T-07-11

HIGH POWER POSITIVE BIAS PLATED HEATSINK GUNN DIODES

DESCRIPTION

The FSI Semiconductor Plated Heatsink diode chip consists of a silver heat sink chemically bonded to the bulk semiconductor diode. The resulting structure not only exhibits lower thermal resistance than that of conventional inverted mesa designs, and lower than gold PHS diodes, but also provides chip to chip uniformity. The chips are rugged and structually sound, and with reasonable care may be handled with tweezers or similar tools.

APPLICATIONS

In-house designed controls on doping level and active layer thickness during the epitaxial gallium arsenide growth process have enabled FSI to manufacture diodes suited for broadband low noise microwave oscillation or amplification.

Applications include local oscillators, medium power transmitters, communications systems or any application where low cost microwave energy is required.

FEATURES

- Broadband performance
- High power
- High efficiency
- Low thermal resistance
- Low noise

ELECTRICAL SPECIFICATIONS

$T_A = 25°C$

HIGH POWER POSITIVE BIAS. The GC-5800 series PHS diodes require positive bias for reliable operation.

OPERATING FREQUENCY (GHz)		TYPICAL OPERATING VOLTAGE	OUTPUT POWER P_O (mW, MINIMUM) AND OPERATING CURRENT I_O (mA)					
			100 mW, (MIN)		200 mW, (MIN)		300 mW, (MIN)	
MIN	MAX	V_O (VOLTS)	MODEL	I_O (mA) TYP	MODEL	I_O (mA) TYP	MODEL	I_O (mA) TYP
4.0	6.0	15.0	GC5831A	400	GC5832A	535	GC5833A	665
6.0	8.0	12.5	GC5831B	480	GC5832B	640	GC5833B	800
8.0	10.0	11.0	GC5831C	545	GC5832C	725	GC5833C	910
10.0	12.5	9.5	GC5831D	630	GC5832D	840	GC5833D	1050
12.5	16.5	8.0	GC5831E	750				

NOTES

1. Bandwidth of 1 GHz is standard, with a guaranteed minimum power output, centered at a frequency specified by the customer. Wider bandwidths of up to several GHz are available, with power roll-off of less than 3 dB.

   In system use, in typical high Q cavities, power will be perhaps one to three dB less.
2. All FSI Gunn diodes are tested for turn-on, bandwidth and power in the cavity shown in Figure 1 and in the circuit configuration shown in Figure 2.
3. The test cavity used is a low Q, coaxial design shown in Figure 1. Cavity drawings are available upon request.
4. Diodes are available in the following standard metal - ceramic packages; 42 and 83. Outline dimensions shown in Figure 3.
5. Typical threshold conditions: Ith ≅ 1.5 Io and Vth ≅ Vo/3.

RATINGS

For reliable operation, it is essential that correct power supply polarity be observed, together with adequate heat sinking. All diodes listed operate below 260°C junction, with package terminal temperature of 70°C.

HIGH POWER NEGATIVE BIAS PLATED HEATSINK GUNN DIODES

DESCRIPTION

The GC5700 series negative bias plated heatsink gunn diodes are gallium arsenide bulk effect devices which exhibit negative resistance and convert applied dc power into microwave energy.

The positive heatsink design approach affords significantly lower thermal resistance and improved dc to RF conversion efficiency over the common negative heatsink diode concept.

Aside from the fact that the polarity of the bias voltage applied to the heatsink of the diode is POSITIVE, the structural detail, handling and mounting concerns are identical to the standard GC5800 series Gunn diodes.

FEATURES

- Lower thermal resistance
- Improved efficiency
- High power
- Broad band performance
- Low noise

APPLICATIONS

FSI's sophistication in doping control during the epitaxial gallium arsenide growth process allows optimization of the thermal profile in the diode structure which results in a reduction in the active layer temperature and thermal resistance. This automatically translates into improved dc to RF conversion efficiency and reduced thermal effects on oscillation frequency and output power.

In addition, this device's inherently lower thermal resistance makes it an invaluable active component in a hybrid microwave circuit for meeting stringent power tuning drift and settling time requirements applicable to new state-of-the-art ECM systems.

ELECTRICAL SPECIFICATIONS

$T_A = 25°C$

HIGH POWER NEGATIVE BIAS. The GC5700 Series PHS diodes require negative bias for reliable operation.

