

GaAs Hyperabrupt Junction Varactor Diodes



**GMV7811, GMV7821
GMV9801, GMV9821, GMV9822**

Features

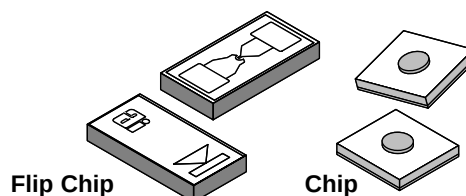
- Constant Gamma of 1.0 and 1.25
- Highly Linear Frequency Tuning
- Constant Modulation Sensitivity
- Lower Series Resistance and Higher Q in Comparison to Equivalent Silicon Hyperabrupt Varactors

Description

This series of GaAs hyperabrupt varactor diodes features a constant gamma of 1.0 and 1.25, which allows for a relatively linear frequency tuning for VCOs, modulators and tunable filters. Varactors in this series are grown by MBE (Molecular Beam Epitaxy), which allows monolayer control of the doping profile. This translates to superb wafer-to-wafer uniformity. The series resistance is lower, and Q is higher when compared to an equivalent silicon hyperabrupt varactor. These diodes are suited for applications at X band frequencies and above, where wide change in frequency is desired. However, in certain applications the GaAs hyperabrupt varactor exhibits a higher surface noise in comparison to an equivalent silicon varactor.

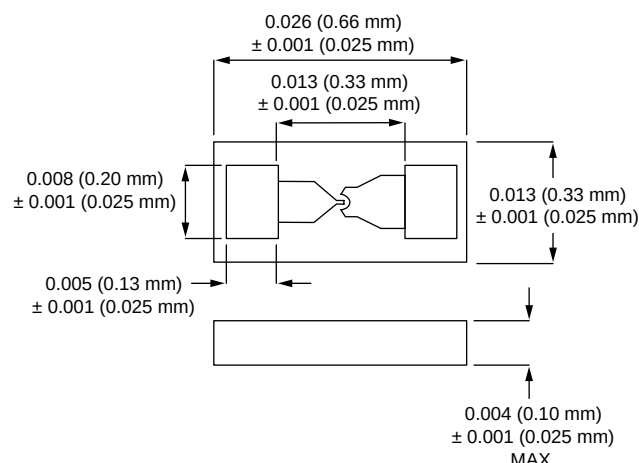
Absolute Maximum Ratings

Characteristic	Value
Reverse Voltage (V_R)	18 V
Forward Current (I_F)	100 mA
Power Dissipation at 25°C	250 mW
Operating Temperature (T_{OP})	-55°C to +150°C
Storage Temperature (T_{ST})	-65°C to +200°C

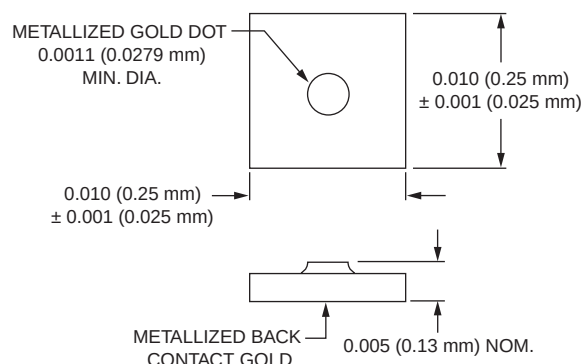


Outline Drawings

540-011



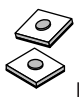
150-808



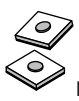
Electrical Characteristics

GaAs Hyperabrupt Junction Varactor Chips

Gamma = 1.0

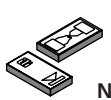
 Part Number	V_B @ 10 μA (V)	I_R @ 14.4 V (nA)	Typical Voltage Range of Gamma (V)	Junction Capacitance C_J @ 4 V (pF)		$\frac{C_J @ 2 V}{C_J @ 12 V}$ (Ratio)		$Q @ 4 V$ 50 MHz	Outline Drawing Number
	Min.	Max.		Min.	Max.	Min.	Max.	Typ.	
GMV7811-000	18	100	2–12	0.4	0.6	3.63	4.43	4000	150-808

