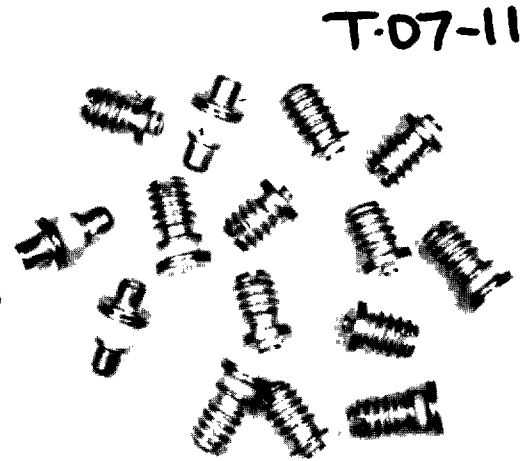


Gunn Diodes

Features

- Spot Frequency
- Choice of Package Styles
- Range of Microwave Power Outputs
- Specific Types for Low Cost
- Commercial Applications
- High Reliability
- Special Screening to Customer Requirements Available



Description

Gunn devices are solid state components which are used to generate energy at microwave frequencies from a DC power input.

Alpha Gunn diodes are produced from epitaxial gallium arsenide grown in Alpha's own in-house epitaxy facility. This sheet describes both the performance of low power, low cost devices suitable for high volume commercial applications as well as high power diodes. Devices for the lowest power applications are produced in a nonflip configuration; that is with the active layer uppermost in the package, requiring the heat sink to be biased as the anode. A flip device construction is used

for the higher power diodes in which the active layer is bonded close to the package heat sink for optimum thermal performance. Such devices require the heat sink to be biased as the cathode.

The tables below list standard device types with performance data applicable to their operation in Alpha critically coupled test cavities. To accommodate alternative requirements, special devices may also be manufactured and tested against other specifications in customer supplied cavities. Please inquire.

Low Power Anode Heat Sink Gunn Diodes

**CW Gunn Diodes, X-Band, 8.2-12.4 GHz
Anode Heat Sink Package 023-001**

| Type | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|---------------|------------------------|---------------------------|
| DGB8081 | 5 | 40 | 8 |
| DGB8181 | 10 | 80 | 8 |
| DGB8281 | 20 | 110 | 8 |
| DGB8381 | 30 | 140 | 8 |

**Pulsed Gunn Diodes, X-Band, 8.2-12.4 GHz
Anode Heat Sink Package 023-001**

| Type | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|---------------|------------------------|---------------------------|
| DGB7081 | 5 | | |
| DGB7181 | 10 | 70 -120 | 8 -12 |
| DGB7281 | 20 | | |
| DGB7381 | 30 | | |

Gunn Diodes

Low Power Anode Heat Sink Gunn Diodes(cont'd)

CW Gunn Diodes, Ku-Band, 12.4-18.0 GHz
Anode Heat Sink Package 023-001

| Type | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|---------------|------------------------|---------------------------|
| DGB8031 | 5 | 40 | 8 |
| DGB8131 | 10 | 95 | 7 |
| DGB8231 | 20 | 125 | 7 |

Pulsed Gunn Diodes, Ku-Band, 12.4-18.0 GHz
Anode Heat Sink Package 023-001

| Type | Peak Power (mW) | Peak Operating Current (mA) | Peak Operating Voltage (Volts) |
|---------|-----------------|-----------------------------|--------------------------------|
| DGB7031 | 5 | | |
| DGB7131 | 10 | 70 -120 | 7 -10 |
| DGB7231 | 20 | | |

CW Gunn Diodes, K-Band, 18-26.5 GHz
Anode Heat Sink Package 023-001

| Type | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|---------------|------------------------|---------------------------|
| DGB8091 | 5 | 70 | 5 |
| DGB8191 | 10 | 110 | 5 |
| DGB8291 | 20 | 175 | 5 |

Pulsed Gunn Diodes, K-Band, 18-26.5 GHz
Anode Heat Sink Package 023-001

| Type | Peak Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|-----------------|------------------------|---------------------------|
| DGB7091 | 5 | | |
| DGB7191 | 10 | 70 -120 | 7 -10 |
| DGB7291 | 20 | | |

