CA3039

March 1993

Diode Array

Features

- **Six Matched Diodes on a Common Substrate**
- **Excellent Reverse Recovery Time 1ns Typical**
- **Matched Monolithic Construction**
  - **V_F Matched Within 5mV**
- **Low Diode Capacitance**
  - **C_D = 0.65pF Typical at V_R = -2V**

Applications

- **Ultra-Fast Low Capacitance Matched Diodes for Applications in Communications and Switching Systems**
- **Balanced Modulators or Demodulators**
- **Ring Modulators**
- **High Speed Diode Gates**
- **Analog Switches**

Description

The CA3039 consists of six ultra-fast, low capacitance diodes on a common monolithic substrate. Integrated circuit construction assures excellent static and dynamic matching of the diodes, making the array extremely useful for a wide variety of applications in communication and switching systems.

Five of the diodes are independently accessible, the sixth shares a common terminal with the substrate.

For applications such as balanced modulators or ring modulators where capacitive balance is important, the substrate should be returned to a DC potential which is significantly more negative (with respect to the active diodes) than the peak signal applied.

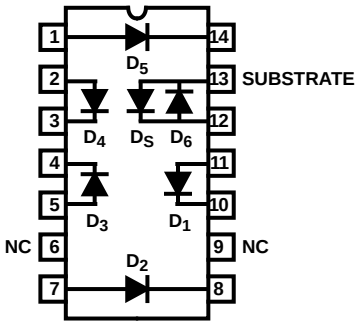
Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
CA3039	-55°C to +125°C	12 Pin CAN
CA3039M	-55°C to +125°C	14 Lead SOIC
CA3039M96	-55°C to +125°C	14 Lead SOIC*

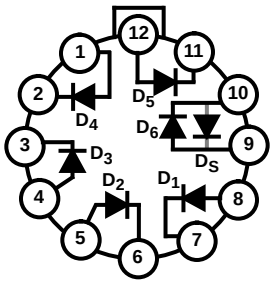
* Denotes Tape and Reel

Pinouts

CA3039
(SOIC)
TOP VIEW



CA3039
(TO-5 CAN)
TOP VIEW



File Number **343.2**

Absolute Maximum Ratings

Inverse Voltage (PIV) for: D_1 - D_5 . . . . . 5V
D_6 . . . . . 0.5V
Diode-to-Substrate Voltage (V_{DI}) for D_1 - D_5 . . . . . +20V, -1V
(Terminal 1, 4, 5, 8 or 12 to Terminal 10)
DC Forward Current (I_F) 25mA
Recurrent Forward Current (I_F) 100mA
Forward Surge Current ($I_{F(SURGE)}$) 100mA
Power Dissipation
Any One Diode Unit 100mW
Total for Device 600mW
For T_A > +55°C . . . . . Derate Linearly 5.7mW/°C
Junction Temperature . . . . . +175°C
Junction Temperature (Plastic Package) . . . . . +150°C
Lead Temperature (Soldering 10 Sec.) . . . . . +300°C

Operating Conditions

Operating Temperature Range . . . . . $-55°C \le T_A \le +125°C$
Storage Temperature Range . . . . . $-65°C \le T_A \le +150°C$

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Specifications

T_A = +25°C. Characteristics apply for each diode unit, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
DC Forward Voltage Drop (Figure 1)	V_F	I_F = 50µA	-	0.65	0.69	V
		I_F = 1mA	-	0.73	0.78	V
		I_F = 3mA	-	0.76	0.80	V
		I_F = 10mA	-	0.81	0.90	V
DC Reverse Breakdown Voltage	$V_{(BR)R}$	I_R = -10µA	5	7	-	V
DC Reverse Breakdown Voltage Between Any Diode Unit and Substrate	$V_{(BR)R}$	I_R = -10µA	20	-	-	V
DC Reverse (Leakage) Current (Figure 2)	I_R	V_R = -4V	-	0.016	100	nA
DC Reverse (Leakage) Current Between Any Diode Unit and Substrate (Figure 3)	I_R	V_R = -10V	-	0.022	100	nA
Magnitude of Diode Offset Voltage (Note 1) (Figure 1)	$\lvert V_{F1} - V_{F2} \rvert$	I_F = 1mA	-	0.5	5.0	mV
Temperature Coefficient of $\lvert V_{F1} - V_{F2} \rvert$ (Figure 4)	$\frac{\Delta \lvert V_{F1} - V_{F2} \rvert}{\Delta T}$	I_F = 1mA	-	1.0	-	µV/°C
Temperature Coefficient of Forward Drop (Figure 5)	$\frac{\Delta V_F}{\Delta T}$	I_F = 1mA	-	-1.9	-	mV/°C
DC Forward Voltage Drop for Anode-to-Substrate Diode (D_S)	V_F	I_F = 1mA	-	0.65	-	V
Reverse Recovery Time	t_{RR}	I_F = 10mA, I_R = -10mA	-	1.0	-	ns
Diode Resistance (Figure 6)	R_D	f = 1kHz, I_F = 1mA	25	30	45	Ω
Diode Capacitance (Figure 7)	C_D	V_R = -2V, I_F = 0	-	0.65	-	pF
Diode-to-Substrate Capacitance (Figure 8)	C_{DI}	V_{DI} = 4V, I_F = 0	-	3.2	-	pF

