

General Description

The **VWA500062AA** is a distributed amplifier designed on a 0.15µm pHEMT process.

The device is capable of more than +22dBm of output power at saturation regime, up to 40GHz. And more than +16dBm of output power at 1dB of gain compression, up to 40GHz. It provides 15dB of linear gain from DC to 40GHz, with an excellent group delay. The design has been optimized to provide high efficiency. The supply current is as low as 180mA when operating with V_D = +6V. The die include a 50Ω transmission line for calibration system.

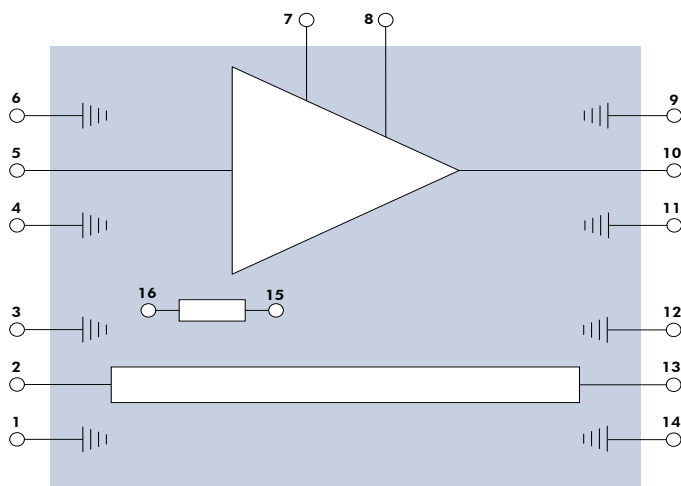
Features

- Wideband Distributed amplifier pHEMT GaAs MMIC
- Wide band: DC to 40GHz.
- Flat group delay.
- 50ΩRF Single ended input and output
- DC coupled In, DC coupled Out
- P_{1dB} > +16dBm DC to 40GHz
- High output P_{SAT} > +22dBm DC to 40GHz
- Small signal gain: >15dB 2GHz to 40GHz
- Nominal Power Supply: 180mA @ +6V
- Chip size: 2.27 x 1.574 x 0.1 mm

Applications

- Wide band MPA
- Radar / ECM / ECCM
- Telecommunications format NRZ, PAM4 56GBPS.
- Test and measurement
- Broadband / datalink communication

Pins Assignment & Functional Block Diagram



Symbol	Pad N°
TL In	2
RF In	5
V _{G2}	7
V _{D_LOAD}	8
RF Out	10
TL Out	13
V _{G1_A}	15
V _{G1_B}	16
GND	1/3/4/6/9/11/12/14

Electrical Specifications (Test Under Probes)

Test conditions unless otherwise noted:

- Tamb.= +25°C
- V_D= +6V
- I_D= 180mA
- V_{G2}= +2.5V

Symbol	Parameter	Min	Typ	Max	Unit
F	Frequency range	DC		40	Ghz
G	Small signal gain		15		dB
ΔG	Small signal gain flatness		+/-0.5		dB
S11	Input return loss		-10		dB
S22	Output return loss		-13		dB
NF	Noise figure (@10GHz)			3	dB
P1dB	Output P1dB	16	18		dBm
P _{SAT}	Saturated output power		22		dBm
I _D	Drain current		180		mA
V _D	Drain supply voltage		6		V

Environmental parameters

Symbol	Parameter	Values	Unit
Top	Operating temperature range	-40/+85	°C
Tstg	Storage temperature range	-55/+85	°C

Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
V _D	Drain bias voltage		9	V
V _{G2}	Gate control input access for second stage	-1	V _D /2	V
P _{in}	RF input power		18	dBm
P _{cw}	Continuous power dissipation(@85°)		2	W
T process	Temperature process max 20 seconds		325	°C

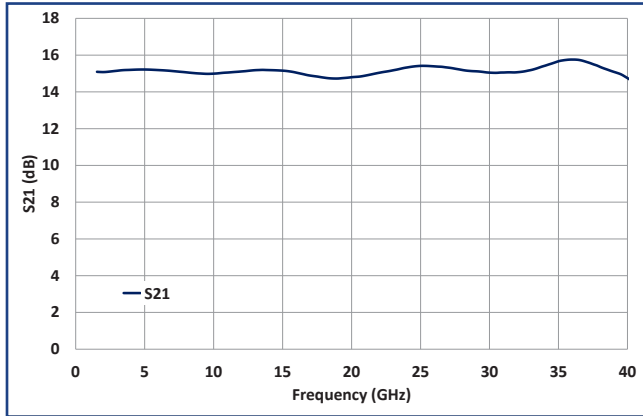
Operation of this device above any of these parameters may cause permanent damage.

