Solderable 0201 Flip-Chip Hyperabrupt GaAs Varactor

MV3903-P2010-STD

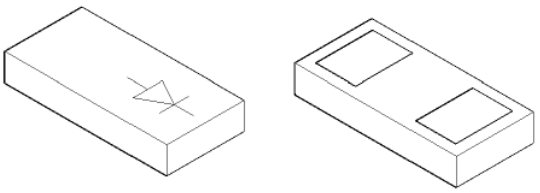
Product Overview

MV3903-P2010 is a surface mount, flip-chip Gallium Arsenide (GaAs) varactor, designed for use as tuning elements in VCOs, modulators, tunable filters, and antenna-tuning at microwave-and millimeter-wave frequencies. The MV3903-P2010 varactor incorporates our expertise in GaAs-material processing, silicon nitride protective coating, and high-temperature metallization. This varactor diode maintains the high-frequency performance of a beam lead structure in a more rugged SMT configuration.

Key Features

- Very high-Q GaAs material
- 1.0 constant-gamma varactors
- Wide tuning range
- Very low parasitic capacitance (0.03 pF)
- Surface mount device
- Large (5.5 mils × 8 mils) solderable Au/Ti bond pads
- Silicon nitride protective coating
- Suitable for pick and place

Functional Block Diagram



Applications

- Military and space
- Telecom infrastructure
- Wideband microwave radios
- Microwave and millimeter-wave communication systems
- Automotive (AEC-Q101 qualified).

Performance Overview

Parameter	Conditions	Typ.	Units
Total capacitance (C_T)	0V, 1 MHz	0.25	pF
	4V, 1 MHz	0.075	
	17V, 1 MHz	0.03	
Capacitance Ratio (C_{T0}/C_{T17})		8.3	
R_s	I_f = 30 mA	1.5	Ω
Q	4V, 50 MHz	30000.0	
V_b	I_r = 10 µA	30.0	V
Gamma	2V to 20V	0.88	

Export Classification: EAR99

Table of Contents

1. Electrical Specifications

Temperature = 25 °C (unless specified otherwise)

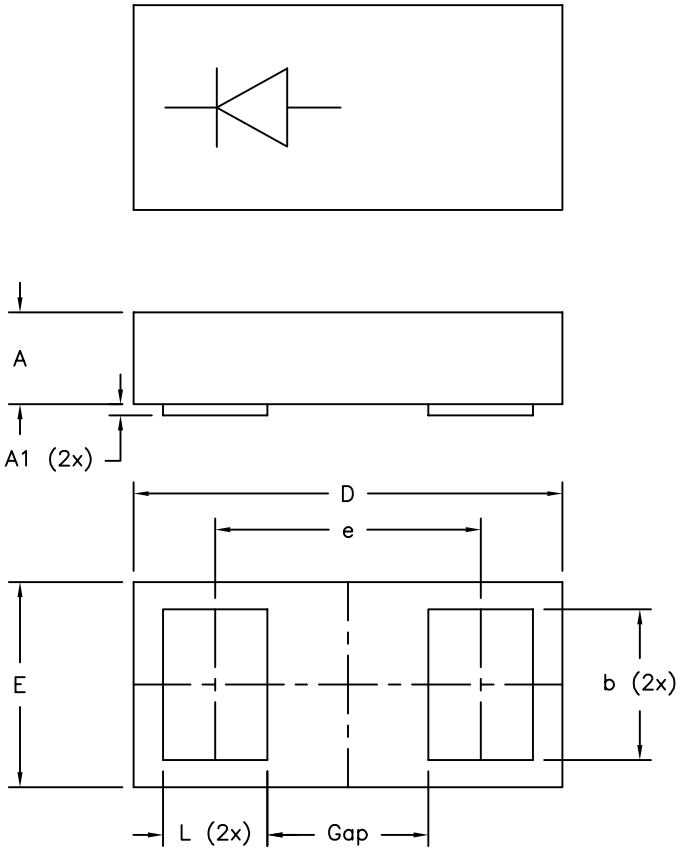
Test V_b, I_r, C_T, and V_f 100% on process control monitor (PCN)

