### **OPERATING INSTRUCTIONS**

## F.E.T CHARACTERISTICS



# **SATISH BROTHERS**

4309/20,MARBLE HOUSE,PUNJABI MOHALLA AMBALA CANTT 133 001

Ph. 2642617, 2645237. Fax: 0171-2645237

#### FET CHARACTERISTICS

The FETs are characterised to Jfet parameters. Like an bipolar transistor a field effwect transistor is also three terminal device. Its function depends upon one type of carrier only thus it is also called as unipolar device. Unlike a bipolar transistor the FET has very high input resistance and it is voltage controlled device rather than a current controlled device in case of BJT. The characteristics of a FET is studied in following manner. The board has following features.

- \* DC regualted contineously variable power supplies for drain source and gate source, in which the gate source supply provided on sockets.
- \* Three meters to take readings of gate voltage, drain source voltage and drain current respectively. These meters are prewired in the given circuit and shown by block diagram upon panel.
- \* One fet BFW 10 or eq, fitted behind the panel with gate protection.

The parameters of FET

1. Drain resistance, rd: The drain resistance of mosfet may defined as follows,

 $rd = \Delta Vds / \Delta Id$ ,

Vgs at constant value...

1

Where Vds is the drain - source supply, Id corrosponding drain current and Vgs is the voltage between gate - source. The rd of such mosfet lies between 20 - 100 K ohms typically. The reciprocal of it gives admittance quantity Yos in  $\mu$ mhos.

2. Transconductance, gm:- It is defined as the control of gate voltage over drain current and measured by forward transconductance gfs as

gfs =  $\Delta$  ld /  $\Delta$  Vgs,

Vds at constant value...

2

Its typical value lies between  $10x10^3$  to  $20x10^3$  µmhos. It is somtimes expressed in millisiemens also.

3. Amplification factor  $\mu$ :- It is related to rd and gfs by

 $\mu = rdgfs = \Delta Vds / \Delta Vgs$ 

ld at constant

3

The typical values of  $\boldsymbol{\mu}$  lies between 5 to 10 for such device.

From above relations, two characteristics curves should be drawn for input and output. The experimental procedure is given on next page.

#### fet characteristics - 2.

#### **Experiment procedure**

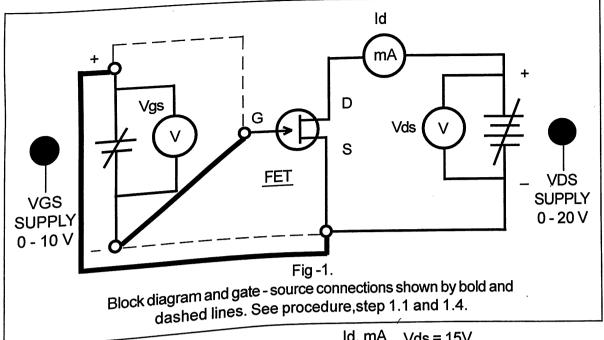
Object: (1). To measure drain current Id, at different values of gate voltage Vgs. (2) To measure drain current Id, for different values of drain - source voltage Vds. To plot input / output characteristics curves and to evaluate the parameters.

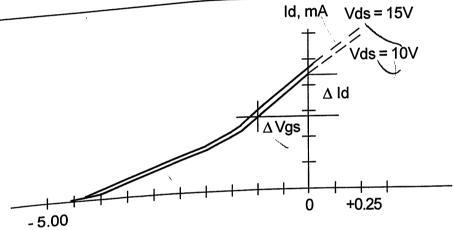
- 1.1. Keep both supply controls at minimum position (fully counter clockwise). Connect gate source connections with gate supply Vgs as shown dotted lines in fig 1.
- 1.2. Switch on the power. Adjust drain supply, Vds at 10 volt and Vgs at + 0.25 volt. Note the current Id, mA at Vgs = + 0.25 V.
- 1.3. Decrease Vgs in small steps and note corrosponding drain current till Vgs = 0V.
- 1.4. Bring VDS = 0V. Reverse the gate source connections as shown in bold lines in fig 1. Now the gate terminal is negative than source. Bring VDS = 10V.
- 1.5. Increase gate voltage in small steps in negative direction and note the drain current for each increament of Vgs.
- 1.6. Repeat the steps at Vds = 15 volt. Tabulate the readings. Exp (2).
- 2.1. Remain the set up as step 1.4. Keep Vgs = 0 volt. Increase Vds in small steps and note drain current with each increament of Vds.
- 2.2. Repeat step 2.1. at -0.5, -1.00, -1.50 and -2.00 volt of Vgs. Tabulate the readings.

### Preparation of table

Sr No	Vgs	ld mA at Vds	Sr No	Vds	ld mA at Vgs
01	+0.25		01	0.00	
02	0.00		02	0.50	
03	-0.50		03	1.00	
03	-1.00		04	2.50	
05	-1.50		05	5.00	•••
	-2.00				•••
06		•••			
	•••				

From the table plot a graph between Vgs and Id for the constant values of Vds. Plot another graph between Id and Vds at constant values of Vgs. From the curves evaluate the parameters as given at page 1.





Plot of typical input characteristics fron exp 1.

