

Ceramic Packaged Step Recovery Diodes

Technical Data

5082-0132
5082-0253
5082-0300
5082-0320
5082-0335
5082-0800
5082-0830
5082-0835
5082-0885

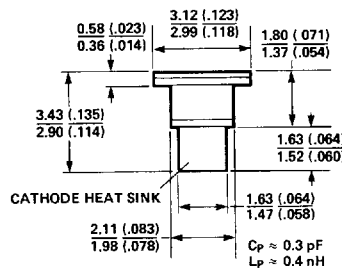
Features

- **UHF Through Ku Band Diodes**
For Low Order and High Order Multipliers
- **RF Tested**
For Guaranteed Performance (5082-0300 Series)
- **Hermetic Package**
For Industrial/Military Environments

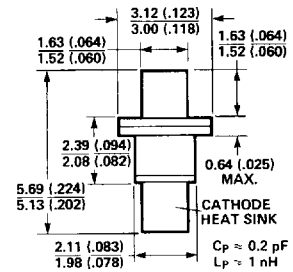
Description/ Applications

HP Step Recovery Diodes are constructed using modern epitaxial techniques. Oxide passivation insures maximum stability and reliability. Devices are available in many package styles.

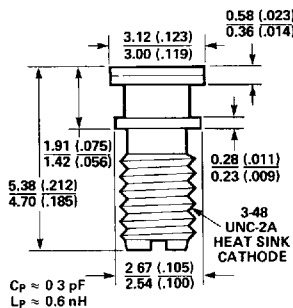
These devices are intended for use as low and high order harmonic generators requiring the ultimate in performance and reliability. They excel as doublers as well as high order multipliers, because the fast transition time design allows full usage of the forward stored charge effect in improving nonlinearity and efficiency for frequency multiplication. These step recovery diodes have the basic design capability to meet



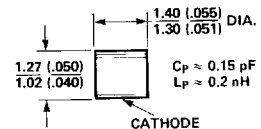
Outline 41



Outline 31



Outline 40



Outline 56

DIMENSIONS IN MILLIMETERS AND (INCHES)

the general reliability requirements of MIL-S-19500, in addition to the special reliability requirements of man-rated space systems.

Mechanical Specifications

Hewlett-Packard's Step Recovery Diodes are available in a

variety of packages. The metal ceramic packages are hermetically sealed. The anode studs and flanges are gold-plated Kovar. The cathode studs are gold-plated copper. The maximum soldering temperature for metal-ceramic packages is 230°C for five seconds.

Maximum Ratings

Junction Operating and Storage

Temperature Range-65°C to 200°C

DC Power Dissipation at $T_{CASE} = 25^\circ\text{C}$ $\frac{200^\circ\text{C} - T_{CASE}}{\theta_{jc}}$

Soldering Temperature230°C for 5 sec.

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

Part Number 5082-	Junction Capacitance C_j (pF)		Min. Break-down Voltage V_{BR} (V)	Min. Cutoff Frequency f_c (GHz)	Package Outline	Transition Time		Min. Lifetime τ (nsec)	Typical Thermal Resistance θ_{jc} ($^\circ\text{C}/\text{W}$)	Typical Output Power P_O (W)
	Min.	Max.				Max. t_t (psec)	Charge Level (pc)			
0835	0.1	0.5	15	350	31	75	100	10	60	0.3
0885	0.1	0.5	15	350	56	75	100	10	60	0.3
0253	-	0.6*	25	-	31	100	200	10	75	-
0830	0.35	1.2	25	200	31	100	300	10	45	1.0
0132	-	1.5*	35	-	31	175	1000	50	40	-
0800	3.5	5.0	75	100	40	400	1500	200	15	10
Test Conditions	$f = 1 \text{ MHz}$ $V_R = 6 \text{ V}$ $*V_R = 10 \text{ V}$		$I_R = 10 \mu\text{A}$	$f_c = 1$ $2 \pi R_S C_j$				$I_F = 10 \text{ mA}$ $I_R = 6 \text{ mA}$		As a doubler

RF Tested Diodes at $T_A = 25^\circ\text{C}$

Electrical Specifications

Part Number 5082-	Output Frequency, f_o (GHz)	N Order	Min. Output Power, $P_O^{(1)}$ (W)	Junction Capacitance at -10V, 1 MHz, C_j (pF)		Breakdown Voltage at $I_R = 10 \mu\text{A}$, V_{BR} (V)		Max. Thermal Resistance, θ_{jc} ($^\circ\text{C}/\text{W}$)	Package Outline	Typical Transition Time		Typical Lifetime τ (ns)
				Min.	Max.	Min.	Max.			t_t (ps)	Charge Level (pc)	
0300	2	X 10	2.0	3.2	4.7	75	100	14	40	300	2400	200
0320	10	X 5	0.23	0.35	1.0	25	40	60	41	60	300	25
0335	16	X 8	0.03	0.25	0.5	20	30	75	31	60	100	15

Note:

1. Guaranteed multiplier tested results. Input power is:

5082-0300 15 W 5082-0320 2 W
5082-0335 0.65 W

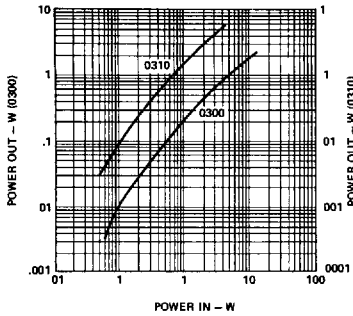


Figure 1. Typical Output Power vs. Input Power at $T_A = 25^\circ\text{C}$. The 5082-0300 is measured in a X 10 multiplier with P_{IN} at 0.2 GHz and P_O at 2.0 GHz.

