

# 31–35 GHz GaAs MMIC Driver Amplifier

 Alpha

AA035P3-00

## Features

- Single Bias Supply Operation (5 V)
- 19 dB Typical Small Signal Gain
- 17 dBm Typical  $P_{1\text{ dB}}$  Output Power at 35 GHz
- 0.25  $\mu\text{m}$  Ti/Pd/Au Gates
- 100% On-Wafer RF and DC Testing
- 100% Visual Inspection to MIL-STD-883 MT 2010

## Description

Alpha's three-stage reactively-matched Ka band GaAs MMIC driver amplifier has a typical  $P_{1\text{ dB}}$  of 17 dBm with 18 dB associated gain at 35 GHz. The chip uses Alpha's proven 0.25  $\mu\text{m}$  MESFET technology, which is based upon MBE layers and electron beam lithography for the highest uniformity and repeatability. The FETs employ surface passivation to ensure a rugged, reliable part with through-substrate via holes and gold-based backside metallization to facilitate solder or epoxy die attach processes. The amplifier is a self-bias design requiring a single positive drain bias to one of any three bonding sites. All chips are screened for S-parameters prior to shipment for guaranteed performance. A broad range of applications exist in both the high reliability and commercial areas where high gain and power are required.

## Electrical Specifications at 25°C ( $V_{DS} = 5$ V)

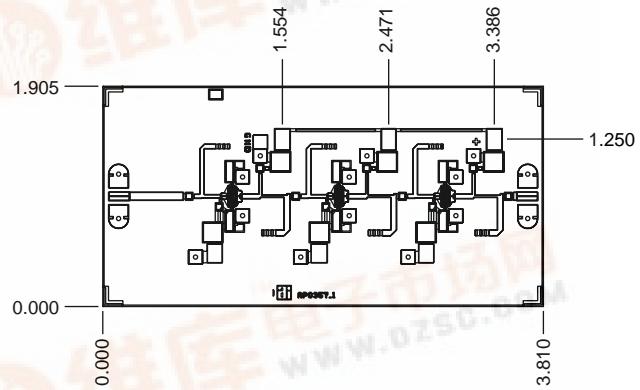
Parameter	Condition	Symbol	Min.	Typ. <sup>3</sup>	Max.	Unit
Drain Current		$I_{DS}$		275	350	mA
Small Signal Gain	$F = 31\text{--}35$ GHz	$G$	15	19		dB
Noise Figure <sup>1</sup>	$F = 35$ GHz	NF		10.5		dB
Input Return Loss	$F = 31\text{--}35$ GHz	$RL_I$		-14	-10	dB
Output Return Loss	$F = 31\text{--}35$ GHz	$RL_O$		-16	-10	dB
Output Power at 1 dB Gain Compression	$F = 35$ GHz	$P_{1\text{ dB}}$	15	17		dBm
Saturated Output Power	$F = 35$ GHz	$P_{SAT}$	16	19		dBm
Thermal Resistance <sup>2</sup>		$\Theta_{JC}$		66		°C/W

1. Not measured on a 100% basis.

2. Calculated value based on measurement of discrete FET.

3. Typical represents the median parameter value across the specified frequency range for the median chip.

## Chip Outline

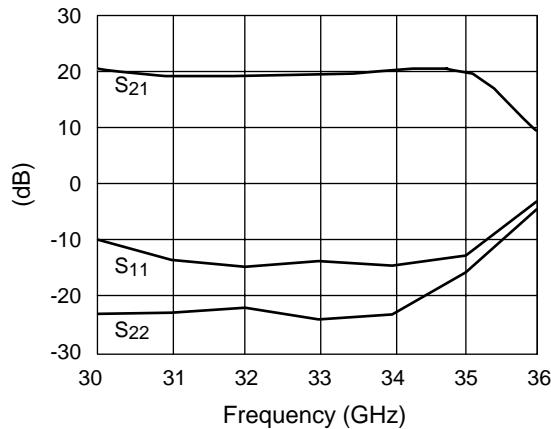


Dimensions indicated in mm.  
All DC (V) pads are 0.1 x 0.1 mm and RF In, Out pads are 0.07 mm wide.  
Chip thickness = 0.1 mm.

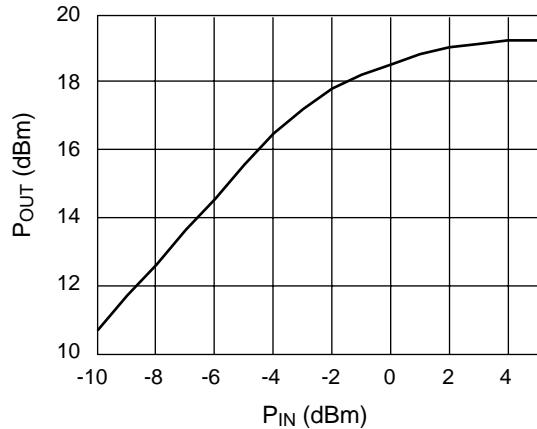
## Absolute Maximum Ratings

Characteristic	Value
Operating Temperature ( $T_C$ )	-55°C to +90°C
Storage Temperature ( $T_{ST}$ )	-65°C to +150°C
Bias Voltage ( $V_D$ )	7 V <sub>DC</sub>
Power In ( $P_{IN}$ )	19 dBm
Junction Temperature ( $T_J$ )	175°C

## Typical Performance Data

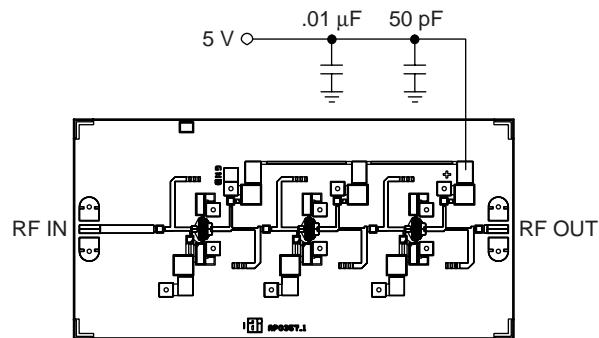


Typical Small Signal Performance  
S-Parameters ( $V_{DS} = 5$  V)



Output Characteristic as a  
Function of Input Drive Level  
( $F = 35$  GHz,  $V_{DS} = 5$  V)

## Bias Arrangement



For biasing on, adjust  $V_{DS}$  from zero to the desired value (4 V–6 V recommended). For biasing off, reverse the biasing on procedure.

## Circuit Schematic

