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RFHA5966A

X BAND 10W HIGH POWER AMPLIFIER GaAs MMIC

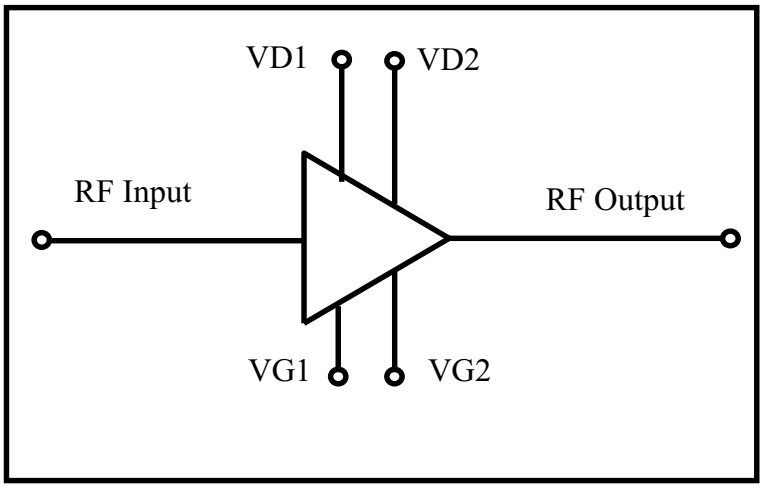
Die Size: 4500μm x 4000μm

Features

- 20dB Gain
- +41dBm Saturated Output Power
- 40% Power Added Efficiency
- 100% On Wafer DC and RF Testing
- 100% Output Power Testing

Applications

- ESCAN Radar
- Weather Radar
- Commercial Ground Based Radar
- Military Ground Based Radar



Functional Schematic

Product Description

The RFHA5966A is a two stage, high efficiency, high performance X-Band Gallium Arsenide Monolithic Amplifier. It has a 41dBm PSAT at 9.5GHz and is well suited for a variety of X-Band Radar Applications. The device also has a PAE of 40% at 9.5GHz and has been designed for operation in 50Ω systems. The die is fabricated using RFMD's 0.3μm pHEMT process and is suitable for eutectic attachment.

Ordering Information

RFHA5966A	X Band 10W High Power Amplifier GaAs MMIC
RFHA5966AS2	2-Piece Sample Bag

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Input Power	35	dBm
Drain Voltage	+12	V
Operating Temperature	-40 to +85	°C
Storage Temperature	-55 to +150	°C

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
RF Electrical Characteristics					
Frequency	9		10	GHz	
Gain		21		dB	9GHz V_D = 9V, V_G = -0.4V, pulsed 12.5%/12.5 kHz
		20		dB	9.5GHz to 10GHz V_D = 9V, V_G = -0.4V, pulsed 12.5%/12.5 kHz
Output Saturated Power		40		dBm	9GHz V_D = 9V, V_G = -0.4V, pulsed 12.5%/12.5 kHz
		41		dBm	9.5GHz to 10GHz V_D = 9V, V_G = -0.4V, pulsed 12.5%/12.5 kHz
Power Added Efficiency		40		%	9.5GHz to 10GHz V_D = 9V, V_G = -0.4V, pulsed 12.5%/12.5 kHz
DC Electrical Characteristics					
Drain Bias Voltage		9		V	
Quiescent Drain Current		3.2		A	9GHz to 10GHz V_D = 9V, V_G = -0.4V, CW