CW Gunn Diodes, 26.5-60 GHz
Anode Heat Sink Package 315-001

| Type | Frequency Range (GHz) | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|-----------------------|---------------|------------------------|---------------------------|
| DGB8054 | 26.5-40 | 5 | 100 | 4 |
| DGB8154 | 26.5-40 | 10 | 175 | 4 |
| DGB8064 | 40-60 | 5 | 140 | 3 |
| DGB8164 | 40-60 | 10 | 250 | 3 |

Pulsed Gunn Diodes, 26.5-60 GHz
Anode Heat Sink Package 315-001

| Type | Peak Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|---------|-----------------|------------------------|---------------------------|
| DGB7054 | 5 | 100-175 | 4-8 |
| DGB7154 | 10 | 100-175 | 4-8 |
| DGB7064 | 5 | 140-250 | 3-7 |
| DGB7164 | 10 | 140-250 | 3-7 |

Surface Mounted Gunn Diodes, 5.0-36.5 GHz
Anode Heat Sink Suggested Package 315-001

| Type | CW Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|------------------------------------|---------------|------------------------|---------------------------|
| Custom Design For Each Application | 5 | 120 | 4-8 |

Gunn Diodes for Self-Detect (Autodyne) Applications
Anode Heat Sink Package 023-001

| Type | Peak Power (mW) | Operating Current (mA) | Operating Voltage (Volts) |
|------------------------------------|-----------------|------------------------|---------------------------|
| Custom Design For Each Application | 5 | 120 | 4-7 |

Notes:

- The required operating frequency (or in the case of wide band types, the frequency range) must be specified when ordering. The specification of any unnecessarily wide frequency range will result in unnecessary expenditure.
- The power output is measured at a single frequency (except for wide band units) in a critically coupled Alpha test cavity at 25°C. Alpha may agree to undertake special testing in a customer cavity if required.
- The standard catalog range of Alpha Gunn devices are tested under C.W. conditions. For certain pulse applications, alternative device types are available. Consult the factory.
- Alternative package styles are available and should be requested as specials at the time of ordering.

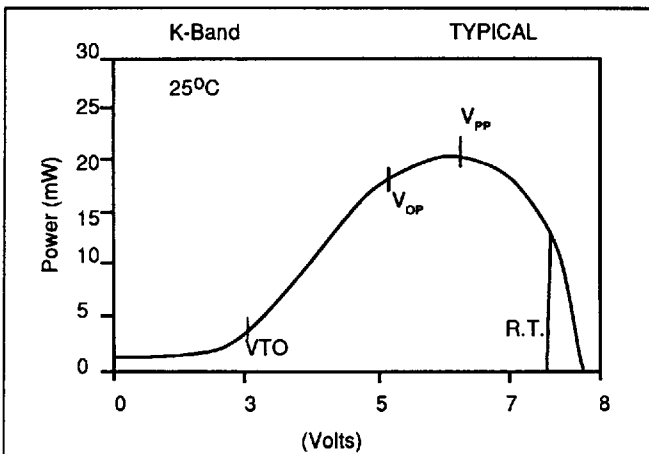
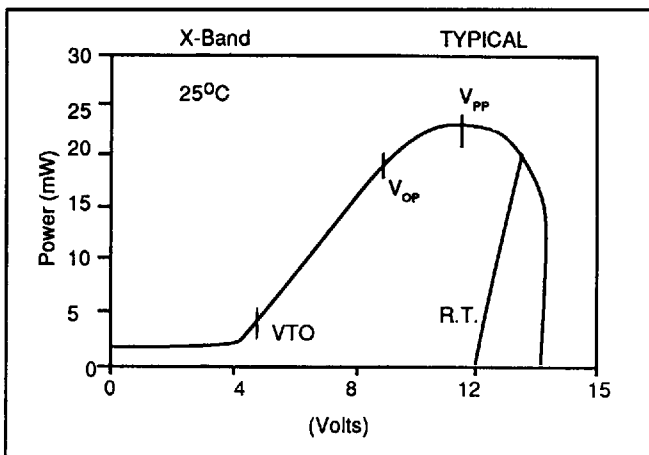
Gunn Diodes

Specific Application Notes

Whenever possible the factory urges the customer to supply oscillator cavities and associated hardware for the evaluation and characterization of the proper Gunn material for the designed application. When oscillators are supplied to the factory, all electrical conditions will be guaranteed out of the customer oscillator.

