

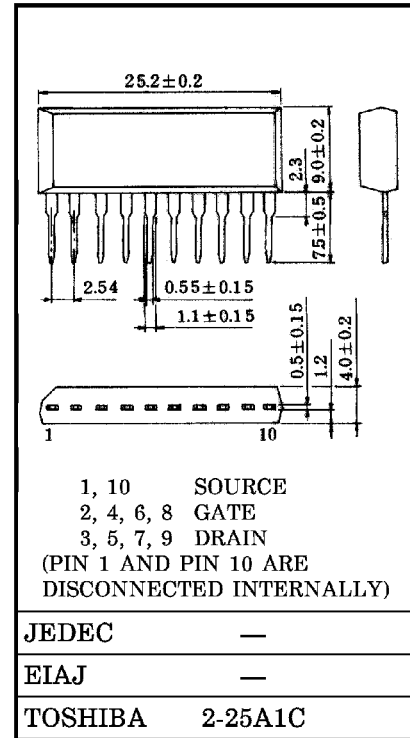
TOSHIBA POWER MOS FET MODULE SILICON N & P CHANNEL MOS TYPE (L<sup>2</sup>-π-MOS<sup>IV</sup> 4 IN 1)

# MP4207

- HIGH POWER HIGH SPEED SWITCHING APPLICATIONS.
- H - SWITCH DRIVER
- 4-Volt Gate Drive.
- Small Package by Full Molding. (SIP 10 Pin)
- High Drain Power Dissipation. (4 Devices Operation)
  - :  $P_T = 4W @ T_a = 25^\circ C$
- Low Drain-Source ON Resistance
  - :  $R_{DS(ON)} = 90m\Omega$  TYP. (Nch)
  - :  $R_{DS(ON)} = 170m\Omega$  TYP. (Pch)
- Low Leakage Current
  - :  $I_{GSS} = \pm 10\mu A$  (Max.) @  $V_{GS} = \pm 16V$
  - :  $I_{DSS} = 100\mu A$  (Max.) @  $V_{DS} = 60V$
- Enhancement-Mode
  - :  $V_{th} = 0.8 \sim 2.0V$  @  $I_D = 1mA$

**INDUSTRIAL APPLICATIONS**

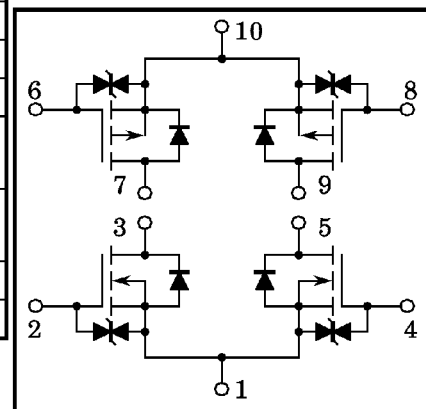
Unit in mm



**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	RATING		UNIT
		Nch	Pch	
Drain-Source Voltage	$V_{DSS}$	60	-60	V
Gate-Source Voltage	$V_{GSS}$	±20	±20	V
Drain Current	$I_D$	5	-5	A
Peak Drain Current	$I_{DP}$	10	-10	A
Drain Power Dissipation (1 Device Operation, Ta = 25°C)	$P_D$	2.0		W
Drain Power Dissipation (4 Devices Operation, Ta = 25°C)	$P_T$	4.0		W
Channel Temperature	$T_{ch}$	150		°C
Storage Temperature Range	$T_{stg}$	-55~150		°C

**ARRAY CONFIGURATION**



**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Thermal Resistance of Channel to Ambient (4 Devices Operation, Ta = 25°C)	$\Sigma R_{th(ch-a)}$	31.2	°C/W
Maximum Lead Temperature for Soldering Purposes (3.2mm from Case for 10 second)	$T_L$	260	°C

THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE. PLEASE HANDLE WITH CAUTION.

