

APPENDIX- D

PIN DIODE DRIVER CIRCUITS

NOTES

DRIVER CIRCUITS FOR HIGH POWER PIN DIODE SWITCHES

The information in this chapter is presented as a guide for the RF switch - switch driver interface. References [1,2] provide a fuller treatment of this subject and can be used as a basis for RF switch - switch driver interface designs. Most of the information in this chapter is based on experimental work done on driver circuits used to evaluate thick I-region, large area, long lifetime PIN diodes. These long lifetime PIN diodes present singular difficulties in driver design because of the potentially large amount of stored charge in the I-region.

This chapter treats only two-state driver circuits in which either a forward bias current or a reverse bias voltage is to be applied to a PIN diode. Not covered are analog drivers as used in such circuits as linear attenuators and continuous phase shifters, where a precise bias current or voltage profile might be required.

White[1] lists five performance categories for driver circuits.

1. Input signal power supply buffer and TTL compatibility
2. Switching speed
3. High power, pulse leakage current supply
4. fault detection
5. Complementary drivers

It should also be noted that the relationship between the driver transistors and the PIN diode are as follows:

DRIVERS	PIN
PNP	cathode to ground
NPN	anode to ground

Since high voltage NPN transistors are easier to obtain, high power PIN circuits require anode to ground PIN diodes. Microsemi supplies both polarities of PIN diodes.

Two starter circuits from [1] are shown below. Figure D.1 is a typical circuit and Figure D.2 is the same circuit with speed-up components.

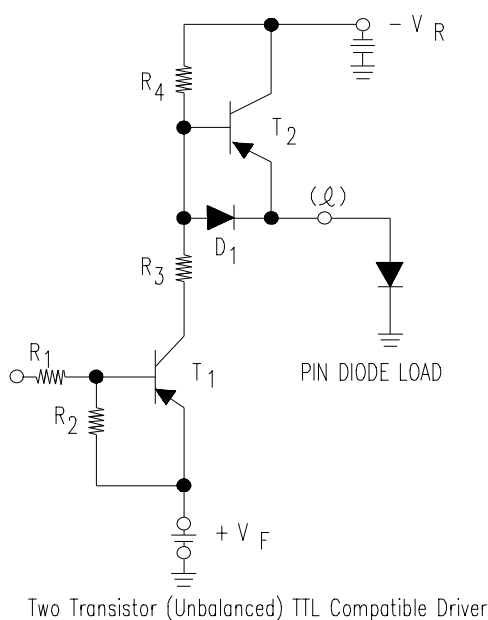


Figure D.1

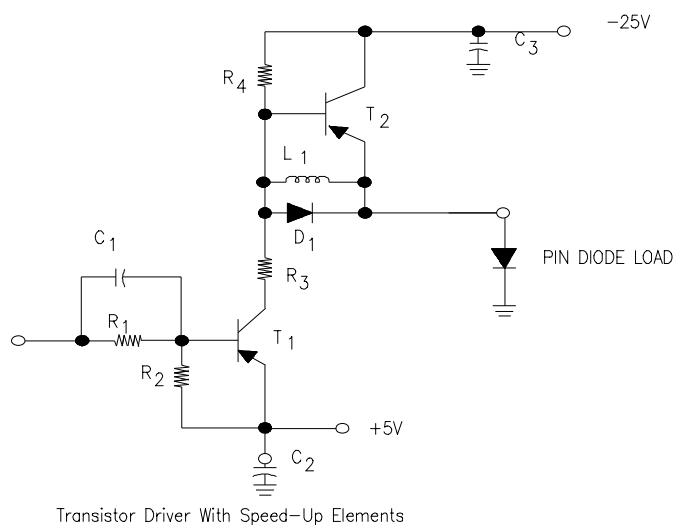


Figure D.2

Typical starting point values for using the circuit in figure D.2:

Q1, Q2	NTE 292 (TO220 PNP)	C1	75 pF
R1	499 Ω	C2	150 μ F
R2	1K Ω	C3	0.05 μ F
R3	15 Ω 5 W	L1	1 mH
R4	10K Ω		
R5	1K Ω		
D1	1N5811		
PIN diode	HUM2020		

An additional good reference for driver circuits is [2].