Parameter	Conditions	Min.	Typ.	Max.	Units
Total capacitance (C_T)	0V, 1 MHz	0.235	0.25	0.265	pF
	4V, 1 MHz	0.05	0.075	0.15	
	17V, 1 MHz	0.025	0.03	0.035	
Capacitance ratio (C_{T0}/C_{T17})		7.0	8.3	9.5	
R_s	I_f = 30 mA	1.0	1.5	2.0	Ω
Q	4V, 50 MHz	3000.0	30000.0	50000.0	
V_b	I_r = 10 µA	20.0	30.0		V
I_r	V_r = 15V		30.0	200.0	nA
Gamma	2V to 20V	0.82	0.88	0.94	
V_f	I_f = 10 mA	0.2	1.3	1.5	V

2. Flip Chip Outline Drawing (P2010)

This section shows the flip chip outline drawing (P2010) for this device.

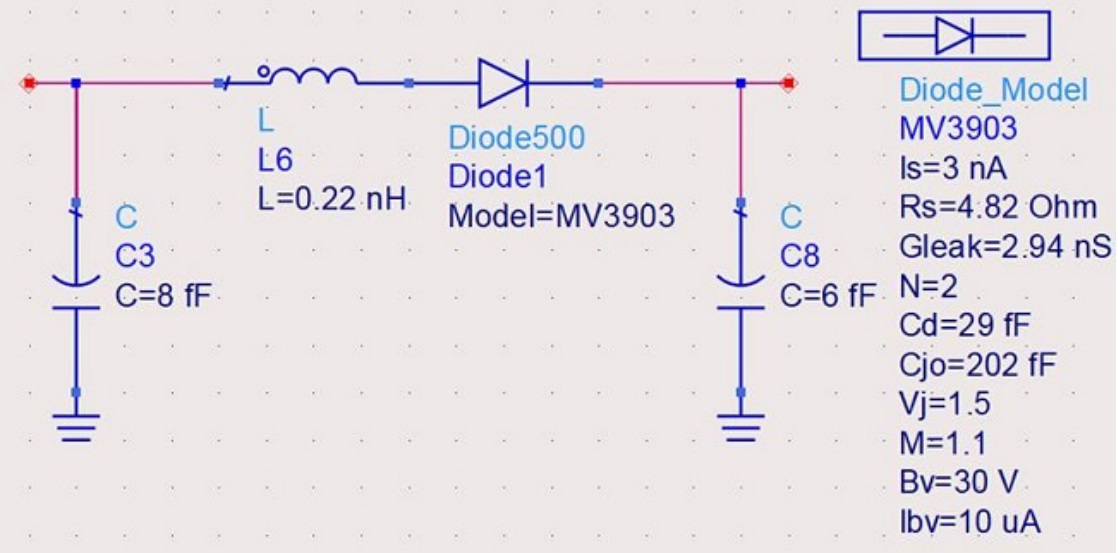
Figure 2-1. Outline Drawing



Dimension	Inches			Millimeters		
	Min.	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**
A	0.00386	0.00426	0.00465	0.098	0.108	0.118
A1	0.00008	-	0.00009	0.002	-	0.002
b	0.00793	0.00801	0.00809	0.202	0.204	0.206
D	0.02264	0.02362	0.02461	0.575	0.600	0.625
E	0.01083	0.01181	0.01280	0.275	0.300	0.325
e	0.01402	0.01409	0.01410	0.356	-	0.358
L	0.00551	0.00559	0.00567	0.140	0.142	0.144
Gap	0.00843	0.00850	0.00858	0.214	0.216	0.218

