RRIO_Clamp_2Slew

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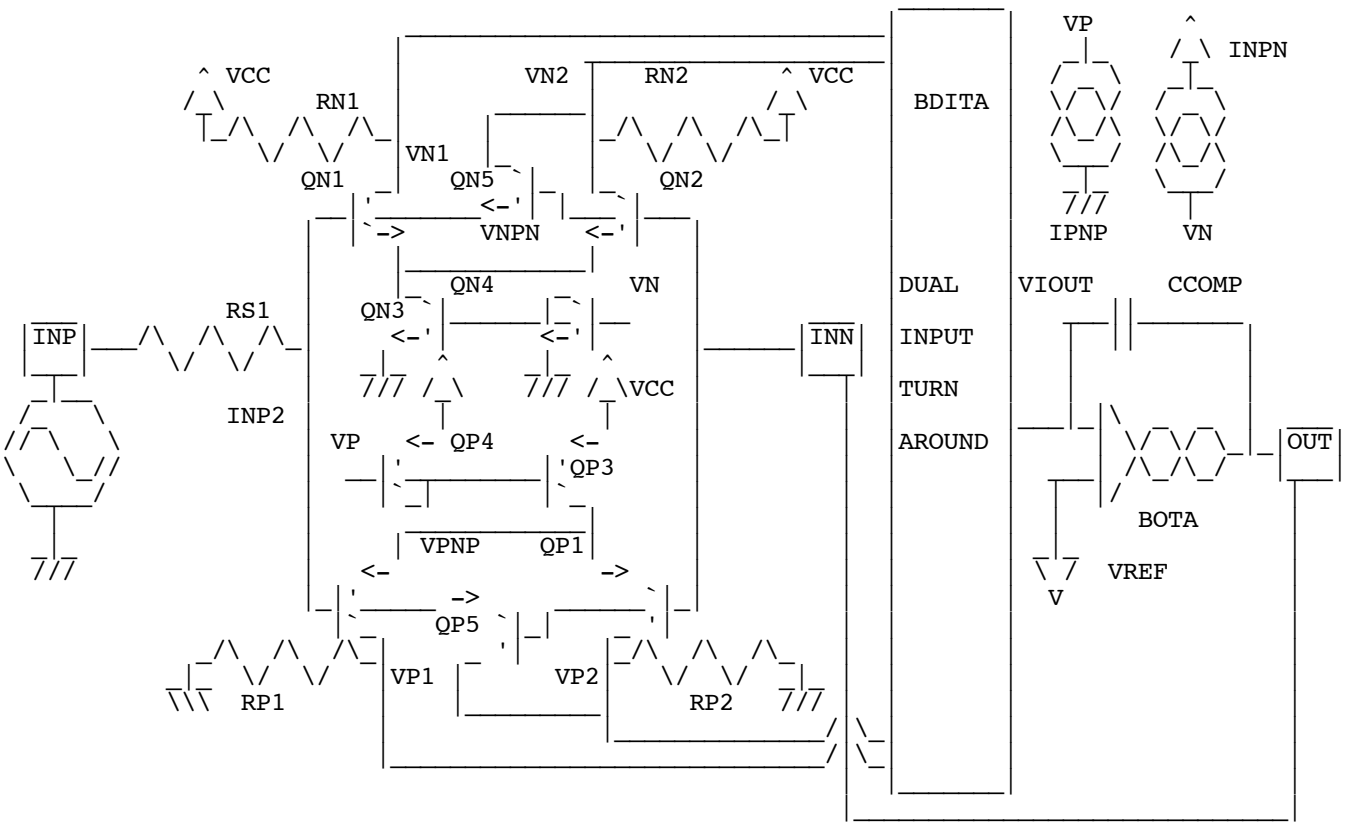
* www.idea2ic.com