Typical Performances (Test Under Probes)

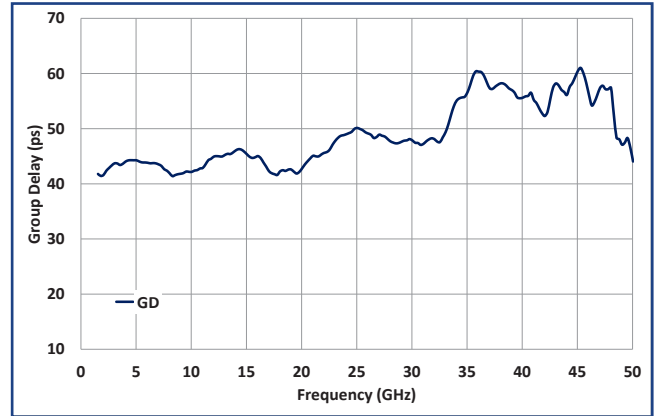
Test conditions unless otherwise noted:

- $T_{amb.} = +25^{\circ}C$
- $V_D = +6V$
- $I_D = 180mA$
- $V_{G2} = +2.5V$

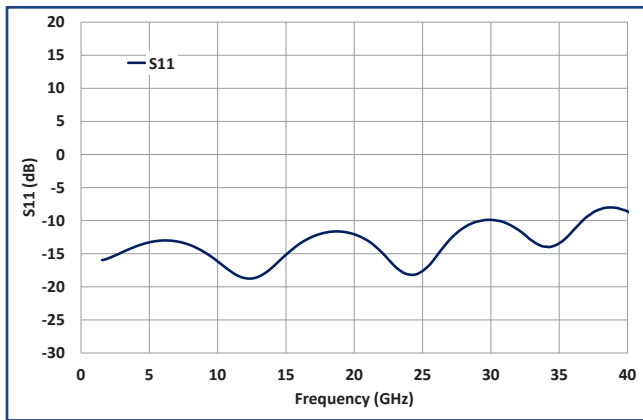
Small Signal Gain



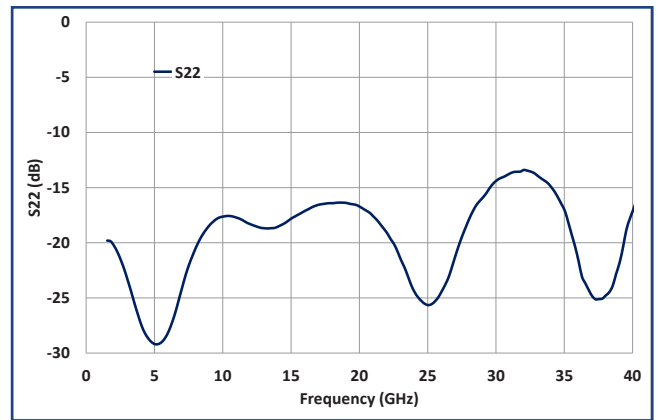
Group Delay



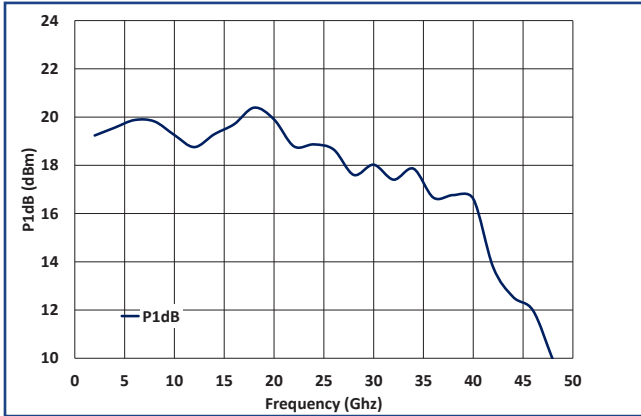
Input Return Loss



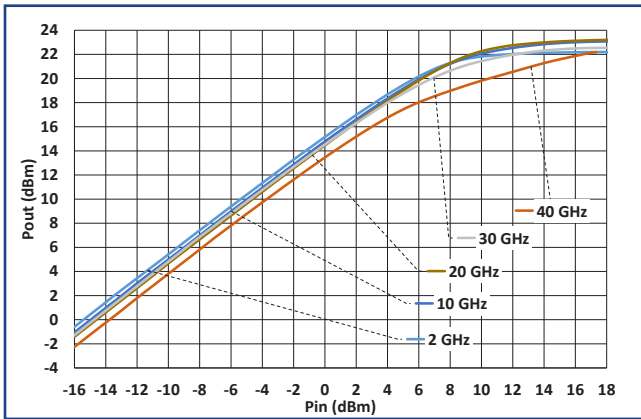