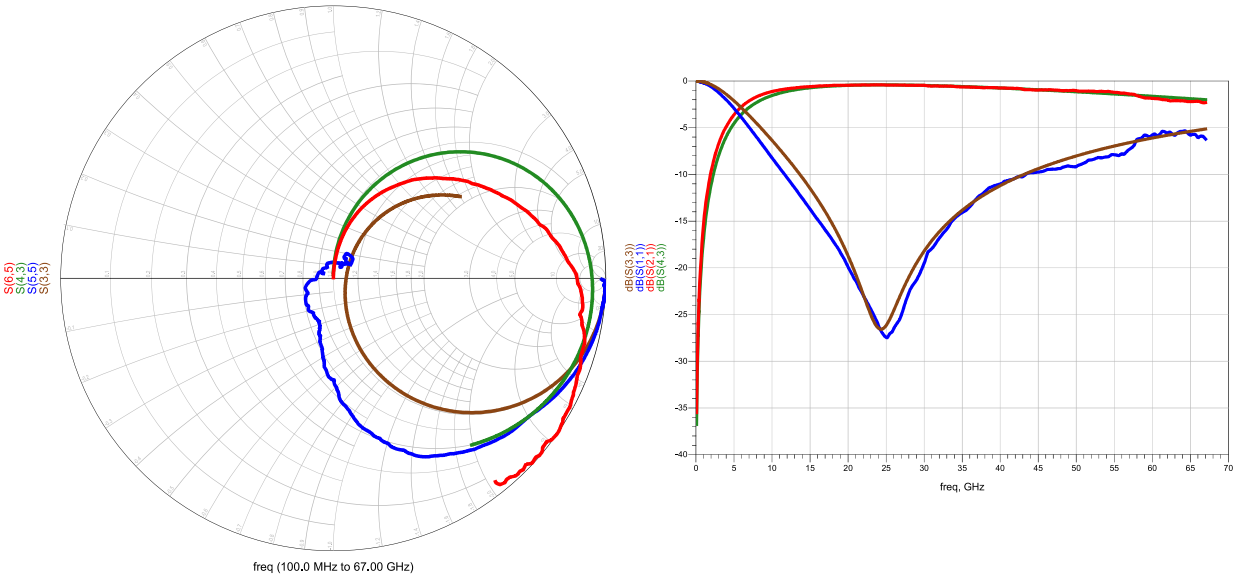
3. SPICE Model

This section shows the SPICE model for this device.

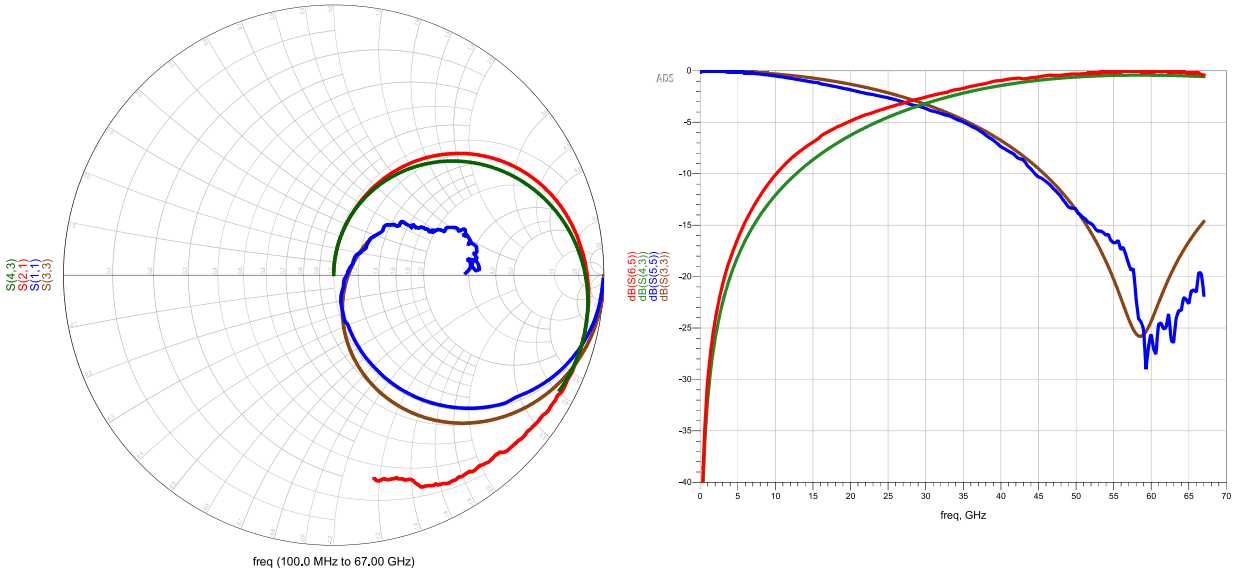


The following images show the model verifications for this device.