Gamma = 1.25

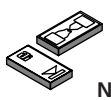
 Part Number	V_B @ 10 μA (V)	I_R @ 14.4 V (nA)	Typical Voltage Range of Gamma (V)	Junction Capacitance (pF)		$\frac{C_J @ 2 V}{C_J @ 12 V}$ (Ratio)		$Q @ 4 V$ 50 MHz	Outline Drawing Number
	Min.	Max.		Min.	Max.	Min.	Max.	Typ.	
GMV9801-000	18	100	2–12	0.3	0.4	5.14	6.28	4000	150-808

GaAs Hyperabrupt Junction Varactor Flip Chips

Gamma = 1.0

 Part Number	V_B @ 10 μA (V)	I_R @ 14.4 V (nA)	Junction Capacitance C_J @ 4 V (pF)		$\frac{C_J @ 2 V}{C_J @ 12 V}$ (Ratio)		$Q @ 4 V$ 50 MHz	Outline Drawing Number
	Min.	Max.	Min.	Max.	Min.	Max.	Typ.	
GMV7821-000	18	100	0.4	0.6	3.30	4.10	4000	540-011

Gamma = 1.25

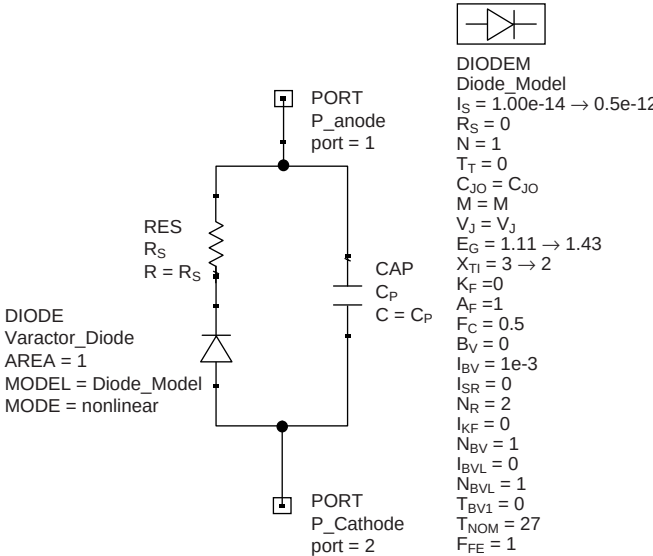
 Part Number	V_B @ 10 μA (V)	I_R @ 14.4 V (nA)	Junction Capacitance C_J @ 4 V (pF)		$\frac{C_J @ 2 V}{C_J @ 12 V}$ (Ratio)		$Q @ 4 V$ 50 MHz	Outline Drawing Number
	Min.	Max.	Min.	Max.	Min.	Max.	Typ.	
GMV9821-000	18	100	0.3	0.4	4.30	5.27	4000	540-011
♦ GMV9822-000	18	100	0.4	0.6	4.53	5.55	3500	540-011

♦ Available through distribution.

Typical Capacitance Values

V _R (V)	GMV7811	GMV9801	GMV7821	GMV9821	GMV9822
	C _J (pF)	C _J (pF)	C _J (pF)	C _J (pF)	C _J (pF)
0	1.38	1.12	1.33	1.07	1.55
1	1.03	0.84	1.01	0.81	1.17
2	0.80	0.63	0.79	0.61	0.88
3	0.62	0.45	0.61	0.45	0.64
4	0.50	0.35	0.50	0.35	0.50
5	0.42	0.28	0.42	0.29	0.41
6	0.36	0.23	0.37	0.24	0.34
7	0.32	0.20	0.33	0.21	0.30
8	0.28	0.17	0.30	0.19	0.26
9	0.26	0.15	0.27	0.17	0.23
10	0.23	0.14	0.25	0.15	0.21
11	0.22	0.12	0.23	0.14	0.19
12	0.20	0.11	0.21	0.13	0.18

SPICE Model



$$C_V = \frac{C_{J0}}{\left(\frac{1 + V_R}{V_J}\right)^M} + C_P$$

Part Number	C _{J0} (pF)	V _J (V)	M	C _P (pF)
GMV7811	1.38	5.20	2.10	0.080
GMV9801	1.12	5.50	2.30	0.030
GMV7821	1.33	5.20	2.00	0.080
GMV9821	1.07	5.50	2.40	0.060
GMV9822	1.55	5.50	2.40	0.080

1. Values extracted from measured performance.