* US Patent # 5414388




```
.OPTIONS  method=trap

VIN       INP     0       PULSE( 1 9 1n 1n 1n 10u 20u )
RS1       INP     INP2    7000
QP5       VP2     OUT     INP2    PNPV   1
QN5       VN2     OUT     INP2    NPNV   1

QP1       VP1     INP2    VPNP    PNPV   1
QP2       VP2     OUT     VPNP    PNPV   1
QP3       VPNP    VP      VCC     PNPV   1
QP4       VP      VP      VCC     PNPV   1
RP1       VP1     0       5K
RP2       VP2     0       5K

QN1       VN1   INP2    VNPN    NPNV   1
```

```
QN2       VN2   OUT     VNPN    NPNV   1
QN3       VNPN  VN      0       NPNV   1
QN4       VN    VN      0       NPNV   1
RN1       VCC   VN1     5K
RN2       VCC   VN2     5K

VCC       VCC    0      12
VREF      VREF   0      6
IPNP      VP     0      20u
INPN      VCC    VN     20u

BDITA     VIOUT  0     I = ( V(VP2) - V(VP1) + V(VN2) - V(VN1)  )/5000
BOTA      OUT    0     I = -1*( V(VIOUT) - V(VREF) )/50
CCOMP     OUT    VIOUT 20p

.tran     100n   50u     0      100n
.model      NPNV npn BF=150
.model      PNPV pnp BF=150

.control
run
set        pensize = 2
plot       v(out) v(inp)

.endc
.end
```