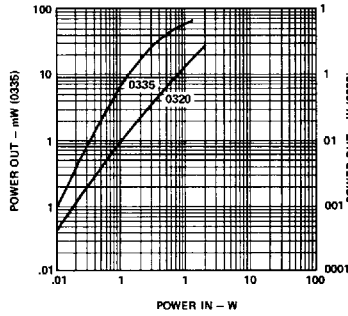


Figure 2. Typical Output Power vs. Input Power at $T_A = 25^\circ\text{C}$. The 5082-0335 is measured in a X 8 multiplier with P_{IN} at 0.2 GHz and P_O at 16 GHz. The 5082-0320 is measured in a X 5 multiplier with P_{IN} at 2.0 GHz and P_O at 10 GHz.

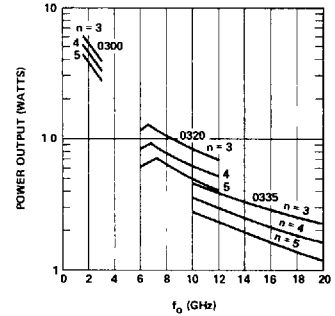


Figure 3. Predicted power output curves for 03XX step recovery diodes in X 3, X 4, and X 5 multiplier applications. These results were obtained using computer optimization programs.

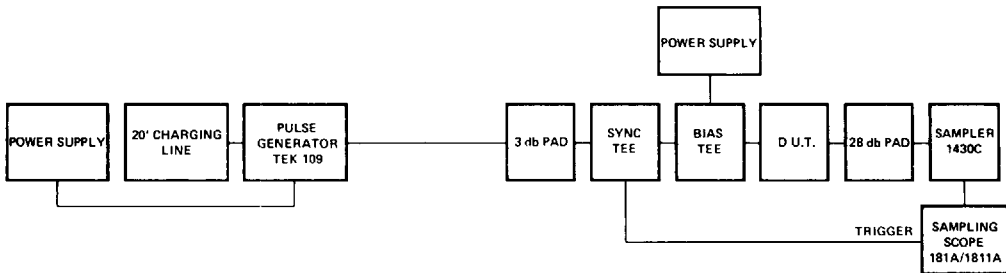


Figure 4. Test circuit for transition time. The pulse generator circuit is adjusted for a 0.5 A pulse when testing 5082-0253, -0335, -0835, and -0885. A pulse of 1.0 A is used for all other diodes. The bias current is adjusted for the specified stored charge level. The transition time is read between the 20% and the 80% points on the oscilloscope.

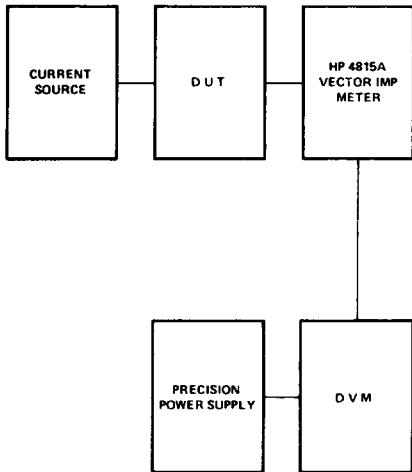


Figure 5. Test setup for measurement of series resistance. The D.U.T. is forward biased (I_F) and the real part of the diode impedance is measured at 100 MHz. The D.V.M. is set up to read the real part on the Vector Voltmeter. The precision power supply is used to offset the test circuit resistance. R_s is measured at $I_F = 100$ mA, except -0800 where $I_F = 500$ mA and -0885 where $I_F = 300$ mA.

OUTPUT WAVE SHAPE

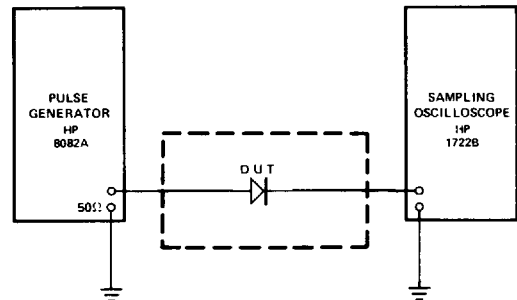
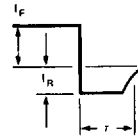


Figure 6. The circuit for measurement of the effective minority carrier lifetime. The value of the reverse current (I_R) is approximately 6 mA and the forward current (I_F) is 10 mA. The lifetime (τ) is measured across the 50% points of the observed wave shape. The input pulse is provided by a pulse generator having a rise time of less than one nanosecond. The output pulse is observed on a sampling oscilloscope.