TOSHIBA POWER MOS FET MODULE SILICON N & P CHANNEL MOS TYPE (L^2-π-MOSⅣ 4 IN 1)

MP4207

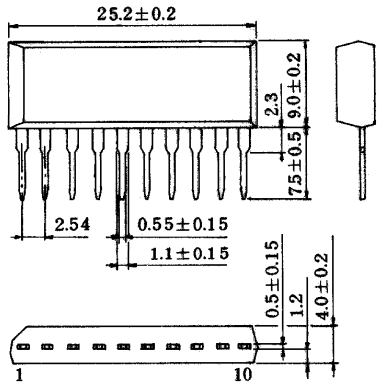
INDUSTRIAL APPLICATIONS

○ 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 @Ta = 25°C
- Low Drain-Source ON Resistance
  : $R_{DS\,(ON)}$ = 90mΩ TYP. (Nch)
  : $R_{DS\,(ON)}$ = 170mΩ TYP.(Pch)
- Low Leakage Current : I_{GSS} = ±10μA (Max.) @V_{GS} = ±16V
  : I_{DSS} = 100μA (Max.) @V_{DS} = 60V
- Enhancement-Mode : V_{th} = 0.8~2.0V @I_D = 1mA

Unit in mm



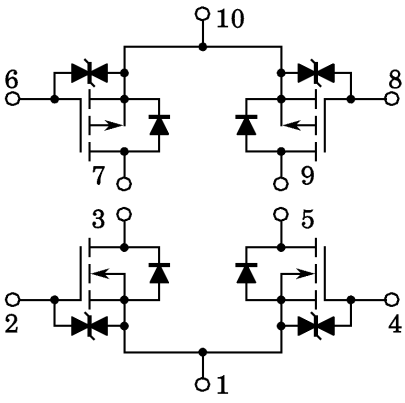
1, 10 SOURCE
2, 4, 6, 8 GATE
3, 5, 7, 9 DRAIN
(PIN 1 AND PIN 10 ARE DISCONNECTED INTERNALLY)

JEDEC	—
EIAJ	—
TOSHIBA	2-25A1C

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

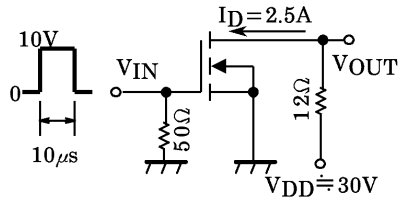


THERMAL CHARACTERISTICS

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.

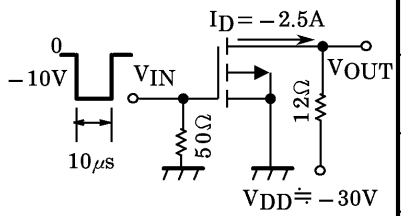
ELECTRICAL CHARACTERISTICS (Ta = 25°C) (Nch MOS FET)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS}=60V$, $V_{GS}=0$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0$	60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	0.8	—	2.0	V
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=2.5A$	3.0	6.0	—	S
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D=2.5A$, $V_{GS}=4V$	—	135	200	mΩ
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D=2.5A$, $V_{GS}=10V$	—	90	130	mΩ
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0$, f=1MHz	—	500	900	pF
Reverse Transfer Capacitance		C_{rss}		—	90	180	pF
Output Capacitance		C_{oss}		—	290	500	pF
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f<5ns$ Du. ≦1% ($Z_{OUT}=50\Omega$)	—	20	40	ns
	Turn-on Time	t_{on}		—	60	120	
	Fall Time	t_f		—	80	160	
	Turn-off Time	t_{off}		—	300	600	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$I_D=5A$, $V_{GS}=10V$ $V_{DD}=48V$	—	20	40	nC
Gate-Source Charge		Q_{gs}		—	14	—	nC
Gate-Drain ("Miller") Charge		Q_{gd}		—	6	—	nC

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYPE	MAX.	UNIT
Drain Reverse Current	I_{DR}	—	—	—	5	A
Peak Drain Reverse Current	I_{DRP}	—	—	—	10	A
Diode Foward Voltage	V_{DSF}	$I_{DR}=5A$, $V_{GS}=0$	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR}=5A$, $V_{GS}=0$	—	140	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt=-50A/\mu s$	—	0.4	—	μC