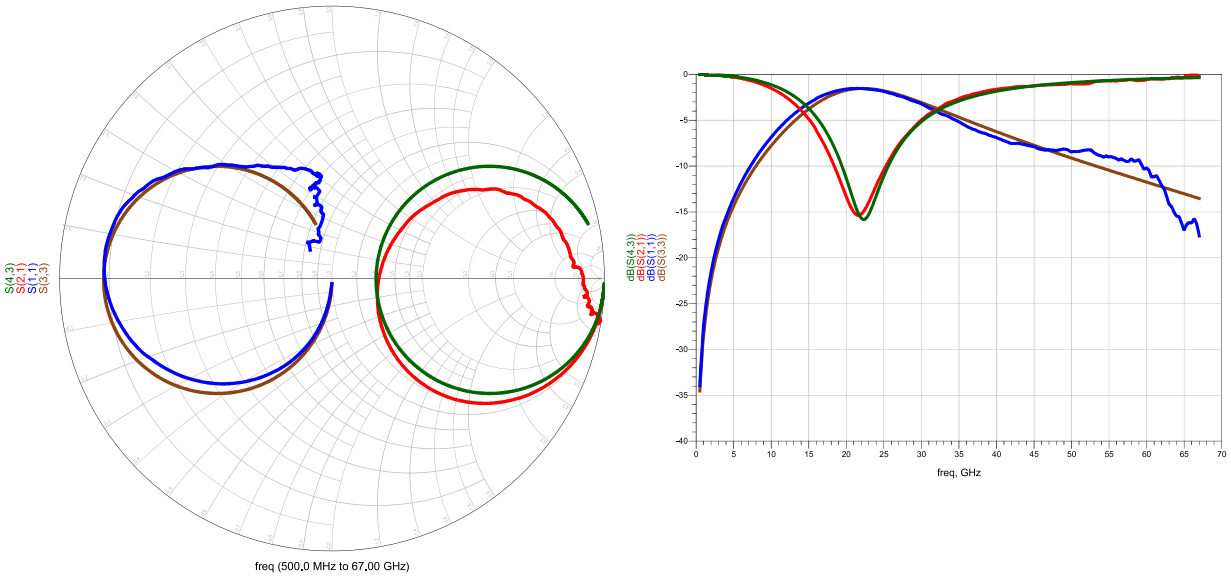
SERIES, 0V (Reverse Voltage)
GREEN, BROWN = MODEL



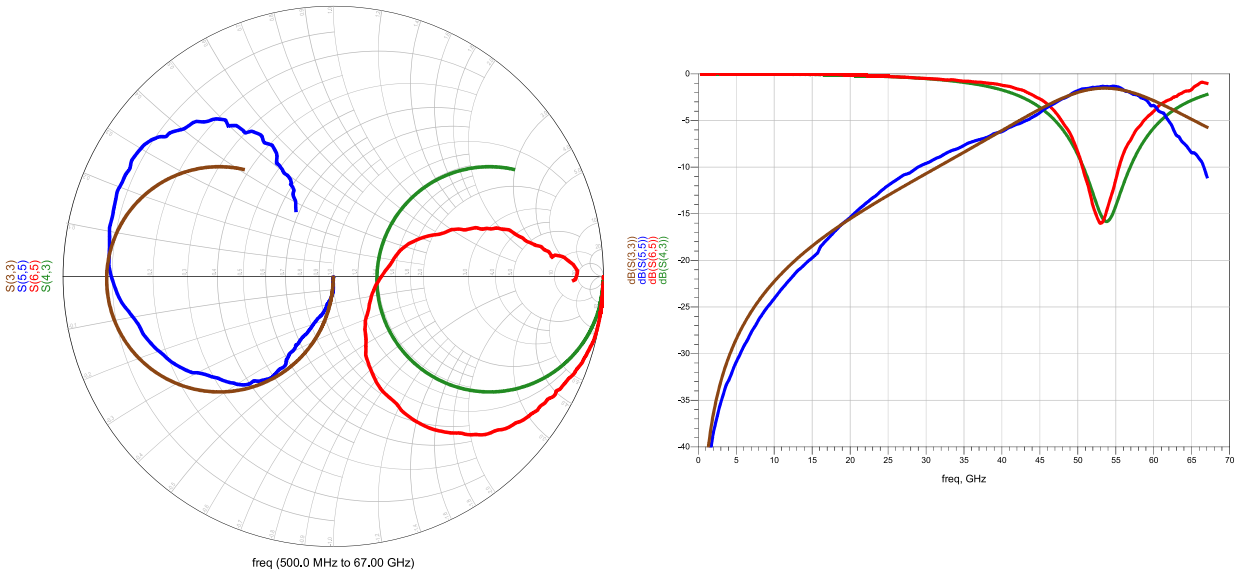
SERIES, 20V (Reverse Voltage)
GREEN, BROWN = MODEL



SHUNT, 0V (Reverse Voltage)
GREEN, BROWN = MODEL



SHUNT, 20V (Reverse Voltage)
GREEN, BROWN = MODEL



4. Handling and Ordering Information

4.1 Handling Recommendations

Gallium Arsenide (GaAs) varactors are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity.