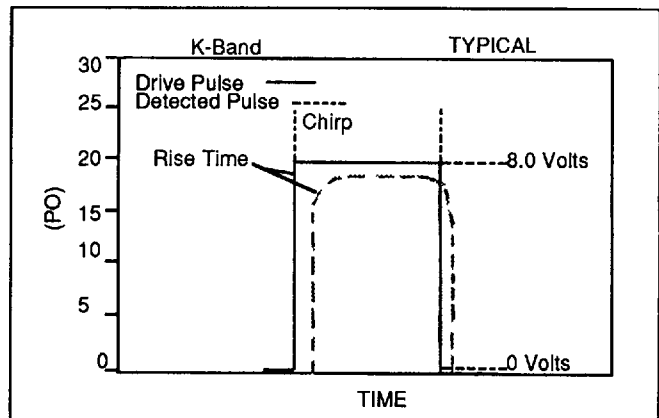
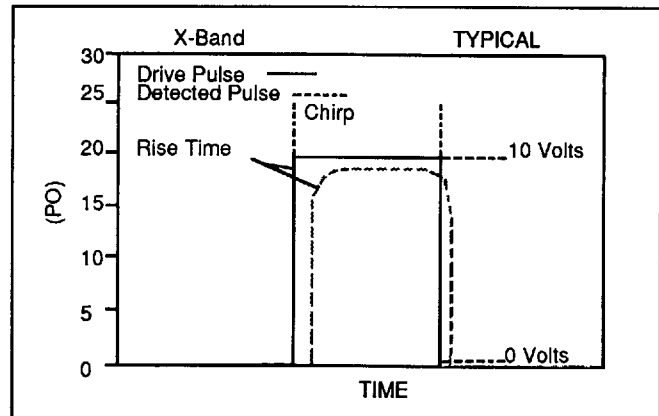
Standard Tests Performed to Guarantee Performance for CW Operation:

1. Voltage Turn-On ($V_{T.O.}$).
2. Power-Out (P_{OUT}) at the Operating Voltage (V_{OP}). (Can also be measured as Rectified Current)
3. Operating Current (I_{OP}) at the V_{OP} Point.
4. Voltage Power Peak (V_{PP}).
5. Retrace (R.T.).
6. Desired Operating Frequency (F_{OP}) at the V_{OP} .



Standard Tests Performed to Guarantee Performance for Pulsed Operation:

1. Power-Out (P_O) (Also measured as Voltage Across Detector)
2. Chirp - frequency change from the Leading Edge to the Trailing Edge of the Pulse.
3. Voltage Noise (V_N) if required.
4. Spectrum if required.
5. Operating Frequency (F_{OP})
6. Duty cycle and pulse width in μ sec.



Whenever possible the customer should attempt to supply answers to the following questions to enable the factory to select the correct diode for the application:

1. What is the application?
2. What is the operating frequency (CTR freq.)?
3. What is the required bandwidth around the center frequency (± 25 mhz)?
4. Is frequency pushing required ($\Delta f/\Delta V$)?
5. Is frequency drift over temperature critical ($\Delta f/\Delta T$)?
6. Is power variation over temperature critical ($\Delta P/\Delta T$)?
7. Is there a cavity available for the factory to use?
8. Are there any current limitations?
9. Are there any voltage limitations?