OPERATING FREQUENCY (GHz)		TYPICAL OPERATING VOLTAGE	OUTPUT POWER P_0 (mW, MINIMUM) AND OPERATING CURRENT I_0 (mA)					
			100 mW, (MIN)		200 mW, (MIN)		300 mW, (MIN)	
MIN	MAX	V_0 VOLTS	MODEL	I_0 (mA) TYP	MODEL	I_0 (mA) TYP	MODEL	I_0 (mA) TYP
4.0	6.0	15.0	GC5731A	335	GC5732A	450	GC5733A	560
6.0	8.0	12.5	GC5731B	400	GC5732B	540	GC5733B	665
8.0	10.0	11.0	GC5731C	455	GC5732C	610	GC5733C	755
10.0	12.5	9.5	GC5731D	530	GC5732D	705	GC5733D	875
12.5	16.5	8.0	GC5731E	625				

NOTES

1 Bandwidth of 1 GHz is standard, with a guaranteed minimum power output, centered at a frequency specified by the customer. Wider bandwidths of up to several GHz are available, with power roll-off of less than 3 dB.

   In system use, in typical high Q cavities, power will be perhaps one to three dB less.

2. All FSI Gunn diodes are tested for turn-on, bandwidth and power in the cavity shown in Figure 1 and in the circuit configuration shown in Figure 2.
3. The test cavity used is a low Q, coaxial design shown in Figure 1. Cavity drawings are available upon request.
4. Diodes are available in the following standard metal - ceramic packages; 42 and 83. Outline dimensions shown in Figure 3.
5. Typical threshold conditions: $I_{th} \cong 1.5\ I_o$ and $V_{th} \cong V_o/3$.

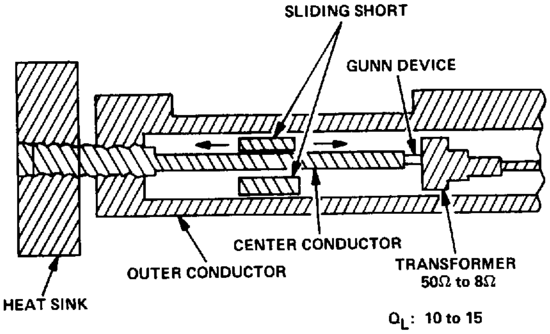
RATINGS

For reliable operation, it is essential that correct power supply polarity be observed, together with adequate heat sinking. All diodes listed operate below 260°C junction, with package terminal temperature of 70°C.

POWER GENERATION

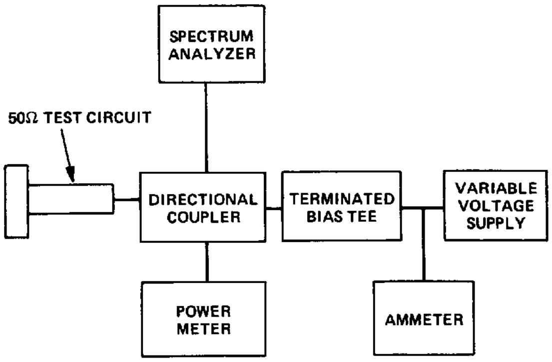
HIGH POWER PLATED HEATSINK GUNN DIODES

TEST CAVITY

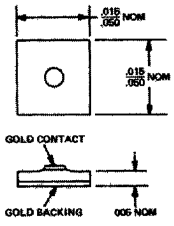


Q_L: 10 to 15

TEST CIRCUIT

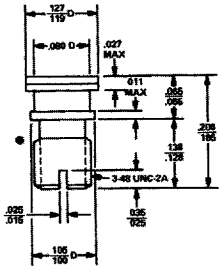


PACKAGE STYLES



NOTES-
1. TOP MESA AND CHIP SIZE DEPENDS ON DIODE PARAMETERS
2. TOP & BOTTOM CONTACTS GOLD
3. CONSULT FACTORY

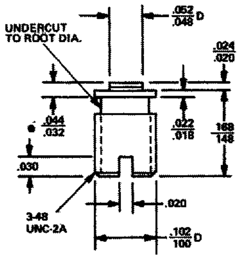
Style 00



Cp=.32pF Lp=.40nH

Spline socket available upon request

Style 42



Cp=.26pF Lp=.15nH

Style 83

ENGINEERING NOTES: