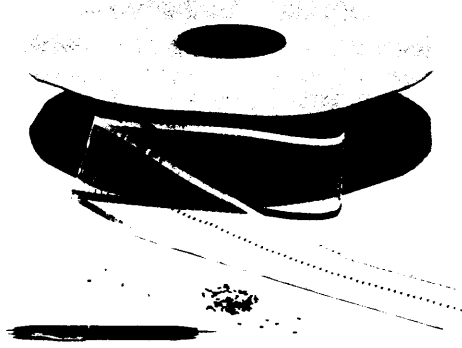


SDI available for CMECCN

DI 18/44/18/74



**ECONOMY  
PIN DIODES**

D-1103

**SDI** Where quality begins...  
11 Executive Park Drive  
N. Billerica, MA 01862  
(617) 667-7700 TLX 95 1592  
TWX 710-347-1576

**Description**

The **SDI** silicon economy PIN switching diodes offer the designer a selection of high performance, low cost devices which will satisfy many HF/VHF/UHF requirements.

Two devices are available in rugged, low inductance, sub-miniature axial lead DO-34 glass packages. A third PIN is assembled in a SOT-23 plastic package for hybrid or surface mount applications.

Although the diodes feature low capacitance, parasitic package capacitance is higher than that of our microwave types. Designers who require ultra-low capacitance should refer to our other PIN devices.

These diodes are intended for low power RF applications such as band switching, duplexers, antenna switching matrices, digital phase shifters, time multiplex filters, and TR or ATR switching.

**Features**

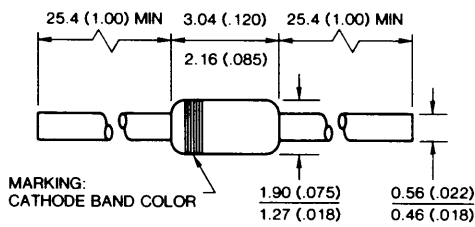
- Low cost
- Low resistance at small forward currents
- Low capacitance at small reverse voltages
- Rugged DO-34 axial lead glass package or plastic SOT-23

**Selection Guide**

Frequency	Part No.	Package
HF	DPJ 0200-034	DO-34
VHF/UHF	DPJ 0350-034	DO-34
HF/VHF/UHF	DPJ 0351-023	SOT-23

**Outlines**

Dimensions in Millimeters (Inches)



**DO-34**

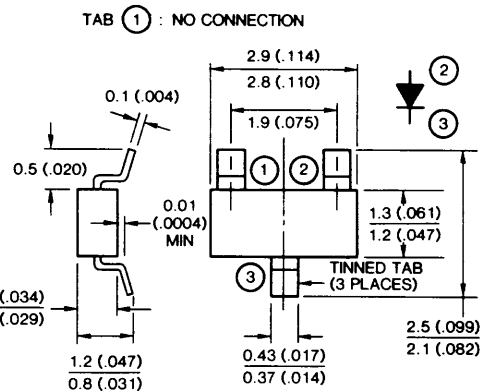
Hermetically Sealed Glass Package  
Series Inductance 2nH typ. (Note 1)  
Package Capacitance 0.4pF typ.

**Maximum Ratings**

Operating Temperature: -65 to +150 °C  
Storage Temperature: -65 to +150 °C  
Power Dissipation (Note 1)  
@ T<sub>A</sub> = 25 °C 200mW  
Derate above 25 °C 1.7mW/°C

Note 1: Lead Length 5mm (0.2 inches)

DO-34 diodes available taped and reeled for quantities over 10,000 pieces.



**SOT-23**

Plastic Package  
Series Inductance 2nH typ.  
Package Capacitance 0.2pF typ.