Output Return Loss



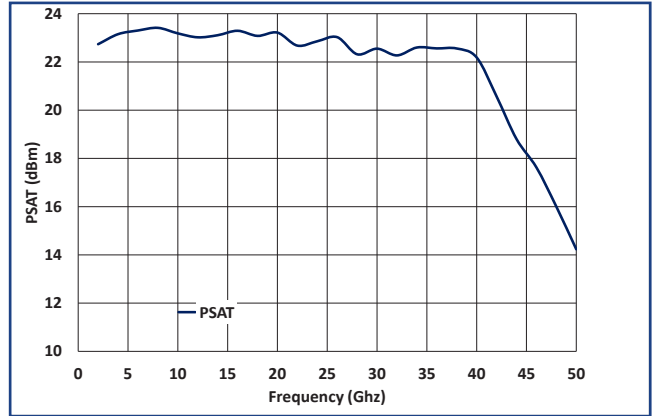
Output P1dB



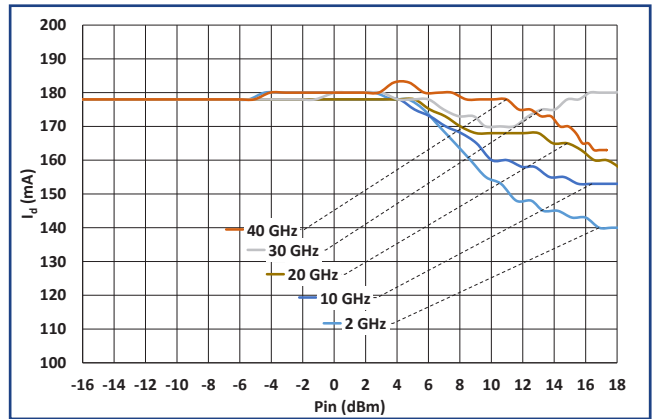
Output Power vs Input Power for various frequency



Saturated Output Power



Drain current vs Input Power for various frequency



Biasing procedure

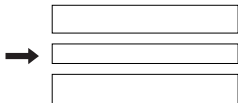
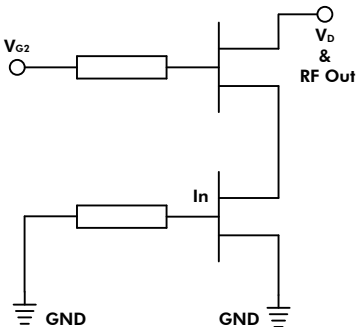
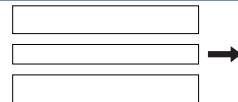
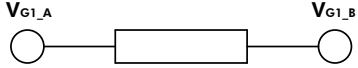

