7570	20.0000	21.4242

Sensitivities in %/%

-0.9545	0.9545	-0.0455	0.0455	0.5000	0.5000
---------	--------	---------	--------	--------	--------

»

Note that the RSS value is exactly  $20.757 - 20 = 0.757$  V.

(The same as Vs1 in fig1819.pdf, the Normal MCA, which verify the analyses.)

```
% dc differential amplifier
% File: c:\M_files\bookupdate\diffamp.m
% Circuit function: DA2.m
% updated version 11/12/06; symmetric tolerances
clear;clc
R1=10;R2=100;R3=10;R4=100;E1=1;E2=-1;
Nom=[R1 R2 R3 R4 E1 E2];
Vo=DA2(Nom); % Nominal output Vo
Nc=size(Nom,2);dpf=0.0001; % Nc = number of components including inputs.
Qx=ones(1,Nc);Bx=ones(1,Nc); % set perturbation vectors Qx & Bx
Q=1+dpf;B=1-dpf;
Tr=0.01;Te=0.05;
T=[-Tr -Tr -Tr -Tr -Te -Te;Tr Tr Tr Tr Te Te];
% For assymetric tolerances if any
Mr=1+(T(2,:)+T(1,:))/2; % Mr all 1's for symmetric tolerances.
Tv=(T(2,:)-T(1,:))./(2*Mr);
%
for p=1:Nc
    Qx(p)=Q;Bx(p)=B;
    if p > 1;Qx(p-1)=1;Bx(p-1)=1;end % reset previous
    Vr=DA2(Nom.*Qx);Vb=DA2(Nom.*Bx);
    Sen(p)=(Vr-Vb)/(2*Vo*dpf); % Sensitivities
    if Sen(p) > 0
        Lo(p)=1+T(1,p);Hi(p)=1+T(2,p); % For EVA
    else
        Lo(p)=1+T(2,p);Hi(p)=1+T(1,p);
    end
end
VL=DA2(Nom.*Lo); % VL = EVA Low
VH=DA2(Nom.*Hi); % VH = EVA High
% RSS
STn=norm(Sen.*Tv);
Vrssl=Vo*(1-STn);Vrssl2=Vo*(1+STn);
Vl=[Vrssl Vo VL;Vrssl2 Vo VH];
format short
disp('Differential Amplifier');
disp(' ');
disp('      RSS      NOM      EVA');
disp(Vl);
disp(' ');
disp('Sensitivities in %/%');
disp(Sen);
```