**Maximum Ratings**

Operating Temperature: -55 to +100 °C  
Storage Temperature: -55 to +100 °C  
Power Dissipation (Note 2)  
@ T<sub>A</sub> = 25 °C 120mW  
Derate above 25 °C 1.6mW/°C

Note 2: Mounted on ceramic substrate

## Applications

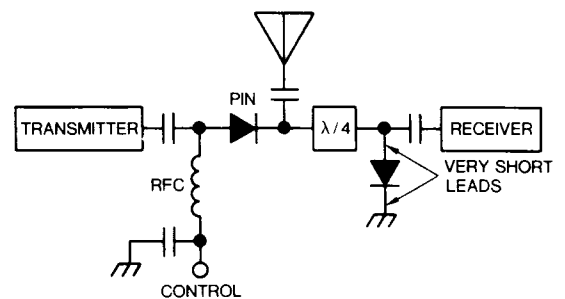
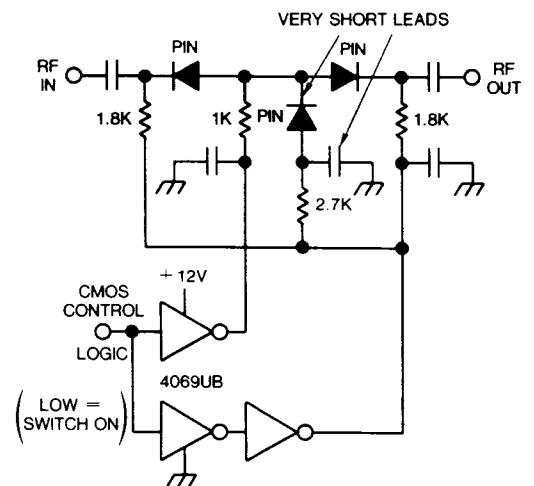
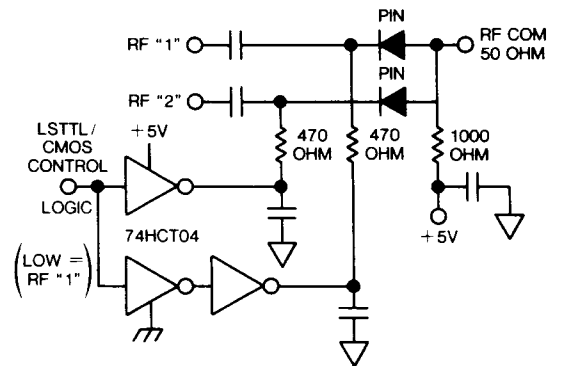
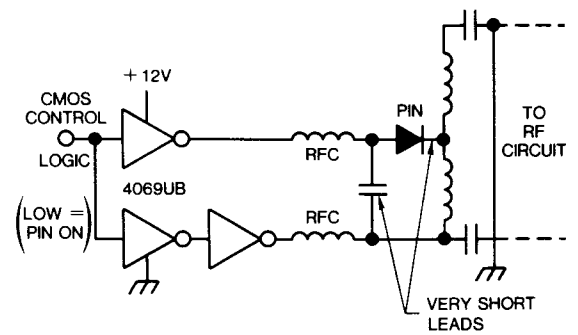
Optimum performance is achieved only when the designer considers the important parasitic reactances of each component used. Series inductance of shunt PIN diodes can often be compensated by use of a bypass capacitor which is series resonant with the diode lead inductance of the highest frequency used. Leadless disk or chip ceramic capacitors are best at UHF. Decoupling RF chokes have a shunt parasitic capacitance which may be used to create parallel resonance at the highest frequency used. All components should be mounted with minimum lead length. Large areas of ground plane should be utilized on both sides of a circuit board and should be interconnected often with plated thru holes, eyelets, or soldered leads. Driver design is often simplified by usage of CMOS logic circuits with their inherent current limited outputs.

Bandswitching is readily accomplished by utilizing the PIN diode to short out a portion of the tank coil. Self-limiting CMOS drivers are used. The two decoupling RF chokes and three decoupling capacitors should be chosen as described above.

Broadband SPDT switching with better than 25dB isolation and 1dB insertion loss below 100 MHz is attained with this circuit which also uses an LSTTL compatible CMOS driver. The DPJ 0350-034 PIN is especially useful in this circuit which operates with 3mA forward bias and 3V reverse bias.