Gunn Diodes

High Power Cathode Heat Sink Gunn Diodes

C.W. Gunn Diodes, C-Band 5-8.2 GHz

| Electrical Characteristics | | Power (mW) | | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 200 | 300 | 400 |
| Operating Current (mA) | Max. | 150 | 200 | 300 | 500 | 700 | 900 |
| Operating Voltage (V) | Max. | 12 | 12 | 12 | 12 | 12 | 12 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number | Part Number |
| 023-001 | | DGB8211 | DGB8311 | DGB8411 | DGB8511 | | |
| 158-001 | | DGB8212 | DGB8312 | DGB8412 | DGB8512 | DGB8612 | DGB8712 |
| 188-001 | | DGB8213 | DGB8313 | DGB8413 | DGB8513 | DGB8613 | DGB8713 |
| 305-001 | | DGB8215 | DGB8315 | DGB8415 | DGB8515 | DGB8615 | DGB8715 |
| 315-001 | | DGB8214 | DGB8314 | DGB8414 | DGB8514 | DGB8614 | DGB8714 |

C.W. Gunn Diodes, C-Band 5-8.2 GHz

| Electrical Characteristics | | Power (mW) | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|
| | | 500 | 600 | 700 | 800 |
| Operating Current (mA) | Max. | 1100 | 1250 | 1450 | 1650 |
| Operating Voltage (V) | Max. | 12 | 12 | 12 | 12 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number |
| 158-001 | | DGB8812 | DGB8912 | DGB8012 | DGB8112 |
| 188-001 | | DGB8813 | DGB8913 | DGB8013 | DGB8113 |

C.W. Fullband Gunn Diodes, C-Band 5-8.2 GHz

| Electrical Characteristics | | Power (mW) | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 200 | 300 |
| Operating Current (mA) | Max. | 250 | 350 | 500 | 900 | 1200 |
| Operating Voltage (V) | Min. | 9 | 9 | 9 | 9 | 9 |
| | Max. | 17 | 17 | 17 | 17 | 17 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number |
| 023-001 | | DGB9211 | DGB9311 | DGB9411 | DGB9511 | |
| 158-001 | | DGB9212 | DGB9312 | DGB9412 | DGB9512 | DGB9612 |
| 188-001 | | DGB9213 | DGB9313 | DGB9413 | DGB9513 | DGB9613 |
| 305-001 | | DGB9215 | DGB9315 | DGB9415 | DGB9515 | DGB9615 |
| 315-001 | | DGB9214 | DGB9314 | DGB9414 | DGB9514 | DGB9614 |

Gunn Diodes

C.W. Gunn Devices, X-Band 8.2-12.4 GHz

| Electrical Characteristics | | Power (mW) | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|
| | | 50 | 100 | 200 | 300 | 400 |
| Operating Current (mA) | Max. | 200 | 300 | 600 | 800 | 1050 |
| Operating Voltage (V) | Max. | 10 | 10 | 10 | 10 | 10 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number |
| 023-001 | | DGB8321 | DGB8421 | DGB8521 | | |
| 158-001 | | DGB8322 | DGB8422 | DGB8522 | DGB8622 | DGB8722 |
| 188-001 | | DGB8323 | DGB8423 | DGB8523 | DGB8623 | DGB8723 |
| 315-001 | | DGB8324 | DGB8424 | DGB8524 | DGB8624 | DGB8724 |
| 305-001 | | DGB8325 | DGB8425 | DGB8525 | DGB8625 | DGB8725 |

C.W. Gunn Devices, X-Band 8.2-12.4 GHz

| Electrical Characteristics | | Power (mW) | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|
| | | 500 | 600 | 700 | 800 |
| Operating Current (mA) | Max. | 1300 | 1550 | 1750 | 1850 |
| Operating Voltage (V) | Max. | 10 | 10 | 10 | 10 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number |
| 158-001 | | DGB8822 | DGB8922 | DGB8082 | DGB8982 |
| 188-001 | | DGB8823 | DGB8923 | DGB8083 | DGB8983 |