NOTE: $T_{AMBIENT}$ = +25°C, Z_0 = 50Ω

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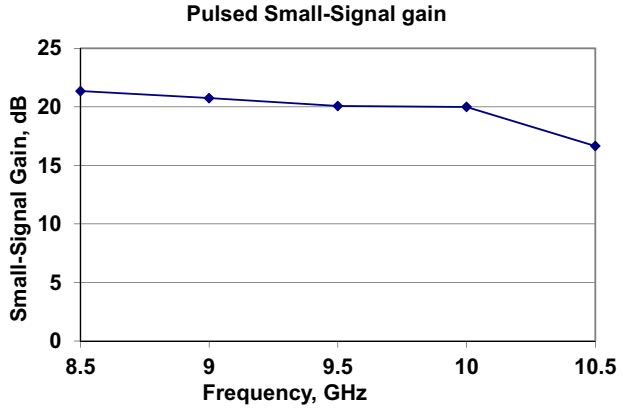
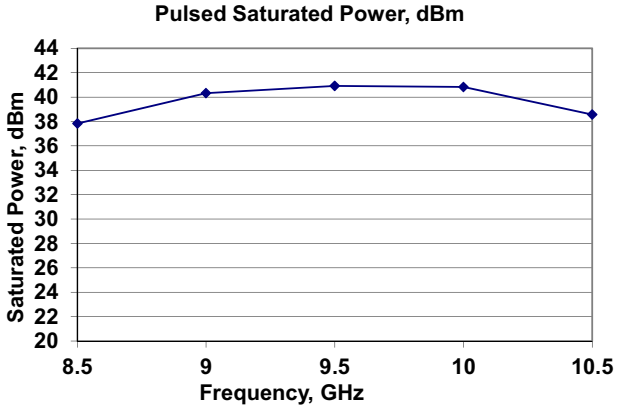
Typical Performance

Pulsed conditions on carrier, with 0.5nH output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz
- Quiescent I_D = 0.38A (average)
- Saturated output power with +26dBm input power



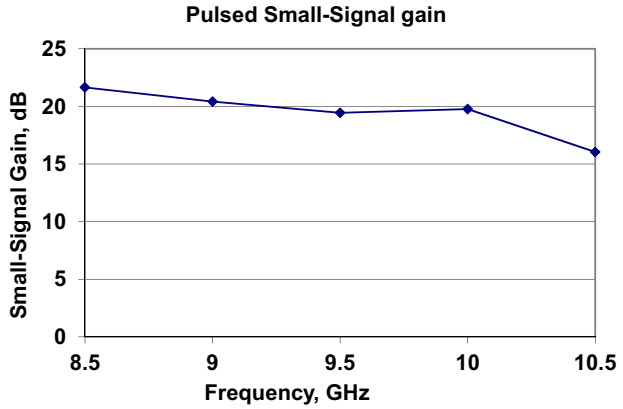


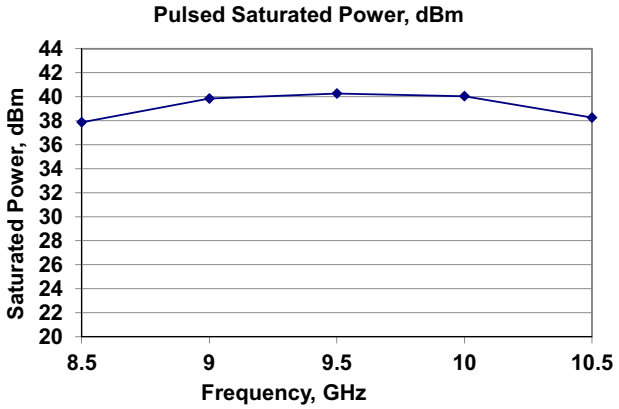
Typical Performance

Pulsed conditions on carrier, without output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz
- Quiescent I_D = 0.38A (average)
- Saturated output power with +26dBm input power



