

GaAs High Q Abrupt Tuning Varactors

Rev. V6

Features

- Constant Gamma Abrupt Junction: 0.5
- Highest Q
- Large Capacitance Variation with Voltage
- Custom Tailored Designs Available on Request
- RoHS* Compliant

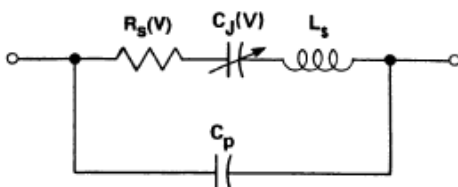
Description

The MA46600 series of microwave tuning varactors is a family of abrupt junction gallium arsenide devices featuring Q factors in excess of 8000. This series is specifically designed for broadband high Q tuning performance (up to 8000 at -4 volts and 50 MHz) from L through Ka band. Characteristics such as high reliability, low leakage and close capacitance tracking between diodes are typical of these devices. Standard capacitance matching is $\pm 10\%$, but closer matching is available upon request. All diode types are available in a wide selection of ceramic packages as well as in chip form.

Applications

The MA46600 series of tuning varactors can be used for both broad and narrow band tuning through Ka-band. Typical applications include solid state tuning of VCOs using transistors or Gunns as well as voltage tunable filters and amplifier circuits. The GaAs abrupt junction tuning varactors offer the highest Q of any tuning varactors and are utilized in high frequency applications where Q is premium.

PACKAGED TUNING VARACTOR EQUIVALENT CIRCUIT

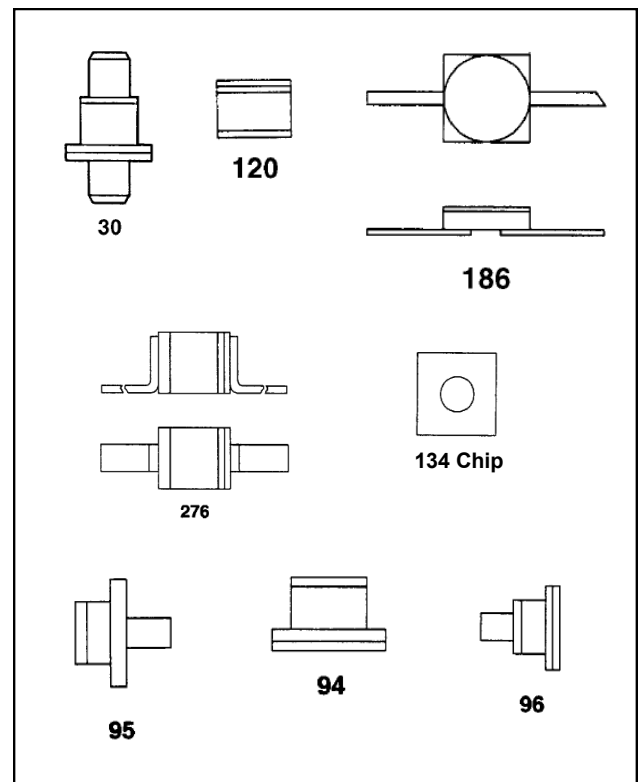


Absolute Maximum Ratings¹ @ T_A=+25°C

Parameter	Absolute Maximum
Operating Temperature	-65°C to +175°C
Storage Temperature	-65°C to +200°C
Reverse Voltage	Breakdown Voltage
Power Dissipation (derate linearly to zero at 200°C)	C _j < 1.0 pF max. @ 50 mW C _j ≥ 1.0 pF min. @ 100 mW

1. Operation of this device above any one of these parameters may cause permanent damage. The maximum storage and operating temperature of the plastic ODS-1088 case style is 125°C.

Common Case styles



Specifications subject to change without notice.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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Electrical Specifications @ $T_A = +25^\circ\text{C}$

Gamma 0.5 Abrupt Tuning Varactors

Breakdown Voltage @ $10\ \mu\text{A} = 30\ \text{V}$ minimum

Reverse Current @ $24\ \text{V} = 100\ \text{nA}$ maximum

Gamma = 0.48 - 0.50, VR = 0 to 30 V

Part Number	Break-down Voltage ⁶ Vb	Total Capacitance ^{1,2} +/-10%	Total Capacitance Ratio ^{1,2,4}	Q Minimum
	Ir=10 μA	Vr=4 V	$\frac{Vr=0\ \text{V}}{Vr=30\ \text{V}}$	Vr=4 V f=50 MHz
	(V)	(pF)	-	-
MA46600	30	0.3	1.9	8000
MA46602	30	0.5	2.5	7000
MA46603	30	0.6	2.8	6500
MA46604	30	0.8	3.2	6000

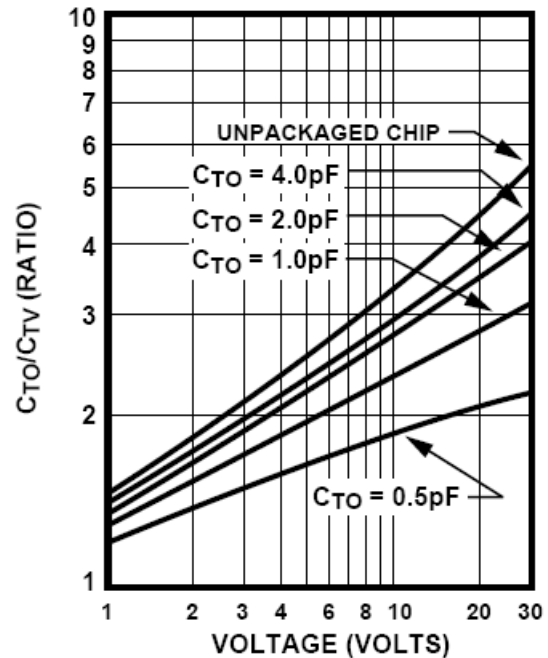
- Capacitance is measured at 1 MHz on a bridge which has been balanced with shielded test holders connected in place but open circuited.
- All GaAs tuning varactors are available in any case style shown in this bulletin as well as in chip form. When ordering, specify the desired case by adding the case designation as a suffix to the model number, i.e., MA46601-30. For example, a MA46601-30 specifies a 30 volt tuning diode in a case style 30 with a $C_{t@-4v}$ between .36 and .44 pF and a Q at -4 volts and 50 MHz ≥ 7500 . The capacitance values and capacitance ratios are for case style 30. Other case styles or chips will have slightly different values.
- All junctions are abrupt i.e., $\gamma = 0.50 \pm .03$.
- Total capacitance ratios will vary with case choice due to differences in case capacitance (C_p). Figure 1 shows the ratio for the 30 case style.
- Case parasitics (C_p and L_s) are given for most case styles.
- Breakdown voltage (V_B) is specified at $-10\ \mu\text{A}$.

Environmental Ratings

	Method	Levels
Temperature, Storage	1031	See Maximum Ratings
Temperature, Cycling	1051	5 cycles, -65 to + 150 C
Shock	2016	500 g's
Vibration	2056	15 g's
Constant Acceleration	2006	20,000 g's
Moisture Resistance	1021	10 days

Typical Performance Curves

CAPACITANCE CHANGE RATIOS FOR GaAs TUNING VARACTORS IN CASE STYLE 30



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