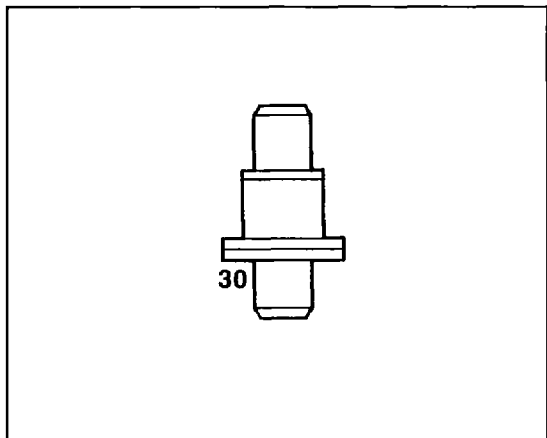


MA44600 Series

Step Recovery Diodes



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 SRD 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 SRD 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. SRD diodes make excellent high order multipliers such as comb generators. They are also useful as efficient moderate power X2 – X4 multipliers. The MA44750 series of higher power step recovery multiplier diodes are higher voltage SRD diodes for use in multipliers with output frequencies of 200 MHz to ~8 GHz, where higher output power of 5 to 50 watts is required. These diodes are normally useful in multipliers with multiplication ratios of 2 to 6 times.

Features

- LOW TRANSITION TIMES
- TIGHT CAPACITANCE RANGES
- HIGH VOLTAGE AND LOW THERMAL RESISTANCE FOR HIGHER INPUT POWER

Applications

High Order Narrow Band Moderate Power Multipliers (MA44600 series)

Comb Generators (MA43592, MA43543)

High Power Narrow Band Multipliers (2 – 6 times) (MA44750 series)

High Power Circuit Tested Multipliers (MA43000 series)

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

Model ¹ Number	Voltage ² Breakdown Minimum V_b (Volts)	Junction ³ Capacitance Range (C_j) Min./Max. (pF)	Minimum Lifetime 10 mA/6 mA T_I (ns)	Transition Snap Time (ps)	
				Nominal	Max.
MA44611A	15	.2-.3	5	50	100
MA44611B	15	.3-.4	5	50	100
MA44611C	15	.4-.5	5	50	100
MA44612A	15	.5-.7	5	50	100
MA44612B	15	.7-.9	5	50	100
MA44612C	15	.9-1.1	5	50	100
MA44612D	15	1.1-1.5	5	50	100
MA44621A	20	.2-.3	7	50	100
MA44621B	20	.3-.4	7	50	100
MA44621C	20	.4-.5	7	50	100
MA44622A	20	.5-.7	7	50	100
MA44622B	20	.7-.9	7	50	100
MA44622C	20	.9-1.1	7	50	100
MA44622D	20	1.1-1.5	7	50	100
MA44631A	30	.3-.5	8	70	100
MA44631B	30	.5-.7	8	70	100
MA44631C	30	.7-.9	8	70	100
MA44631D	30	.9-1.1	8	70	100
MA44632A	30	.5-.7	8	70	120
MA44632B	30	.7-.9	8	70	120
MA44632C	30	.9-1.1	8	70	120
MA44632D	30	1.1-1.5	8	70	120
MA44641A	40	.4-.6	12	90	150
MA44641B	40	.6-.8	12	90	150
MA44641C	40	.8-1.1	12	90	150
MA44641D	40	1.1-1.5	12	90	150
MA44642A	40	.5-.7	12	150	200
MA44642B	40	.7-.9	12	150	200
MA44642C	40	.9-1.1	12	150	200
MA44642D	40	1.1-1.5	12	150	200
MA44643A	40	.7-.9	12	250	300
MA44643B	40	.9-1.1	12	250	300
MA44643C	40	1.1-1.5	12	250	300
MA44643D	40	1.5-2.0	12	250	300
MA44652A	50	.5-.7	15	150	200
MA44652B	50	.7-.9	15	150	200
MA44652C	50	.9-1.1	15	150	200
MA44652D	50	1.1-1.5	15	150	200
MA44653A	50	.7-.9	15	250	300
MA44653B	50	.9-1.1	15	250	300
MA44653C	50	1.1-1.5	15	250	300
MA44653D	50	1.5-2.0	15	250	300
MA44663A	60	.7-.9	20	250	300
MA44663B	60	.9-1.1	20	250	300
MA44663C	60	1.1-1.5	20	250	300
MA44663D	60	1.5-2.0	20	250	300

* The nominal chip size for the MA44600 series is 15 mils.

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, 31, 91, 92, 93, 111 and 113. To order in chip form, add the suffix "C" to the model number.
- Breakdown voltage (V_b) is measured at a reverse bias current of 10 μA .

- 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. These values are guaranteed for the A and B capacitance ranges only. Test conditions are +10 mA and -10 volts.