C.W. Fullband Gunn Devices, X-Band 8.2-12.4 GHz

| Electrical Characteristics | | Power (mW) | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 200 | 300 |
| Operating Current (mA) | Max. | 300 | 450 | 600 | 1050 | 1250 |
| Operating Voltage (V) | Min. | 7 | 7 | 7 | 7 | 7 |
| | Max. | 14 | 14 | 14 | 14 | 14 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number |
| 023-001 | | DGB9221 | DGB9321 | DGB9421 | | |
| 158-001 | | DGB9222 | DGB9322 | DGB9422 | DGB9522 | DGB9622 |
| 188-001 | | DGB9223 | DGB9323 | DGB9423 | DGB9523 | DGB9623 |
| 315-001 | | DGB9224 | DGB9324 | DGB9424 | DGB9524 | DGB9624 |
| 305-001 | | DGB9225 | DGB9325 | DGB9425 | DGB9525 | DGB9625 |

Gunn Diodes

C.W. Gunn Devices, Ku-Band 12.4-18 GHz

| Electrical Characteristics | | Power (mW) | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|
| | | 50 | 100 | 200 | 300 | 400 |
| Operating Current (mA) | Max. | 260 | 400 | 700 | 1000 | 1300 |
| Operating Voltage (V) | Max. | 8 | 8 | 8 | 8 | 8 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number |
| 023-001 | | DGB8331 | DGB8431 | DGB8531 | | |
| 158-001 | | DGB8332 | DGB8432 | DGB8532 | DGB8632 | DGB8732 |
| 188-001 | | DGB8333 | DGB8433 | DGB8533 | DGB8633 | DGB8733 |
| 315-001 | | DGB8334 | DGB8434 | DGB8534 | DGB8634 | DGB8734 |
| 305-001 | | DGB8335 | DGB8435 | DGB8535 | DGB8635 | DGB8735 |

C.W. Gunn Devices, Ku-Band 12.4-18 GHz

| Electrical Characteristics | | Power (mW) | |
|----------------------------|------|-------------|-------------|
| | | 500 | 600 |
| Operating Current (mA) | Max. | 1550 | 1750 |
| Operating Voltage (V) | Max. | 8 | 8 |
| Outline Number | | Part Number | Part Number |
| 158-001 | | DGB8832 | DGB8932 |
| 188-001 | | DGB8833 | DGB8933 |
| 315-001 | | DGB8834 | DGB8934 |
| 305-001 | | DGB8835 | DGB8935 |

C.W. Fullband Gunn Devices, Ku-Band 12.4-18 GHz

| Electrical Characteristics | | Power (mW) | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 200 |
| Operating Current (mA) | Max. | 360 | 360 | 520 | 1050 |
| Operating Voltage (V) | Min. | 6 | 6 | 6 | 6 |
| | Max | 12 | 12 | 12 | 12 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number |
| 315-001 | | DGB9234 | DGB9334 | DGB9434 | DGB9534 |
| 305-001 | | DGB9235 | DGB9335 | DGB9435 | DGB9535 |
| 296-001 | | DGB9236 | DGB9336 | DGB9436 | |

Gunn Diodes

C.W. Gunn Devices, K-Band 18-26.5 GHz

| Electrical Characteristics | | Power (mW) | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|
| | | 50 | 100 | 200 | 300 | 400 |
| Operating Current (mA) | Max. | 300 | 550 | 900 | 1250 | 1600 |
| Operating Voltage (V) | Max. | 6 | 6 | 6 | 6 | 6 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number |
| 315-001 | | DGB8344 | DGB8444 | DGB8544 | DGB8644 | DGB8744 |
| 305-001 | | DGB8345 | DGB8445 | DGB8545 | DGB8645 | DGB8745 |
| 296-001 | | DGB8346 | DGB8446 | DGB8546 | DGB8646 | |

C.W. Fullband Gunn Devices, K-Band 18-26.5 GHz

| Electrical Characteristics | | Power (mW) | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 200 |
| Operating Current (mA) | Max. | 400 | 600 | 950 | 1250 |
| Operating Voltage (V) | Min. | 4 | 4 | 4 | 4 |
| | Max. | 8 | 8 | 8 | 8 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number |
| 315-001 | | DGB9244 | DGB9344 | DGB9444 | DGB9544 |
| 305-001 | | DGB9245 | DGB9345 | DGB9445 | DGB9545 |
| 296-001 | | DGB9246 | DGB9346 | DGB9446 | DGB9546 |