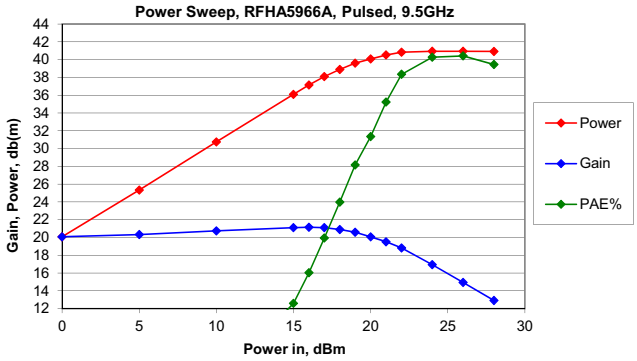


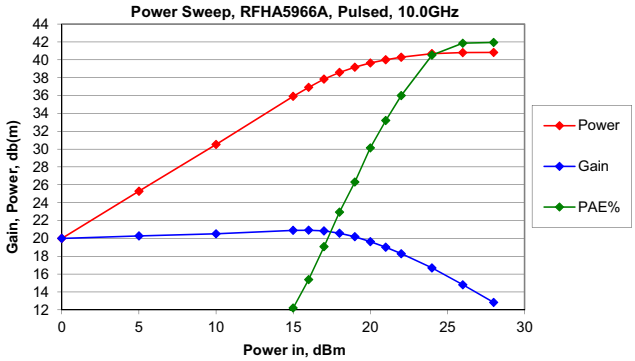
Typical Performance

Pulsed conditions on carrier, with 0.5nH output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz
- Quiescent I_D = 0.38A (average)



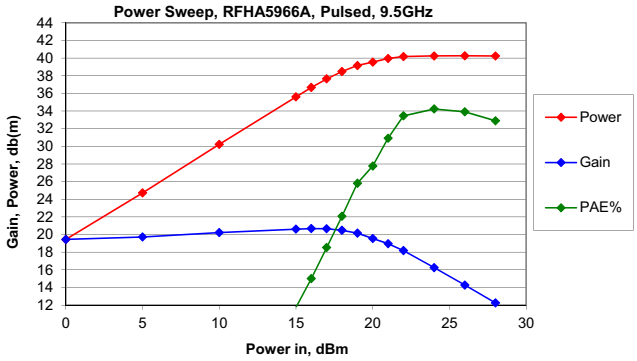


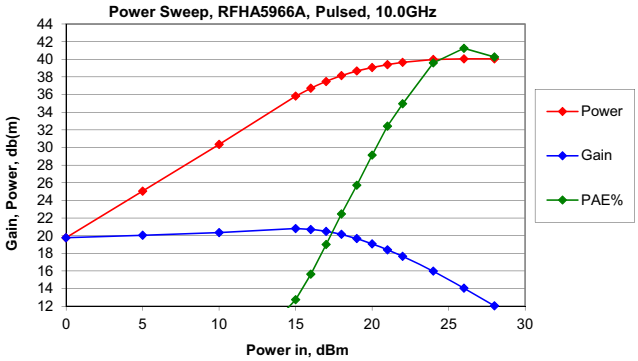
Typical Performance

Pulsed conditions on carrier, without output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz
- Quiescent I_D = 0.38A (average)





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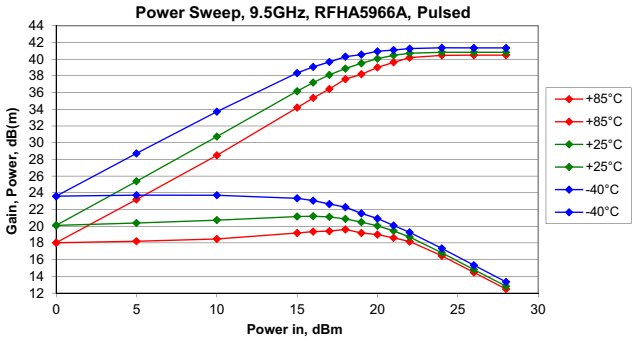
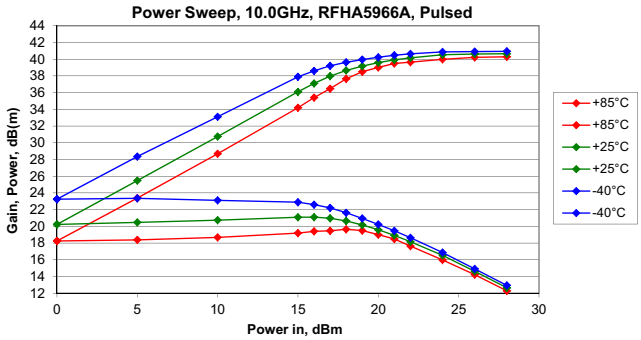
Typical Performance over Temperature

Pulsed conditions on carrier, with 0.5nH output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz



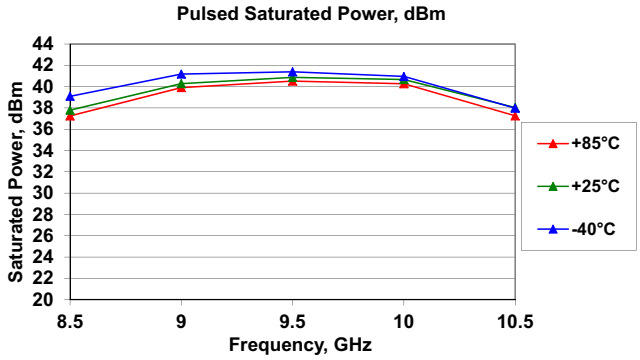


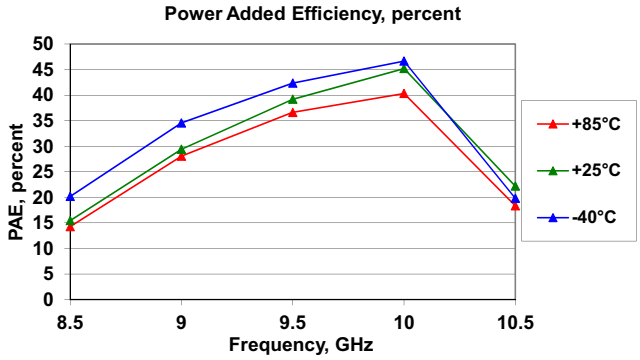
Typical Large-Signal Performance over Temperature

Pulsed conditions on carrier, with 0.5nH output bondwire.

Conditions:

- V_D = 9V, V_G = -0.4V
- Duty cycle = 12.5%, Pulse frequency = 12.5kHz
- Saturated output power with +26dBm input power



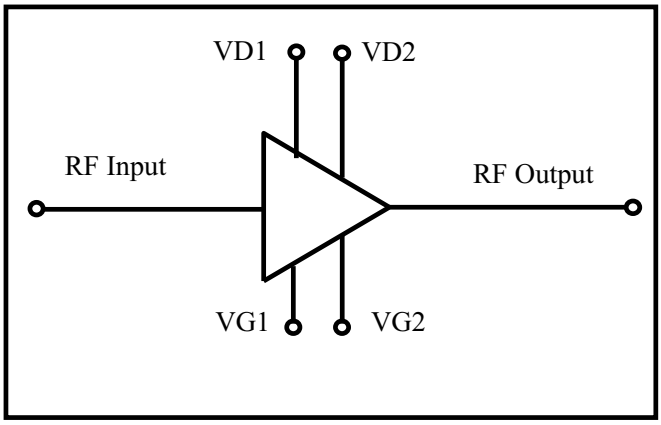


Pad Names and Descriptions

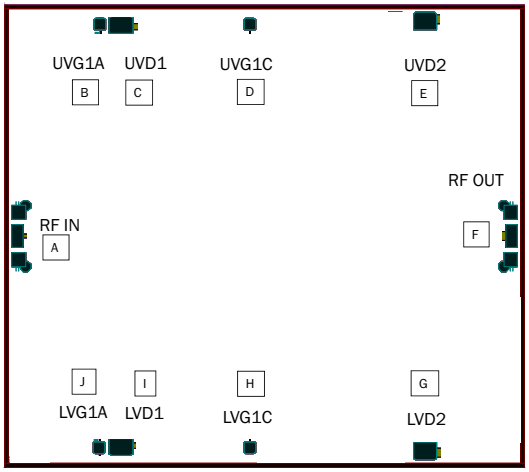
Pad	Name	Description
A	RFIN	RF Input
B	UVG1A	North Gate Voltage 1
C	UVD1	North Drain Voltage 1
D	UVG1C	North Gate Voltage 2
E	UVD2	North Drain Voltage 2
F	RFOUT	RF Output
G	LVD2	South Drain Voltage 2
H	LVG1C	South Gate Voltage 2
I	LVD1	South Drain Voltage 1
J	LVG1A	South Gate Voltage 1

