HEWLETT PACKARD

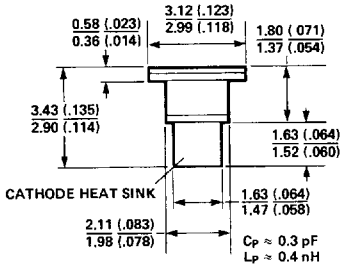
# Ceramic Packaged Step Recovery Diodes

## Technical Data

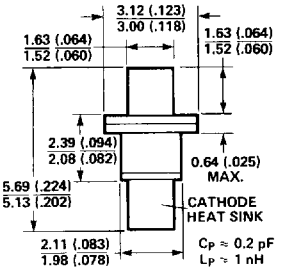
**5082-0132**
**5082-0253**
**5082-0300**
**5082-0320**
**5082-0335**
**5082-0800**
**5082-0830**
**5082-0835**
**5082-0885**

### Features

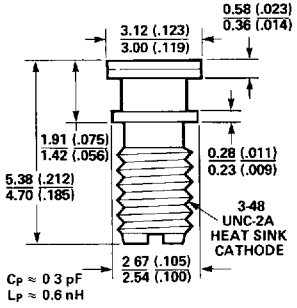
- **UHF Through Ku Band Diodes**
  For Low Order and High Order Multipliers
- **RF Tested**
  For Guaranteed Performance (5082-0300 Series)
- **Hermetic Package**
  For Industrial/Military Environments



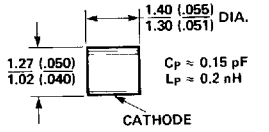

**Outline 41**




**Outline 31**




**Outline 40**




**Outline 56**

DIMENSIONS IN MILLIMETERS AND (INCHES)

### 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 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°C ..... $\frac{200°C - T_{CASE}}{\theta_{jc}}$

Soldering Temperature ..... 230°C for 5 sec.

## Electrical Specifications at $T_A$ = 25°C

| Part Number 5082- | Junction Capacitance $C_J$ (pF) | | Min. Breakdown Voltage $V_{BR}$ (V) | Min. Cutoff Frequency $f_C$ (GHz) | Package Outline | Transition Time | | Min. Lifetime $\tau$ (nsec) | Typical Thermal Resistance $\theta_{jc}$ (°C/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 MHz $V_R$ = 6 V *$V_R$ = 10 V | | $I_R$ = 10 µA | $f_C = \frac{1}{2\pi R_S C_j}$ | | | | $I_F$ = 10 mA $I_R$ = 6 mA | | As a doubler |

## RF Tested Diodes at $T_A$ = 25°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 µA $V_{BR}$ (V) | | Max. Thermal Resistance, $\theta_{jc}$ (°C/W) | Package Outline | Typical Transition Time | | Typical Lifetime $\tau$ (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

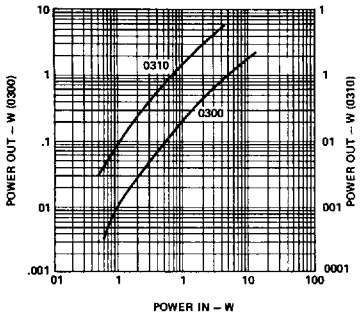



**Figure 1. Typical Output Power vs. Input Power at $T_A$ = 25°C. The 5082-0300 is measured in a X 10 multiplier with $P_{IN}$ at 0.2 GHz and $P_O$ at 2.0 GHz.**

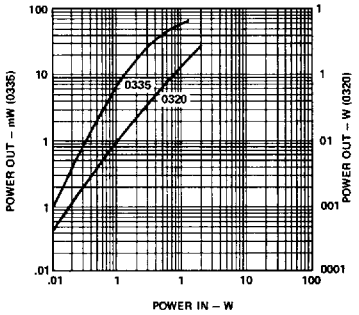



**Figure 2. Typical Output Power vs. Input Power at $T_A$ = 25°C. The 5082-0335 is measured in a X 8 multiplier with $P_{IN}$ at 0.2 GHz and $P_O$ at 16 GHz. The 5082-0320 is measured in a X 5 multiplier with $P_{IN}$ at 2.0 GHz and $P_O$ at 10 GHz.**

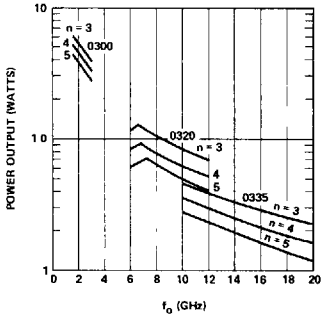



**Figure 3. Predicted power output curves for 03XX step recovery diodes in X 3, X 4, and X 5 multiplier applications. These results were obtained using computer optimization programs.**

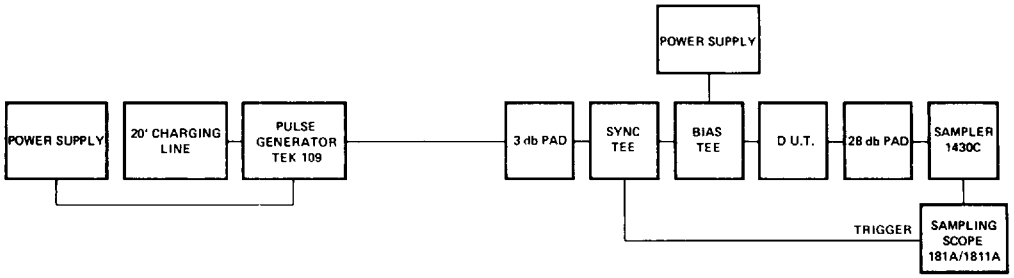



**Figure 4. Test circuit for transition time. The pulse generator circuit is adjusted for a 0.5 A pulse when testing 5082-0253, -0335, -0835, and -0885. A pulse of 1.0 A is used for all other diodes. The bias current is adjusted for the specified stored charge level. The transition time is read between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

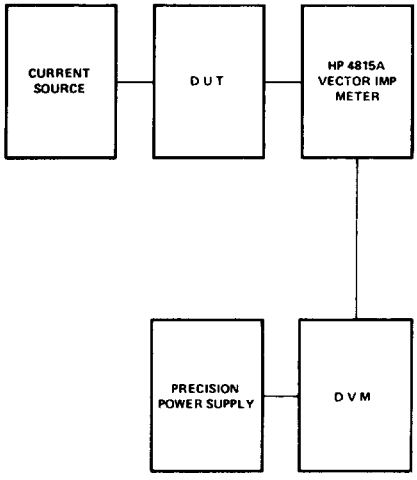



**Figure 5. Test setup for measurement of series resistance. The D.U.T. is forward biased ($I_F$) and the real part of the diode impedance is measured at 100 MHz. The D.V.M. is set up to read the real part on the Vector Voltmeter. The precision power supply is used to offset the test circuit resistance.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

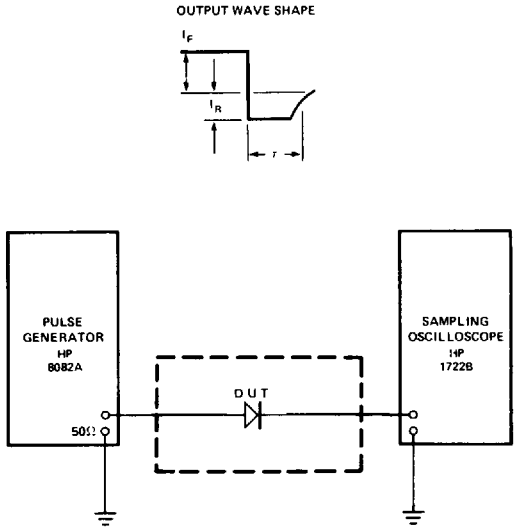



**Figure 6. The circuit for measurement of the effective minority carrier lifetime. The value of the reverse current ($I_R$) is approximately 6 mA and the forward current ($I_F$) is 10 mA. The lifetime (τ) is measured across the 50% points of the observed wave shape. The input pulse is provided by a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