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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

ELECTRICAL CHARACTERISTICS (Ta = 25°C) (Nch MOS FET)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	IGSS	VGS = ±16V, VDS = 0	—	—	±10	μA	
Drain Cut-off Current	IDSS	VDS = 60V, VGS = 0	—	—	100	μA	
Drain-Source Breakdown Voltage	V(BR)DSS	ID = 10mA, VGS = 0	60	—	—	V	
Gate Threshold Voltage	Vth	VDS = 10V, ID = 1mA	0.8	—	2.0	V	
Forward Transfer Admittance	Yfs	VDS = 10V, ID = 2.5A	3.0	6.0	—	S	
Drain-Source ON Resistance	RDS(ON)	ID = 2.5A, VGS = 4V	—	135	200	mΩ	
Drain-Source ON Resistance	RDS(ON)	ID = 2.5A, VGS = 10V	—	90	130	mΩ	
Input Capacitance	Ciss	VDS = 10V, VGS = 0, f = 1MHz	—	500	900	pF	
Reverse Transfer Capacitance	Crss		—	90	180	pF	
Output Capacitance	Coss		—	290	500	pF	
Switching Time	Rise Time	tr		—	20	40	ns
	Turn-on Time	ton		—	60	120	
	Fall Time	tf		—	80	160	
	Turn-off Time	t <sub>off</sub>		—	300	600	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Qg	ID = 5A, VGS = 10V VDD = 48V	—	20	40	nC	
Gate-Source Charge	Qgs		—	14	—	nC	
Gate-Drain ("Miller") Charge	Qgd		—	6	—	nC	

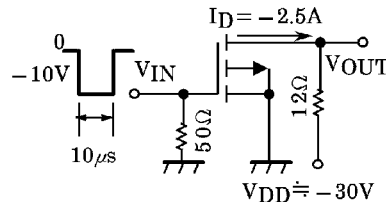
SOURCE-DRAIN DIODE RATING AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYPE	MAX.	UNIT
Drain Reverse Current	IDR	—	—	—	5	A
Peak Drain Reverse Current	IDRP	—	—	—	10	A
Diode Forward Voltage	VDSF	IDR = 5A, VGS = 0	—	—	-1.5	V
Reverse Recovery Time	t <sub>rr</sub>	IDR = 5A, VGS = 0	—	140	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dIDR / dt = -50A / μs	—	0.4	—	μC