Switch on

1. Set V_D to +6V
2. Set V_{G2} to +2.5V
3. Turn RF Input ON

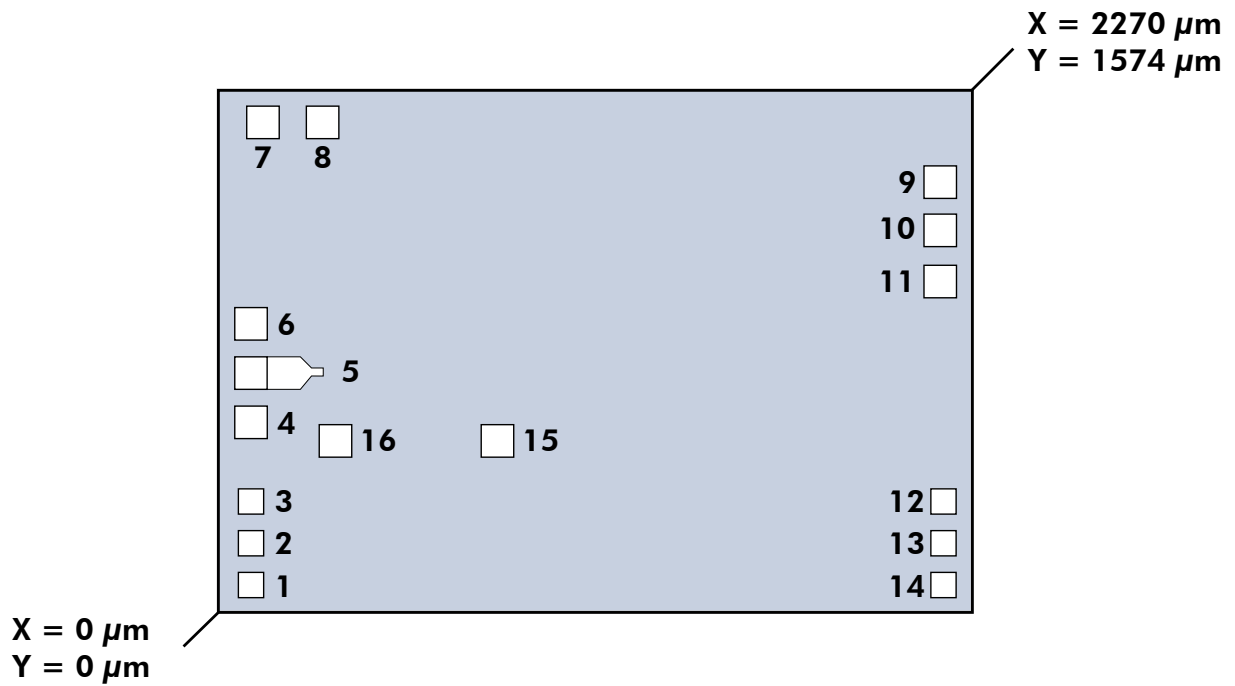
Switch off

1. Turn RF Input OFF
2. Decrease V_{G2} to 0V
3. Decrease V_D to 0V

Access Description

Pin Number	Name	Description	Electrical interface
2	TL In	RF 50Ω line input	
5	Rf In	RF Amplifier input, this access is DC coupled and internally matched to 50Ω.	
7	V_{G2}	Drain termination load decoupling access. This access must be connected to a MIM 100pF or 1000pF capacitor, with a low serial inductance bonding wire (the serial inductance impacts the Output return loss)	
8	V_{D_LOAD}	Drain termination load decoupling access. This access must be connected to a MIM 100pF or 1000pF capacitor, with a low serial inductance bonding wire (the serial inductance impacts the Output return loss)	
10	RF Out	HF Amplifier output, this access is DC coupled and internally matched to 50Ω. It is also used to bias the drain current (I_D), by using a wide bandwidth external Bias-T structure.	
13	TL Out	RF 50Ω line output	
15	V_{G1_A}	Gate control input access for first stage distributed amplifier structure. Unused for nominal biasing conditions.	
16	V_{G1_B}	Gate control output access for first stage distributed amplifier structure. Unused for nominal biasing conditions.	
Die Bottom	GND	Die must be connected to HF and DC Ground	