Specifications @ $T_A = 25^\circ \text{C}$ (Cont'd)

HIGH POWER CIRCUIT TESTED STEP RECOVERY DIODES

Model Number	Case ¹ Style	Minimum Output Power (Watts)	Input Frequency (GHz)	Output Frequency (GHz)	Maximum Input Power (Watts)	Min./Max. ² Breakdown Voltage Range, V_B (Volts)
MA4B300	43	8.0	0.400	2.0	30	100-145
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. ³ Junction Capacitance Range, C_j (pF)	Min./Max. Minor Carrier Lifetime, T_L 10 mA/6 mA (ns)	Maximum Snap Time, T_S ~ 10V/10 mA (ps)	Maximum Thermal Resistance, j_c (C/W)
MA4B300	5.00-8.00	300-800	750	7
MA43000	3.00-4.50	250-500	600	12
MA43002	1.60-2.40	75-225	250	25
MA43004	0.45-0.85	20-50	150	45

NOTES

- The standard case styles are indicated for each model number. Other case styles are available. Consult the factory for information.
- Breakdown voltage is measured at reverse bias current of 10 μA .
- Junction capacitance is measured at a reverse bias of 6 volts and a frequency of 1 MHz.

MA44750 SERIES HIGH POWER STEP RECOVERY MULTIPLIER DIODES

Model ¹ Number	Case Style	Minimum ⁵ Breakdown Voltage, V_B (Volts)	Min./Max. ⁶ Junction Capacitance, C_j (pF)	Maximum Thermal Resistance (C/W)	Maximum Transition Time, T_S ~ 10V/10 mA (ps)	Output ² Frequency Range (GHz)
MA44750	56	180	8.0-12.0	8	3000	0.2-0.5
MA44751	56	160	5.0-8.0	8	2000	0.5-1.0
MA44752	56	120	3.0-5.0	10	1500	1.0-2.0
MA44753	30	100	1.5-3.0	12	1000	2.0-4.0
MA44754	30	80	1.0-1.5	15	750	4.0-8.0

NOMINAL CHARACTERISTICS

Model Number	Output Power ^{3, 4} (Watts)	Minor Carrier Lifetime, T_L 10 mA/6 mA (ns)	X3 Efficiency ⁷ (%)	Chip Size ¹ (mils)
MA44750	60	500	65	65
MA44751	20	400	60	50
MA44752	10	250	55	30
MA44753	8	150	50	20
MA44754	6	70	45	20

NOTES

- Standard case styles are listed for each model number. For other case styles available, consult the factory. These diodes can be supplied in chip form. To order in chip form, add the suffix "C" to the model number.
- This is an operable output frequency and does not imply instantaneous bandwidth.
- Characteristic values are based on performance tests and include circuit losses amounting to about 1.5 dB. For special circuits, factors other than the diode may cause variations from the values shown. Contact the factory before using this information for equipment design.
- These are nominal values at the midpoint of the specified frequency range. The MA44750 series of diodes can be operated at full efficiency over a broad range of drive power.
- Breakdown voltage is measured at a reverse current of 10 μA .
- Junction capacitance is measured at 1 MHz and ~ 6 volts. The nominal tolerance is $\pm 10\%$, but $\pm 3\%$ control is available at a nominal charge. Contact the factory. Nominal case capacitance are given with the case style outline drawings.
- These are nominal values for narrow band circuits within the suggested frequency range and are to be used as guidelines in circuit designs. These values can vary substantially depending on the multiplier circuit design. These diodes are specifically designed for multiplication orders from 2 to 6.

Specifications @ $T_A = 25^\circ\text{C}$ (Cont'd)**HIGH ORDER SRD VARACTORS FOR USE IN COMB GENERATION**

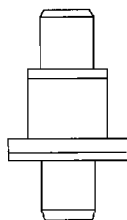
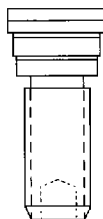
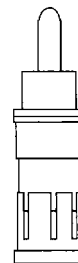
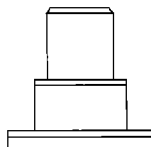
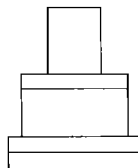
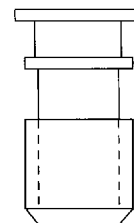
Model Number	Case ¹ Style	Maximum ² Input Power (Watts)	Min./Max. ³ Breakdown Voltage Range, V_B (Volts)	Min./Max. ⁴ Junction Capacitance C_j Range (pF)	Min./Max. Minor Carrier Lifetime, T_L Range (ps)	Maximum Snap Time, T_S - 10V/10 mA (ps)	Maximum Thermal Resistance j_c (C/W)	Nominal ² Output Frequency (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 $10\ \mu\text{A}$.
4. Junction capacitance is measured at a reverse bias voltage of 6 volts and a frequency of 1 MHz.

MAXIMUM RATINGS**Temperature Range****Operating Range** - 65°C to $+200^\circ\text{C}$ **Storage Range** - 65°C to $+200^\circ\text{C}$ **ENVIRONMENTAL PERFORMANCE**

The MA44600 series of diodes is 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 semiconductor products.

Case Styles**30****43****56****91****93****103**