A TEE switch provides better than 60 dB isolation below 100 MHz with only a modest increase in circuit complexity. Very short lead lengths for the shunt diode and its bypass capacitor are essential to high isolation.

T/R switching at VHF/UHF can be economically accomplished at power levels up to 10 watts into a 50 ohm load. The receiver is isolated from the transmitter by 30 to 40 dB over bandwidths of a few percent. The CONTROL terminal should source about 20mA forward bias into the PIN diodes during transmit and should be grounded for receiving.



The following component values are guidelines for a 50 ohm system and may need to be varied to obtain optimum performance.

Operating Frequency (MHz)	1	2	5	10	20	50	100	200	500
R.F. Choke ( $\mu$ H)	220	100	56	22	10	5.6	2.7	1.0	.22
Bypass/Coupling Capacitor (pF)	100,000	50,000	22,000	4,700	2,700	1,000	470	270	100

## Economy PIN RF Switching Diodes — Electrical Characteristics

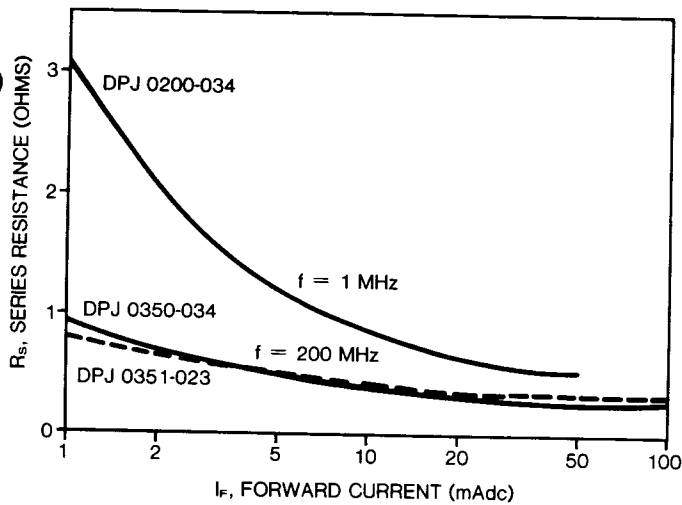
(T<sub>A</sub> 25°C unless otherwise noted)

Type	Diode Capacitance f = 1.0 MHz		Series Resistance f = 50 MHz			Effective Minority Carrier Lifetime (nsec) I <sub>F</sub> = 10mA I <sub>R</sub> = 6mA Typ
	C <sub>T</sub> (pF) Typ./Max	V <sub>R</sub> (Vdc)	R <sub>S</sub> (ohms) Typ/Max	I <sub>F</sub> (mAdc)	f (MHz)	
DPJ 0200-034	1.6/2.5	3	0.8/1.2	10	1	500
DPJ 0350-034	0.8/1.2	3	0.6/0.7	3	200	50
DPJ 0351-023	0.8/1.0	20	0.5/0.7	5	200	250

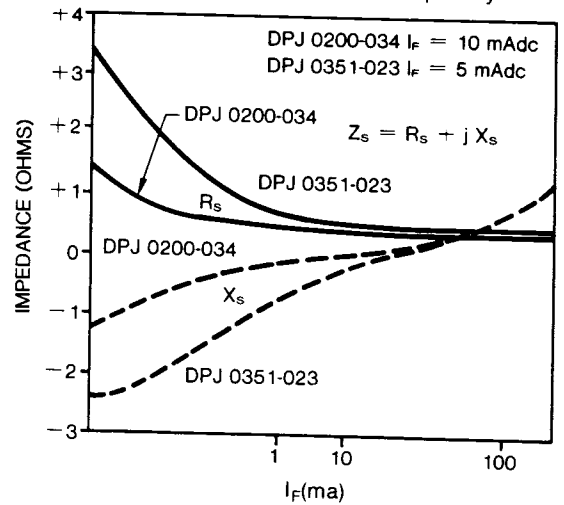
Type	V <sub>R</sub> Reverse Breakdown Voltage I <sub>R</sub> = 10μAdc Min/Typ	Reverse Leakage Current			Forward Voltage		Package	Marking
		I (nAdc) Max	I <sub>R</sub> @ T <sub>A</sub> (μA) Max	T <sub>A</sub> (°C) Max	V <sub>F</sub> (Vdc) Max	I <sub>F</sub> (mAdc) Max		
DPJ 0200-034	20/300	100	5	+125	20	0.9	50	DO-34 Black
DPJ 0350-034	35/80	100	1	+75	20	1.2	100	DO-34 Red
DPJ 0351-023	35/100	100	1	+60	20	1.2	100	SOT-23 A2