Die Size 4500µm x 4000µm
Die Thickness 100µm
Min. Bond Pad Pitch 200µm
Min. Bond Pad Opening 89µm x 79µm

Functional Schematic



Pad Layout



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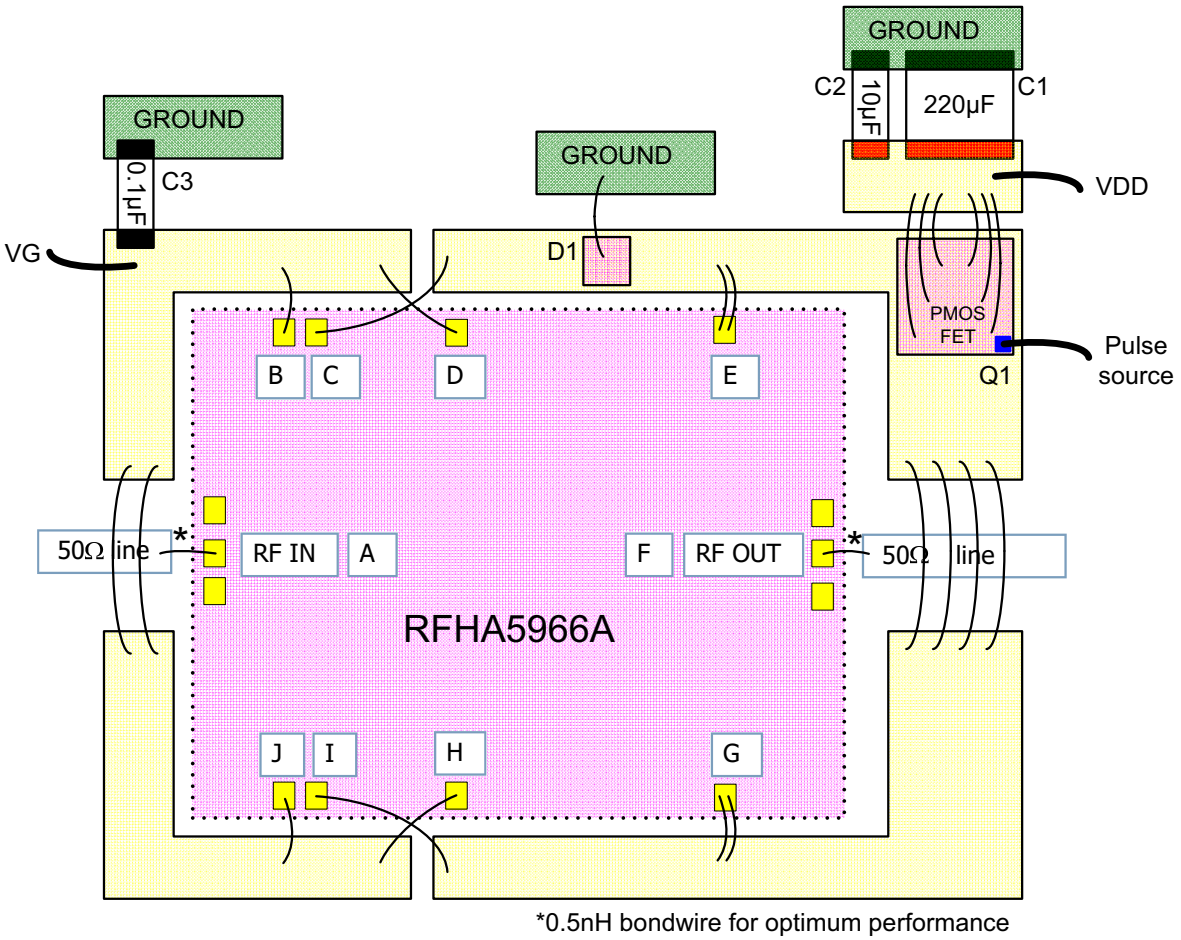
Assembly Diagram



The yellow shaded areas in the diagram are isolated metal lands on an insulating substrate.

The green shaded areas are connections to ground, either by means of multiple vias in the substrate or directly to the module ground plane.