Gunn Diodes

C.W. Gunn Devices, Ka-Band 26.5-40 GHz

| Electrical Characteristics | | Power (mW) | | | | | |
|----------------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | 20 | 50 | 100 | 150 | 200 | 250 |
| Operating Current (mA) | Max. | 280 | 380 | 650 | 950 | 1300 | 1400 |
| Operating Voltage (V) | Max. | 5 | 5 | 5 | 5 | 5 | 5 |
| Outline Number | | Part Number | Part Number | Part Number | Part Number | Part Number | Part Number |
| 315-001 | | DGB8254 | DGB8354 | DGB8454 | DGB8554 | DGB8654 | DGB8754 |
| 305-001 | | DGB8255 | DGB8355 | DGB8455 | DGB8555 | DGB8655 | DGB8755 |
| 296-001 | | DGB8256 | DGB8356 | DGB8456 | DGB8556 | DGB8656 | DGB8756 |

C.W. Fullband Gunn Devices, Ka-Band 26.5-40 GHz

| Electrical Characteristics | | Power (mW) | |
|----------------------------|------|-------------|-------------|
| | | 20 | 50 |
| Operating Current (mA) | Max. | 500 | 800 |
| Operating Voltage (V) | Min. | 4 | 4 |
| | Max. | 7 | 7 |
| Outline Number | | Part Number | Part Number |
| 315-001 | | DGB9254 | DGB9354 |
| 305-001 | | DGB9255 | DGB9355 |
| 296-001 | | DGB9256 | DGB9356 |

Gunn Diodes

C.W. Gunn Devices For U-Band (40-60 GHz)

| Type | Specified Frequency ¹ (GHz) | Min.C.W. Output ^{2,3} (mW) | Operating Current Typical (mA) | Operating Voltage Typical (V) | Heat Sink Polarity ⁵ | Package Style ⁴ |
|---------|--|-------------------------------------|--------------------------------|-------------------------------|---------------------------------|----------------------------|
| DGB8266 | 40-60 | 20 | 400 | 4 | Cathode | 296-001 |
| DGB8366 | 40-60 | 50 | 600 | 4 | Cathode | 296-001 |
| DGB8466 | 40-50 | 75 | 750 | 4 | Cathode | 296-001 |
| DGB8566 | 40-50 | 100 | 950 | 4 | Cathode | 296-001 |
| DGB8666 | 40-50 | 125 | 1100 | 4 | Cathode | 296-001 |
| DGB8766 | 40-50 | 150 | 1300 | 4 | Cathode | 296-001 |

C.W. Devices for 40-100 GHz are available. Consult the factory for your specific requirement. For example:

| Type | Specified Frequency ¹ (GHz) | Min.C.W. Output ^{2,3} (mW) | Operating Current Typical (mA) | Operating Voltage Typical (V) | Heat Sink Polarity ⁵ | Package Style ⁴ |
|---------|--|-------------------------------------|--------------------------------|-------------------------------|---------------------------------|----------------------------|
| DGB8076 | 94 GHz | 5 | 600 | 4 | Cathode | 296-001 |
| DGB8176 | 94 GHz | 10 | 750 | 4 | Cathode | 296-001 |
| DGB8276 | 94 GHz | 15 | 900 | 4 | Cathode | 296-001 |
| DGB8376 | 94 GHz | 20 | 950 | 4 | Cathode | 296-001 |

Notes:

1. The required operating frequency (or in the case of wide band types, the frequency range) must be specified when ordering. The specification of any unnecessarily wide frequency range will result in unnecessary expenditure.
2. The power output is measured at a single frequency (except for wide band units) in a critically coupled Alpha test cavity at 25°C. Alpha may agree to undertake special testing in a customer cavity if required.
3. The standard catalog range of Alpha Gunn devices are tested under C.W. conditions. For certain pulse applications, alternative device types are available. Consult the factory.
4. Alternative package styles are available and should be requested as specials at the time of ordering.