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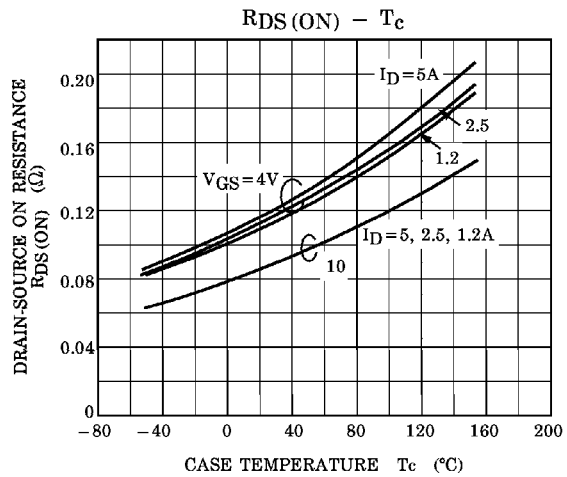
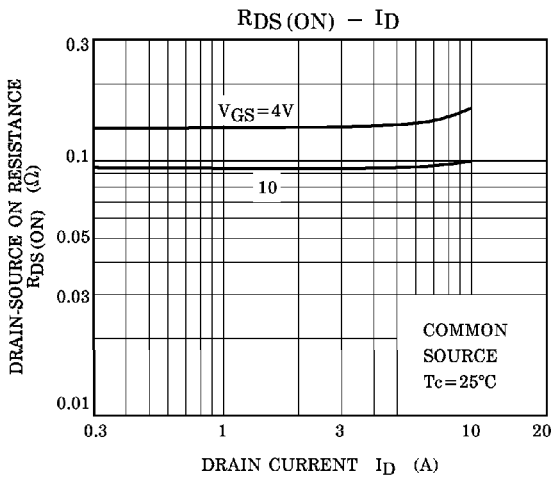
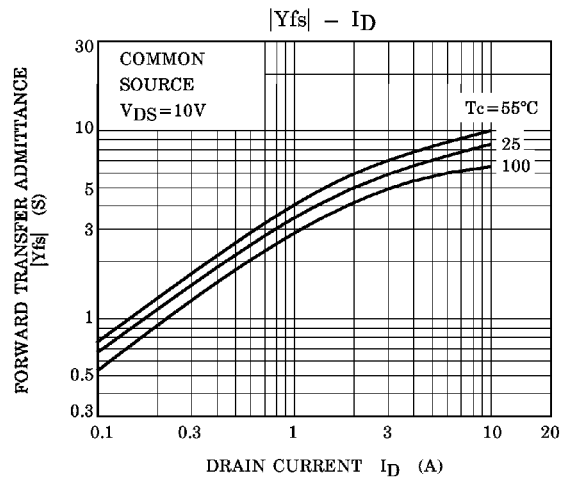
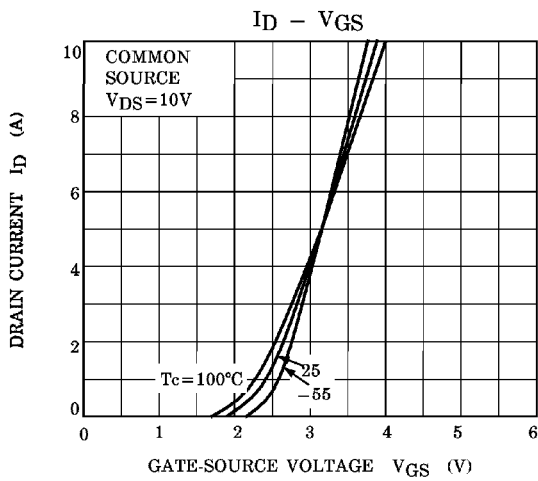
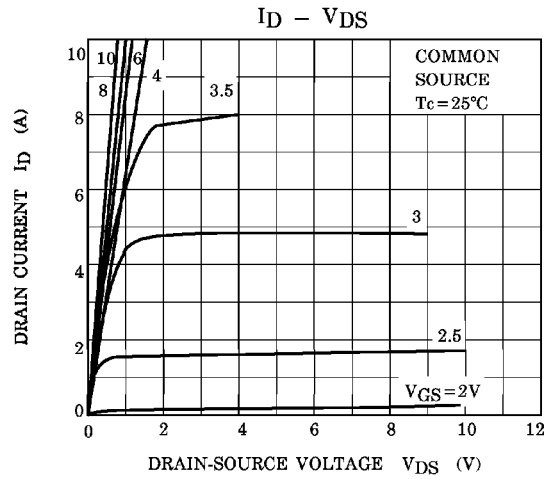
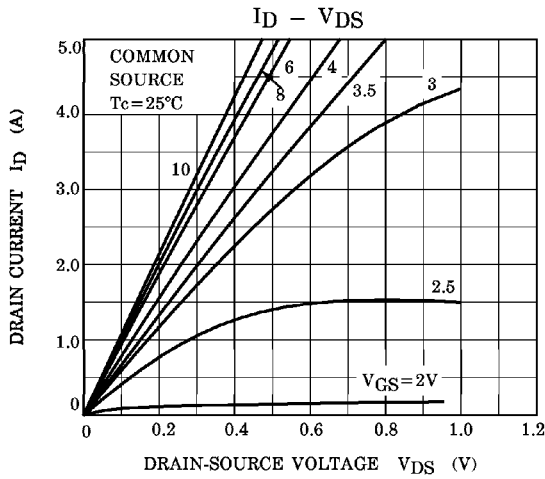
ELECTRICAL CHARACTERISTICS (Ta = 25°C) (Pch MOS FET)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	IGSS	VGS = ±16V, VDS = 0	—	—	±10	μA	
Drain Cut-off Current	IDSS	VDS = -60V, VGS = 0	—	—	-100	μA	
Drain-Source Breakdown Voltage	V(BR)DSS	ID = -10mA, VGS = 0	-60	—	—	V	
Gate Threshold Voltage	Vth	VDS = -10V, ID = -1mA	-0.8	—	-2.0	V	
Forward Transfer Admittance	Yfs	VDS = -10V, ID = -2.5A	1.0	2.0	—	S	
Drain-Source ON Resistance	RDS(ON)	ID = -2.5A, VGS = -4V	—	250	400	mΩ	
Drain-Source ON Resistance	RDS(ON)	ID = -2.5A, VGS = -10V	—	170	250	mΩ	
Input Capacitance	Ciss	VDS = -10V, VGS = 0, f = 1MHz	—	500	720	pF	
Reverse Transfer Capacitance	Crss		—	90	150	pF	
Output Capacitance	Coss		—	290	420	pF	
Switching Time	Rise Time	tr		—	120	240	ns
	Turn-on Time	ton		—	130	260	
	Fall Time	tf		—	80	160	
	Turn-off Time	t <sub>off</sub>		—	200	400	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Qg	ID = -5A, VGS = -10V VDD = -48V	—	22	45	nC	
Gate-Source Charge	Qgs		—	14	—	nC	
Gate-Drain ("Miller") Charge	Qgd		—	8	—	nC	