Die Layout



Pinout and Bonding Pad Coordinates

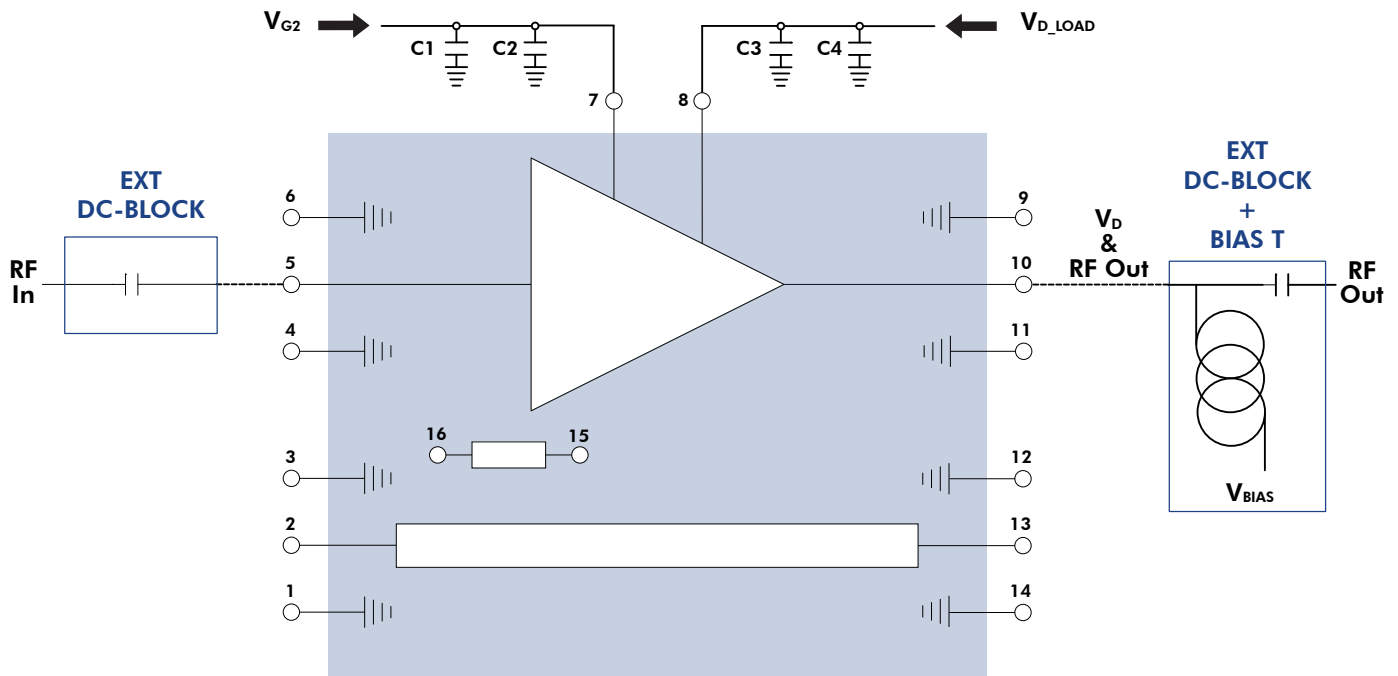
Die Pin Out				
Pad	X (μm)	Y (μm)	Size ($\mu\text{m} \times \mu\text{m}$)	Function
1	97	83	75 x 75	GND
2	97	208	75 x 75	TL In
3	97	333	75 x 75	GND
4	97	572	100 x 100	GND
5	97	722	100 x 100	RF In
6	97	872	100 x 100	GND
7	133	1478	100 x 100	V _{G2}
8	313	1478	100 x 100	V _{D_LOAD}
9	2174	1296	100 x 100	GND
10	2174	1146	100 x 100	RF Out
11	2174	996	100 x 100	GND
12	2183	333	75 x 75	GND
13	2183	208	75 x 75	TL Out
14	2183	83	75 x 75	GND
15	841	517	100 x 100	V _{G1_A}
16	350	517	100 x 100	V _{G1_B}