4.2 Ordering Information

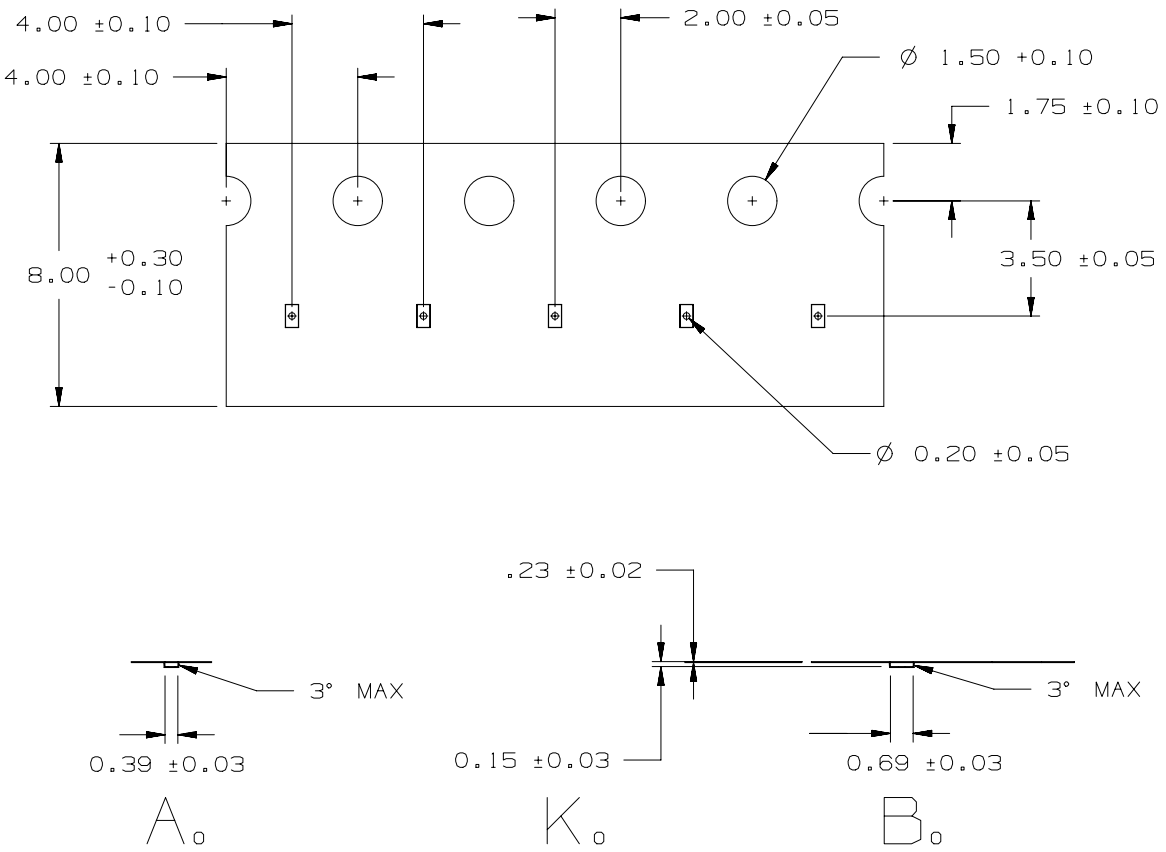
For additional ordering information, contact your Microchip sales representative.

Part Number	Package Style
MV3903	P2010

Note:

1. For Tape and reel add /TR at the end, for example, MV3903–P2010/TR.

Figure 4-1. Tape and Reel Format—4 mm pitch



5. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Table 5-1. Revision History

Revision	Date	Description
B	10/2024	• Added SPICE models. • Added Handling and Ordering Information.
A	07/2023	Document created.

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