NOTE:

1. Magnitude of Diode Offset Voltage is the difference in DC Forward Voltage Drops of any two diode units.

Typical Performance Curves

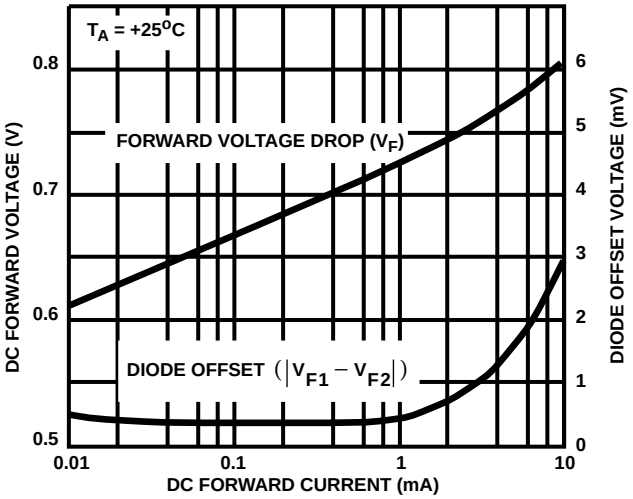


FIGURE 1. DC FORWARD VOLTAGE DROP (ANY DIODE) AND DIODE OFFSET VOLTAGE vs DC FORWARD CURRENT

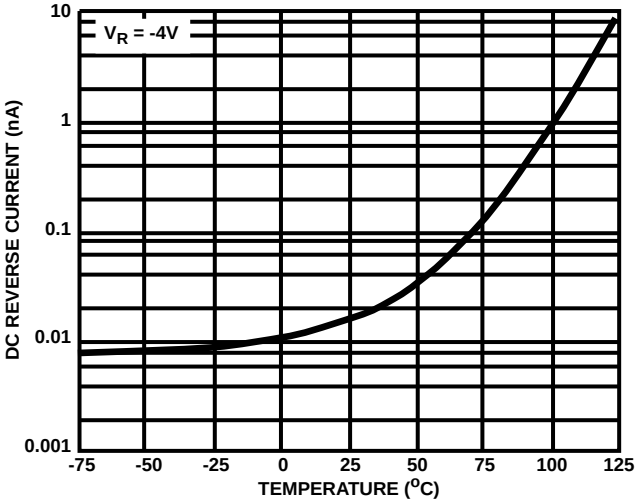


FIGURE 2. DC REVERSE (LEAKAGE) CURRENT (D_1 - D_5) vs TEMPERATURE

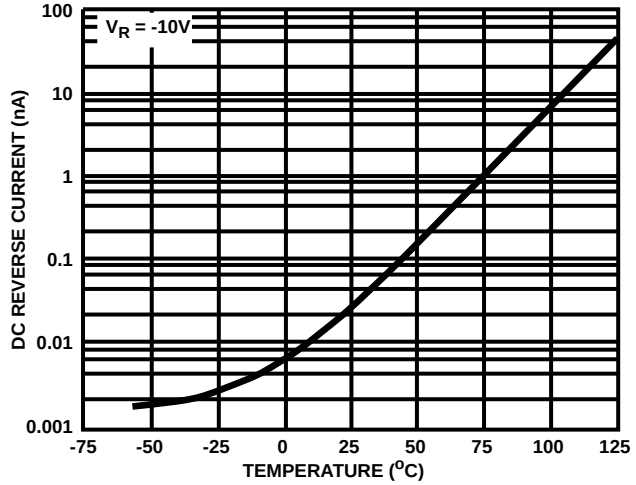


FIGURE 3. DC REVERSE (LEAKAGE) CURRENT BETWEEN D_1, D_2, D_3, D_4, D_5 AND SUBSTRATE vs TEMPERATURE