* ==========END==========

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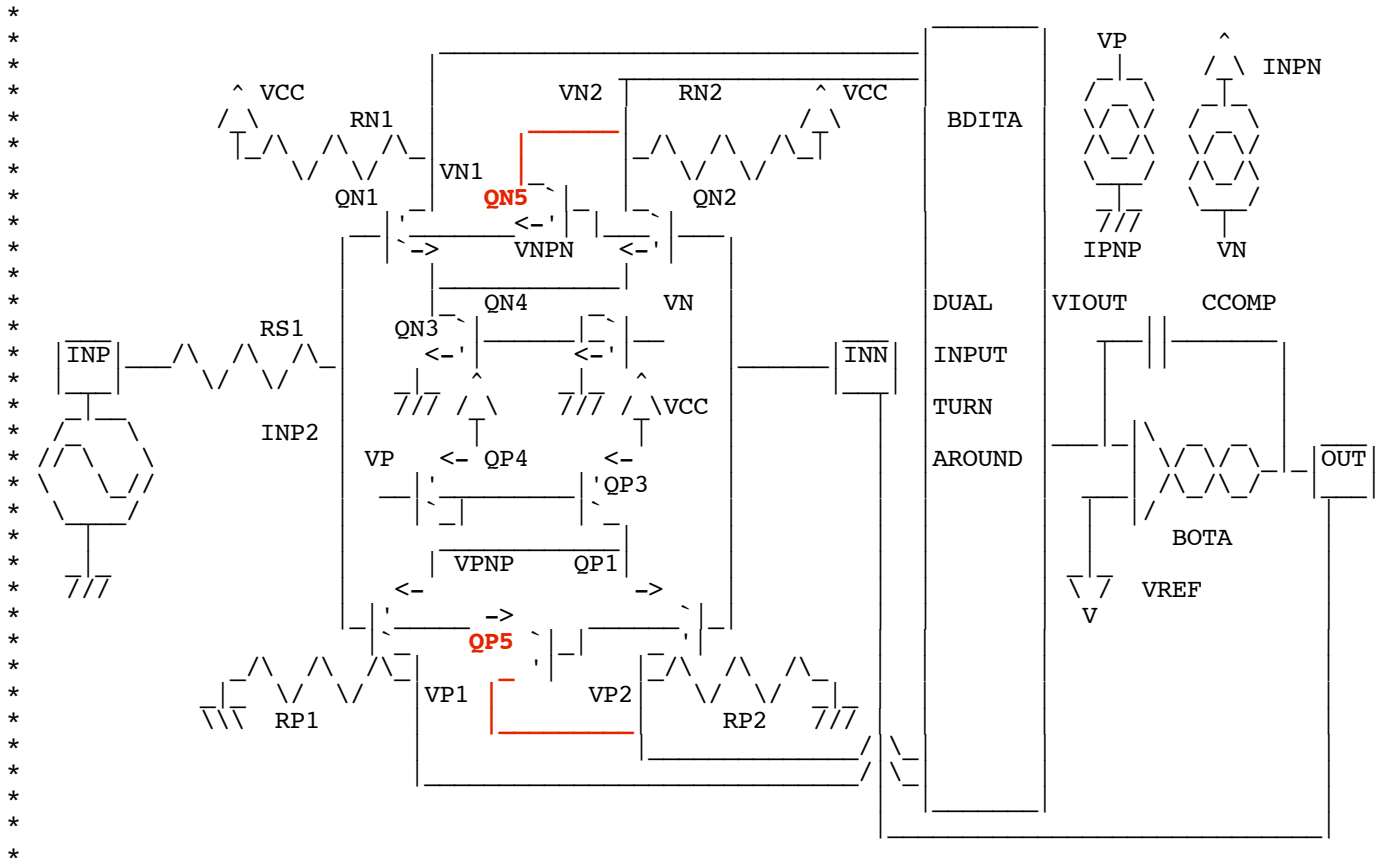
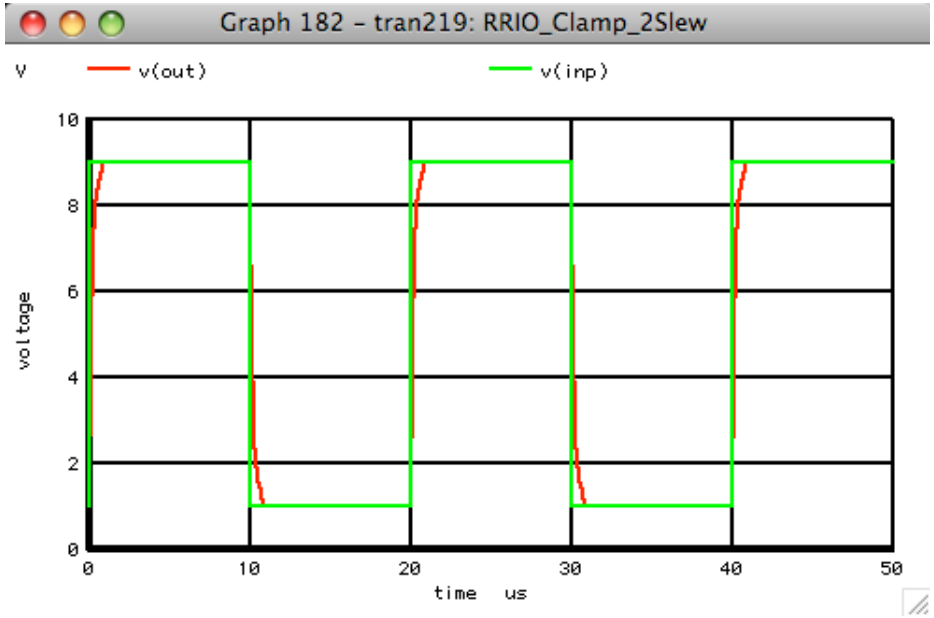
Sometime good things come for free. In the case of the LM6142, input clamp diodes were needed. But diodes are just transistors which have there collector and base leads shorted together.



What would happen if the collectors were connected to the signal path instead. So not only do they protect the inputs, they greatly increase the slew rate.



This had another interesting effect in terms of settle time. The clamping current only come in when the input stage is being overdriven by about a volt. For following a square wave, the slew is fast up until the output starts approaching the input. The the clamping stops and the settle time proceeds as normal.