Die thickness = 100 μm

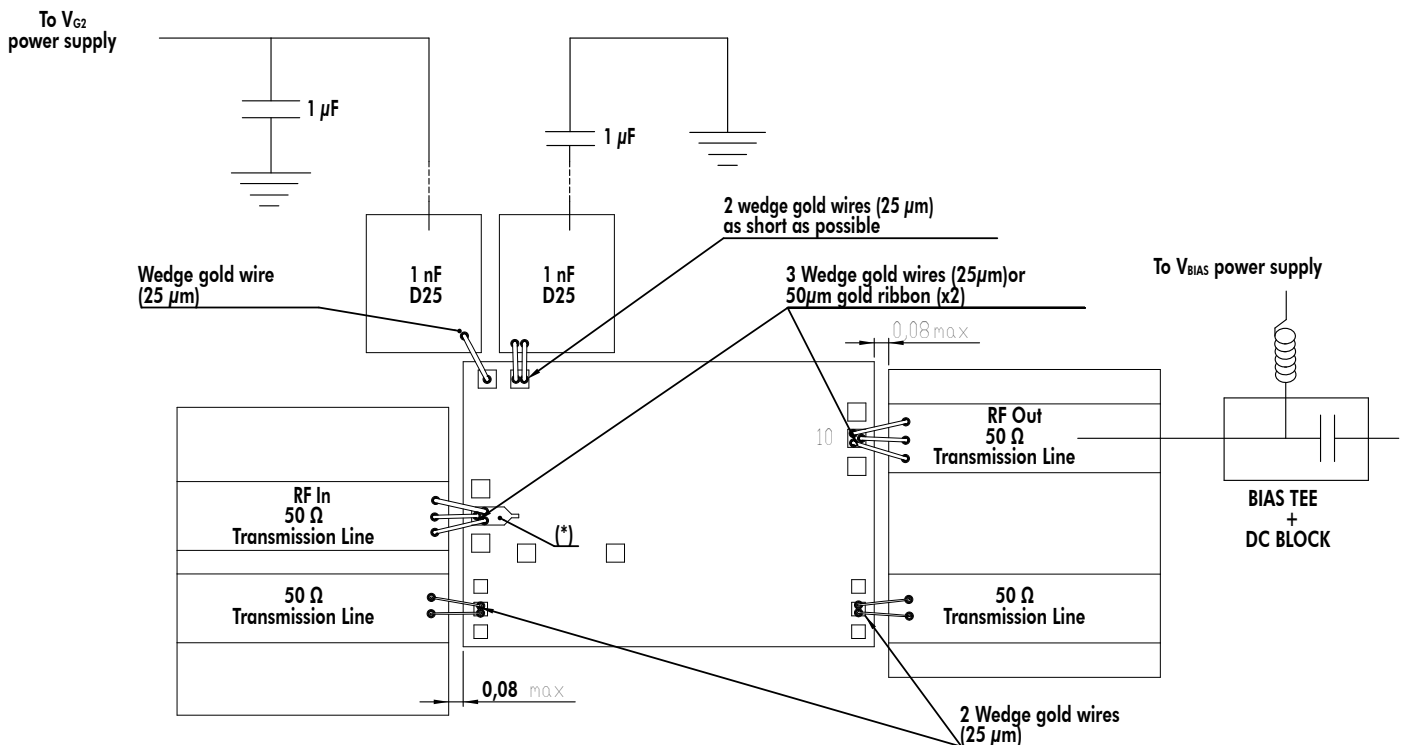
Die bottom must be connected to ground (RF and DC)

Application Circuit

- C1, C4 = 1 μ F
- C2, C3 = 1 nF capacitors are MIM type and must be placed as close as possible to the die access.



Typical Assembly Diagram



(*): Another wedge gold wire (25 μ m) can be wired on this place

Ordering Information

Product Code	Definition
VWA 5000062AA	DC To 40GHz / 15dB Gain / 22dBm P _{SAT}

Associated Material

Material	Status
Packaged die	Contact factory
Die Evaluation Board (die EVB)	Contact factory
Packaged die Evaluation Board (packaged die EVB)	Contact factory
Mechanical files (DXF)	Contact factory
Measurements files (S2P)	Contact factory

Product Compliance Information

Solderability :

Use only AuSn (80/20) solder and limit exposure to temperature above 300 °C TO 3 - 4 minutes, maximum

ESD Sensitivity Rating :

Test : Human Body Model (HBM)
 Standard : JEDEC Standard JESD22-A114



CAUTION ! ESD-Sensitive device

RoHS-Compliance :

This part is compliant with EU 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C15H12Br4O2) Free
- PFOS Free
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about Vectrawave:

Vectrawave SA
 5, rue Louis de Broglie
 22 300 Lannion
 France

www.vectrawave.com
 Email sales: contact_sales@vectrawave.com
 Tel sales:+33 (0)2 57 63 00 20

Represented by