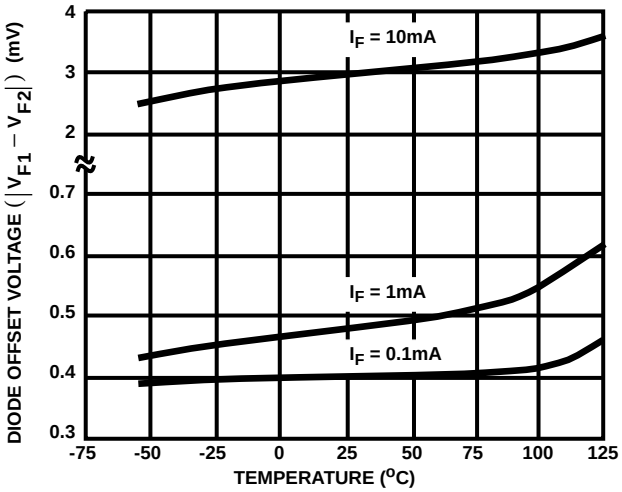


FIGURE 4. DIODE OFFSET VOLTAGE (ANY DIODE) vs TEMPERATURE

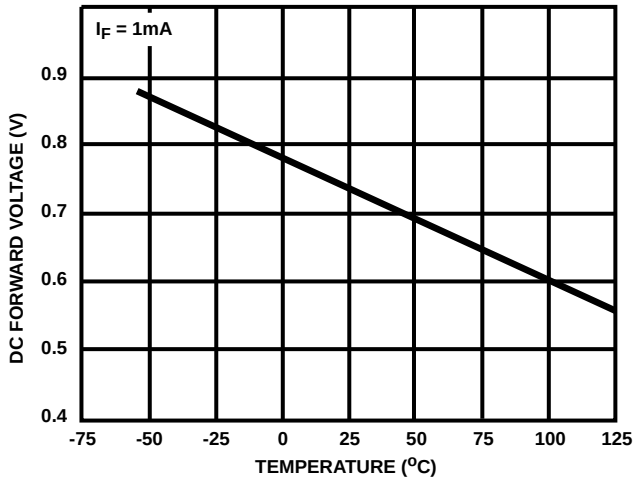


FIGURE 5. DC FORWARD VOLTAGE DROP (ANY DIODE) vs TEMPERATURE

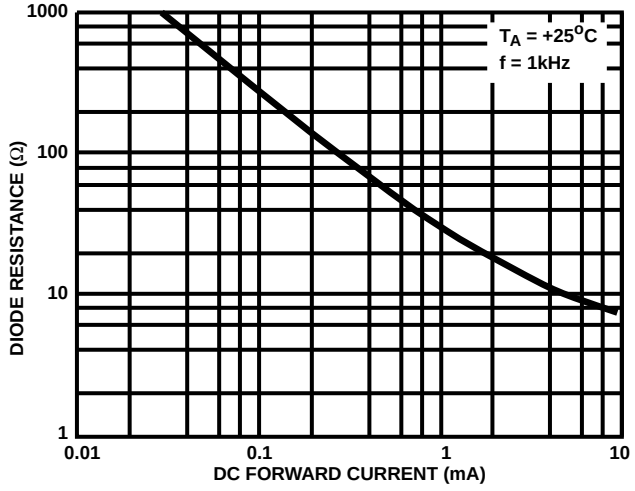


FIGURE 6. DIODE RESISTANCE (ANY DIODE) vs DC FORWARD CURRENT

Typical Performance Curves (Continued)

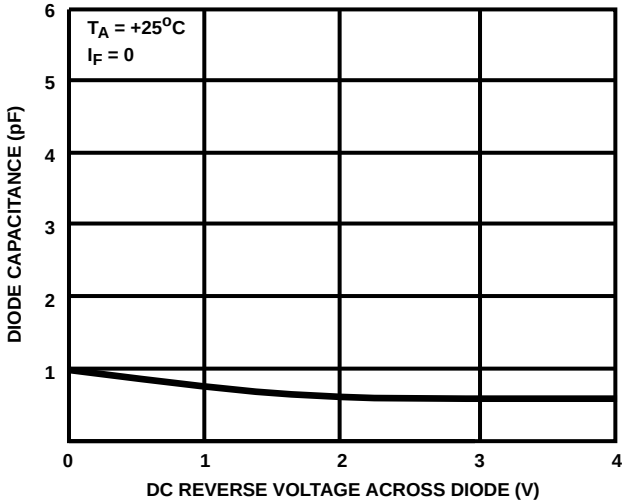


FIGURE 7. DIODE CAPACITANCE (D_1 - D_5) vs REVERSE VOLTAGE

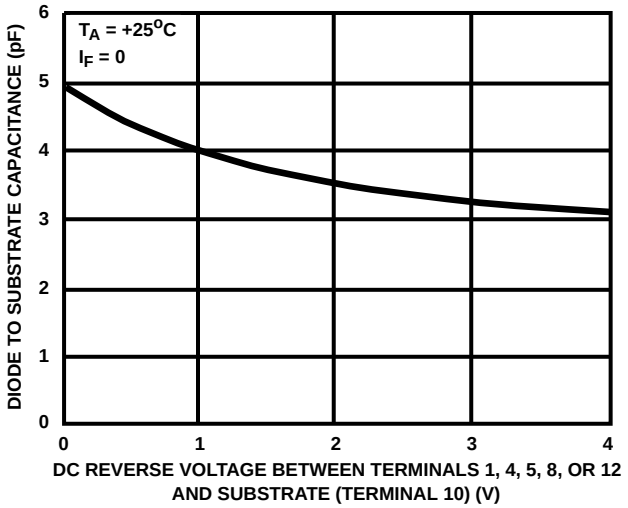


FIGURE 8. DIODE-TO-SUBSTRATE CAPACITANCE vs REVERSE VOLTAGE