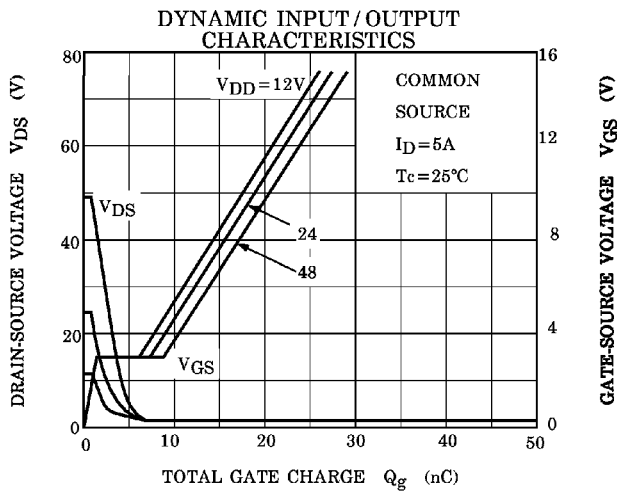
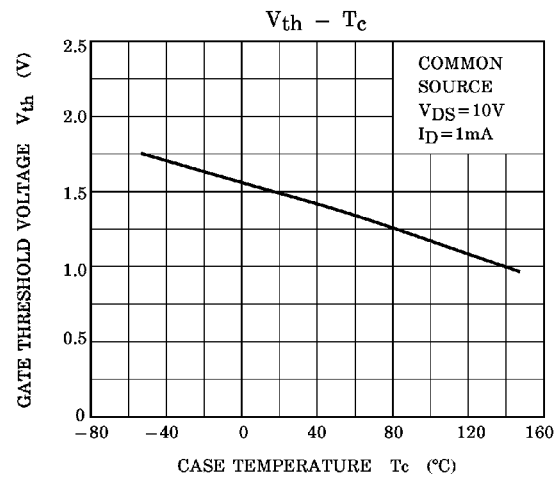
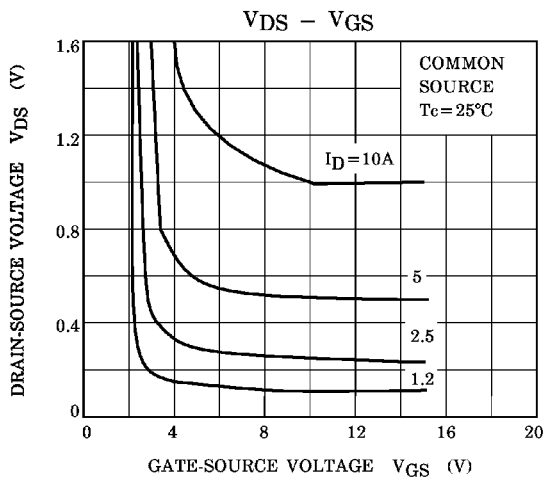
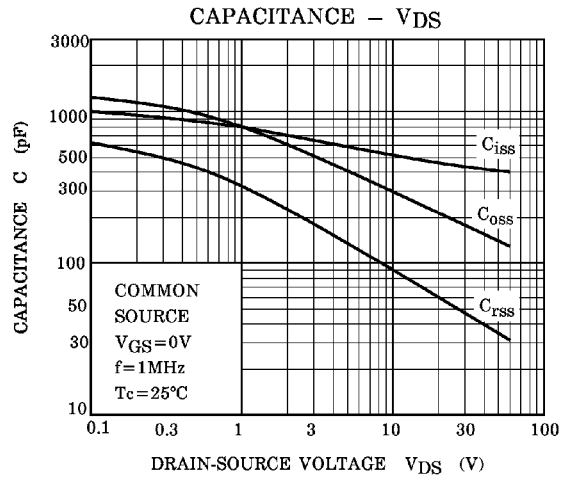
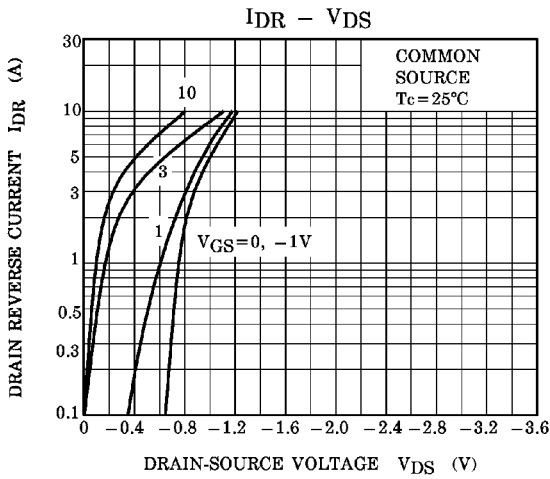
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYPE	MAX.	UNIT
Drain Reverse Current	IDR	—	—	—	-5	A
Peak Drain Reverse Current	IDRP	—	—	—	-10	A
Diode Forward Voltage	VDSF	IDR = -5A, VGS = 0	—	—	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	IDR = -5A, VGS = 0	—	120	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dIDR / dt = -50A / μs	—	0.24	—	μC