### Typical Characteristics

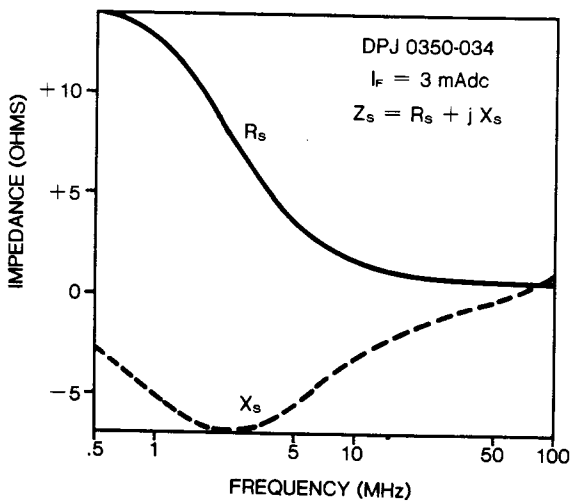
Series Resistance vs. Forward Current



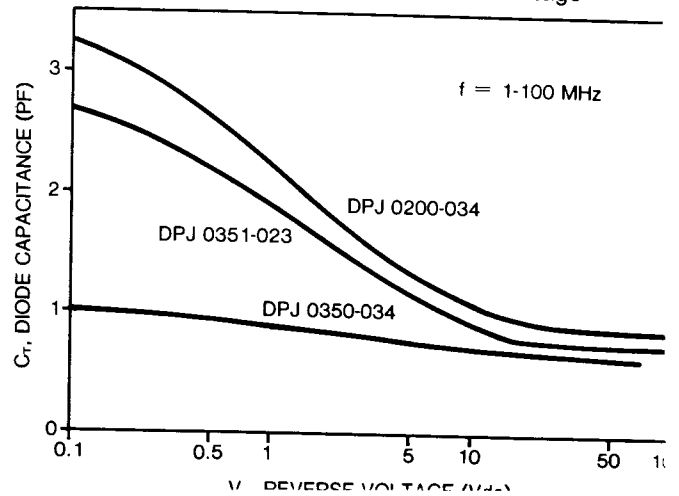
Diode Impedance vs. Frequency



Diode Impedance vs. Frequency



Diode Capacitance vs. Reverse Voltage



**Cross Reference** (Certain industry types may have been discontinued)

Microwave Associates Type	SDI Recommended Replacement
MA-47120	DPJ 0350-034
MA-47122	DPJ 0350-034
MA-4P200	DPJ 0350-034
MA-4P201	DPJ 0200-034*
MA-4P205	DPJ 0200-034*

\*100 volt  $V_R$  of replacement typical but not guaranteed

Motorola Semiconductor Type	SDI Recommended Replacement
MMBV3401	DPJ 0351-023
MPN3401	DPJ 0350-034
MPN3402	DPJ 0350-034
MPN3404	DPJ 0350-034
MPN3500	DPJ 0350-034
MPN3503	DPJ 0350-034
MPN3504	DPJ 0350-034

HP Part No.	SDI Recommended Replacement
5082-3168	DPJ-0350-034
5082-3188	DPJ-0350-034