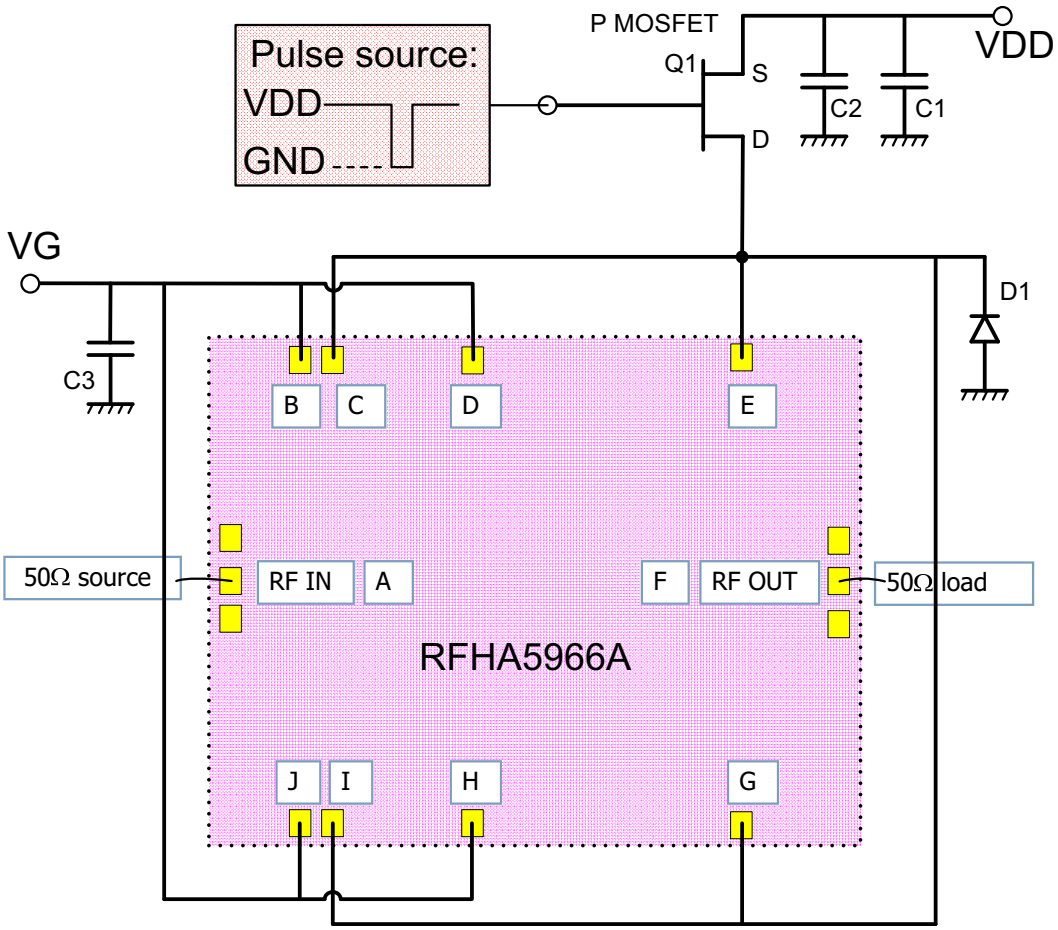
The RFHA5966A is attached using Gold-Tin eutectic; all other components may be mounted using metal loaded epoxy.

It is recommended that the RF connections be made using bond wires with 25µm diameter and an RF output bondwire length giving an inductance of approximately 0.5 nH to achieve optimum output power.

A bondwire giving an inductance of 0.5 nH is also recommended at the RF input.

Please refer to the Assembly diagram above for surface mount components locations.

Biasing Circuit Schematic



Reference	Component Description	Quantity
Q1	P-type MOSFET, die	1
C1	Capacitor, 220µF, Electrolytic, low ESR	1
C2	Capacitor, 10µF, Electrolytic, low ESR	1
C3	Capacitor, 0.1µF, low ESR	1
D1	1N4148, die	1
BOND	Bondwire	-

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