

# Step Recovery Diodes

## MA43000, MA44600, MA44700 Series

V3.00

### Features

- Low Transition Times
- Tight Capacitance Ranges
- High Voltage and Low Thermal Resistance  
for Higher Input Power
- Surface Mount Package Available (SOT-23)

### Description

The MA44600 series of Step Recovery diodes is designed for use in low and moderate power multipliers with output frequencies of up to 20 GHz. These Step Recovery diodes generate harmonics by storing a charge as the diode is driven to forward conductance by the positive voltage of the input signal. When the signal reverses polarity, this charge is extracted. The Step Recovery diode will appear as a low impedance current source until all the charge is extracted, then it will “snap” to a higher impedance. This causes a voltage pulse to form in the impulse circuit of the multiplier. Step Recovery diodes make excellent high order multipliers such as comb generators. They are also useful as efficient moderate power X2- X4 multipliers.

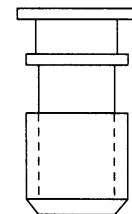
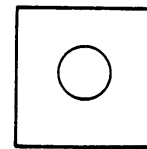
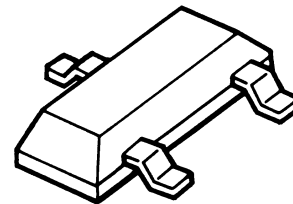
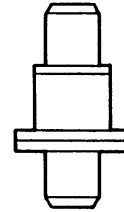
### Applications

High Order Narrow Band Moderate Power Multipliers  
(MA44600 series)

Comb Generators (MA43592, MA43543)

High Power Circuit Tested Multiplier (MA43000 Series)

Surface Mount Low Power Multipliers (MA44700 Series)



Specifications Subject to Change Without Notice.

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## Electrical Specifications @ 25°C

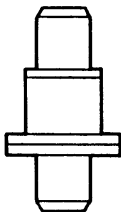
### Snap Varactors

Model <sup>1</sup> Number	Minimum <sup>2</sup> Reverse Voltage $V_R$ (Volts)	Junction <sup>3</sup> Capacitance Range ( $C_j$ ) Min./Max. (pF)	Minimum Lifetime 10 mA/6 mA TI (ns)	Transition Time $T_S$ <sup>4</sup> (ps)	
				Nominal	Max.
MA44621A	20	0.2 / 0.3	7	50	100
MA44621B	20	0.3 / 0.4	7	50	100
MA44621C	20	0.4 / 0.5	7	50	100
MA44622A	20	0.5 / 0.7	7	50	100
MA44622B	20	0.7 / 0.9	7	50	100
MA44631A	30	0.3 / 0.5	8	70	100
MA44631B	30	0.5 / 0.7	8	70	100
MA44631C	30	0.7 / 0.9	8	70	100
MA44641A	40	0.4 / 0.6	12	90	150
MA44641B	40	0.6 / 0.8	12	90	150
MA44641C	40	0.8 / 1.1	12	90	150
MA44652A	50	0.5 / 0.7	15	150	200
MA44652B	50	0.7 / 0.9	15	150	200
MA44652C	50	0.9 / 1.1	15	150	200
MA44663A	60	0.7 / 0.9	20	250	300
MA44663B	60	0.9 / 1.1	20	250	300
MA44663C	60	1.1 / 1.5	20	250	300
MA44663D	60	1.5 / 2.0	20	250	300

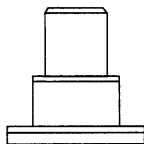
#### Notes:

- When ordering, specify the desired case style by adding the case designation as a suffix to the model number. Case styles for the MA44600 series are 30, 91 and 93. To order in chip form, add the suffix "134" to the model number. The nominal chip size for the MA44600 series is 15 mils.
- Reverse voltage ( $V_R$ ) is measured at a reverse bias current of 10  $\mu$ A.
- Junction capacitance is measured at a reverse voltage of 6 volts and a frequency of 1 MHz.
- Transition time is measured between 20% and 80% points on the voltage recovery trace. Test conditions are +10 mA and -10 volts.

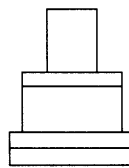
### Case Styles (See appendix for complete dimensions)



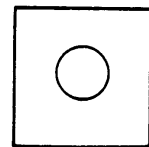
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91



93



134

Specifications Subject to Change Without Notice.

## Electrical Specifications @ 25° C (Cont'd)

## High Power Circuit Tested Step Recovery Diodes

Model Number	Case <sup>1</sup> Style	Minimum Output Power (Watts)	Input Frequency (GHz)	Output Frequency (GHz)	Maximum Input Power (Watts)	Min./Max. <sup>2</sup> Reverse Voltage $V_R$ (Volts)
MA43000	103	4.0	0.333	2.0	15	85 - 105
MA43002	91	1.5	2.000	6.0	5	45 - 70
MA43004	91	0.3	3.300	13.0	2	30 - 45

Model Number	Min./Max. <sup>3</sup> Junction Capacitance $C_j$ (pF)	Min./Max. Lifetime, $T_L$ 10 mA/6 mA (ns)	Maximum Snap Time, $T_S$ -10V/10 mA (ps)	Maximum Thermal Resistance, $j_c$ (C/W)
MA43000	3 - 4.50	250 - 500	600	12
MA43002	1.60 - 2.40	75 - 225	250	25
MA43004	0.45 - 0.85	20 - 50	150	45

## Surface Mount Step Recovery Diodes (SOT-23)

Model Number	Min./Max. Total Capacitance (pF)	Minimum Reverse Voltage $V_R$ (Volts)	Nominal Carrier Lifetime $T_L$ (ns)	Maximum Transition Time $T_S$ (psec)	Suggested	
	$f = 1 \text{ MHz}$ $V_R = 6 \text{ V}$	$I_R = 10 \mu\text{A}$			Nominal Input Frequency (GHz)	Nominal Output Frequency (GHz)
MA44767	3 - 4.5	30V	250 - 500	600	0.05 - 0.5	0.5 - 1.5
MA44768	1.6 - 2.4		75 - 225	250	0.1 - 1	0.5 - 2.5
MA44769	0.8 - 1.2		20 - 50	150	0.1 - 1	1 - 5

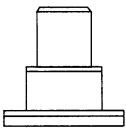
## Notes:

1. The standard case styles are indicated for each model number.  
Other case styles are available. Consult the factory for information.

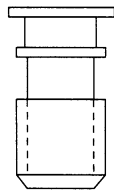
2. Reverse voltage is measured at reverse bias current of 10  $\mu\text{A}$ .

3. Junction capacitance is measured at a reverse bias of 6 volts and a frequency of 1 MHz.

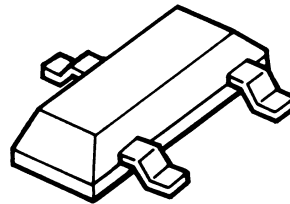
## Case styles (See appendix for complete dimensions)



91



103



SOT-23 (High Profile)

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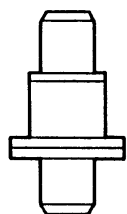
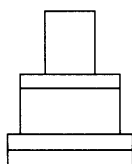
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**Electrical Specifications @ 25° C (Cont'd)****High Order Step Recovery Diode Varactors for Use in Comb Generation**

Model Number	Case <sup>1</sup> Style	Maximum <sup>2</sup> Input Power (Watts)	Min./Max. <sup>3</sup> Reverse Voltage $V_R$ (Volts)	Min./Max. <sup>4</sup> Junction Capacitance $C_j$ (pF)	Min./Max. Carrier Lifetime, $T_L$ (ps)	Maximum Snap Time, $T_S$ -10V/10 mA (ps)	Maximum Thermal Resistance $j_c$ (C/W)	Nominal <sup>2</sup> Output Frequency (GHz)
MA43592	30	1.0	25 - 40	0.2 - 0.30	9 - 27	90	70	1 - 12
MA43543	93	1.5	20 - 50	0.2 - 0.55	10 - 25	60	125	2 - 20

**Notes:**

1. The standard case styles are indicated for each model number. For other available case styles, consult the factory.
2. This is an operable output frequency range and does not imply instantaneous bandwidth.
3. Breakdown voltage is measured at a reverse bias voltage of 10  $\mu$ A.
4. Junction capacitance is measured at a reverse bias voltage of 6 volts and a frequency of 1 MHz.

**Case Styles** (See appendix for complete dimensions)**30****93****Absolute Maximum Ratings @ 25°C**

Parameter	Absolute Maximum
Temperature Range	
Operating Range	-65°C to +200°C -65°C to +125°C (SOT-23 only)
Storage Range	-65°C to +200°C -65°C to +125°C (SOT-23 only)

**Environmental Performance**

The MA44600 and MA43000 series of diodes in ceramic packages are capable of meeting the tests dictated by the methods and procedures of the latest revisions of MIL-S-19500, MIL-STD-202 and MIL-STD-750 which specify mechanical, electrical, thermal and other environmental tests common to military semiconductor products.