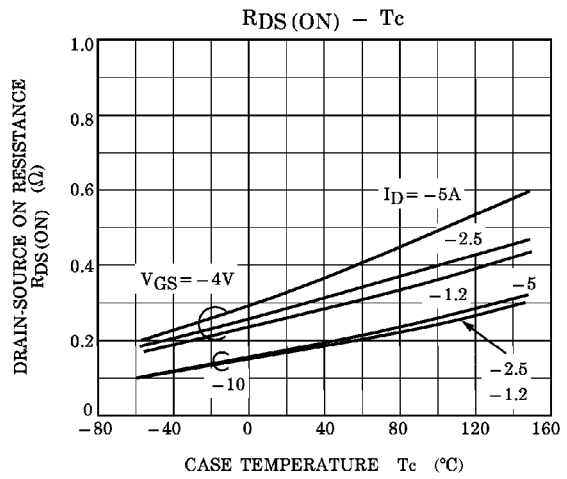
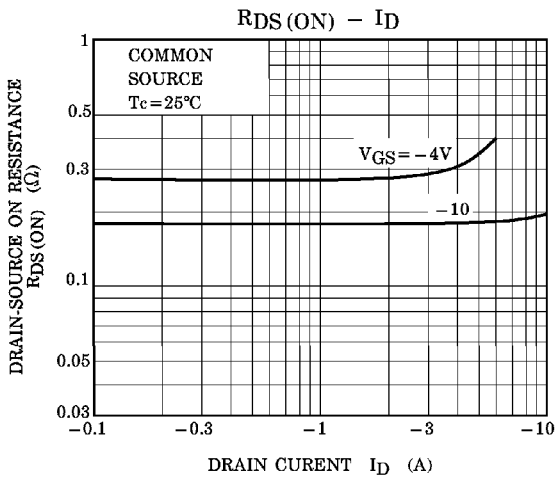
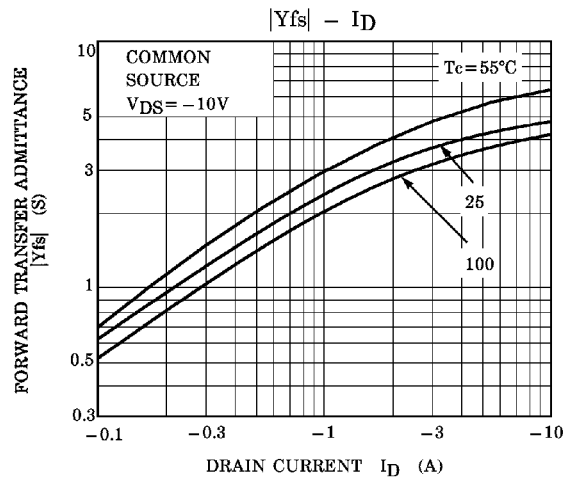
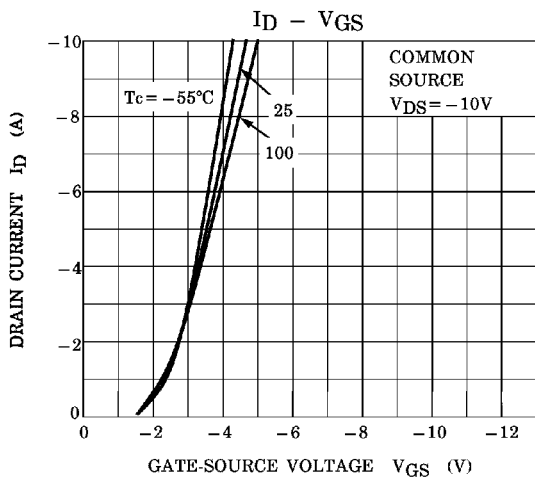
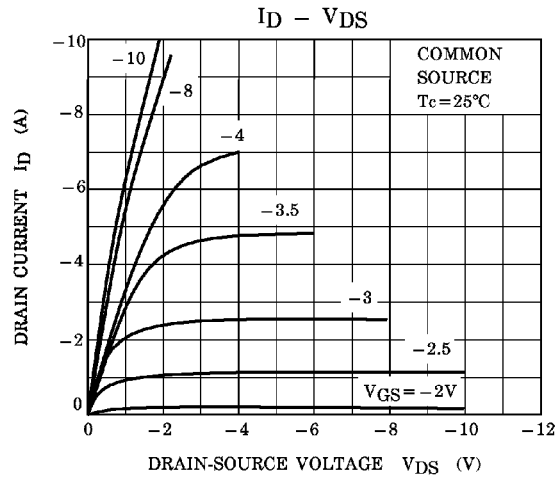
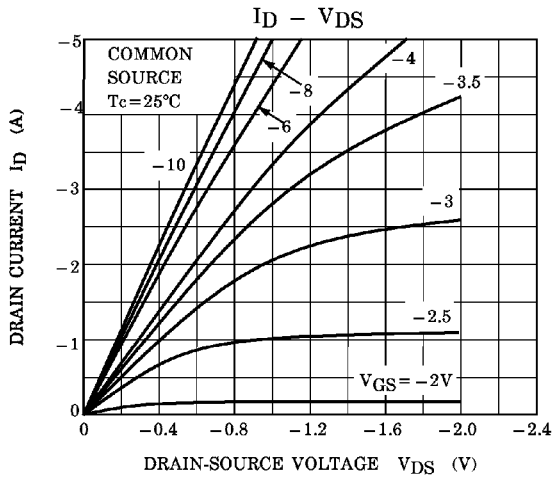
Nch FET



Nch FET



Pch FET



Pch FET