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

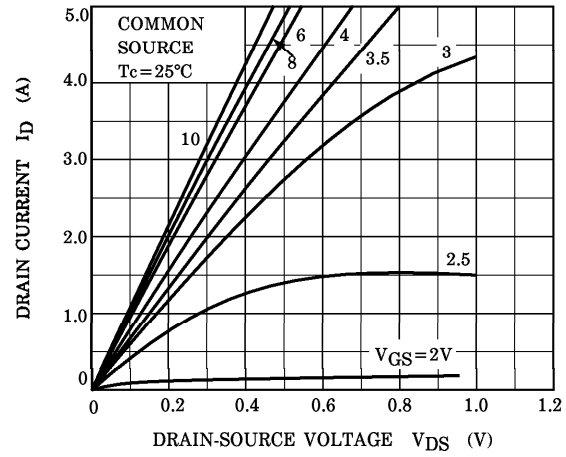
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16V$, $V_{DS} = 0$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = -60V$, $V_{GS} = 0$	—	—	−100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = -10mA$, $V_{GS} = 0$	−60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = -10V$, $I_D = -1mA$	−0.8	—	−2.0	V
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = -10V$, $I_D = -2.5A$	1.0	2.0	—	S
Drain-Source ON Resistance		$R_{DS\ (ON)}$	$I_D = -2.5A$, $V_{GS} = -4V$	—	250	400	mΩ
Drain-Source ON Resistance		$R_{DS\ (ON)}$	$I_D = -2.5A$, $V_{GS} = -10V$	—	170	250	mΩ
Input Capacitance		C_{iss}	$V_{DS} = -10V$, $V_{GS} = 0$, f = 1MHz	—	500	720	pF
Reverse Transfer Capacitance		C_{rss}		—	90	150	pF
Output Capacitance		C_{oss}		—	290	420	pF
Switching Time	Rise Time	t_r		—	120	240	ns
	Turn-on Time	t_{on}		—	130	260	
	Fall Time	t_f		—	80	160	
	Turn-off Time	t_{off}		—	200	400	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$I_D = -5A$, $V_{GS} = -10V$, $V_{DD} = -48V$	—	22	45	nC
Gate-Source Charge		Q_{gs}		—	14	—	nC
Gate-Drain ("Miller") Charge		Q_{gd}		—	8	—	nC

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

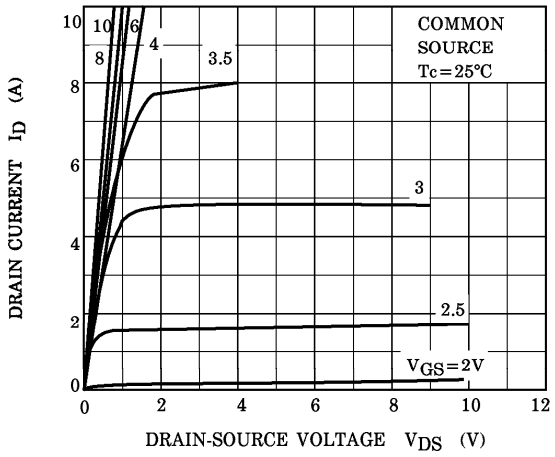
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYPE	MAX.	UNIT
Drain Reverse Current	I_{DR}	—	—	—	−5	A
Peak Drain Reverse Current	I_{DRP}	—	—	—	−10	A
Diode Foward Voltage	V_{DSF}	$I_{DR} = -5A$, $V_{GS} = 0$	—	—	1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -5A$, $V_{GS} = 0$	—	120	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = -50A / \mu s$	—	0.24	—	μC

Nch FET

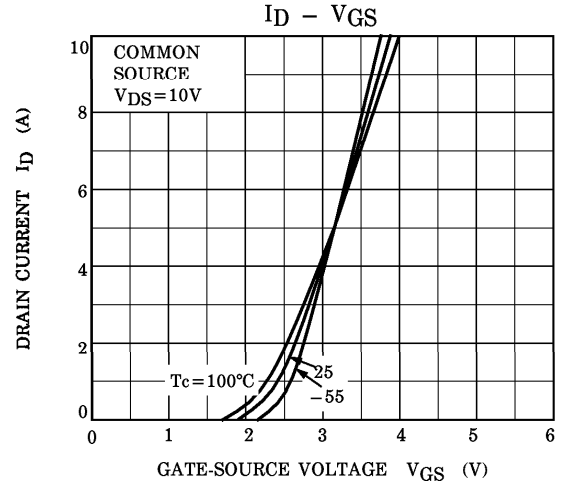
$I_D - V_{DS}$



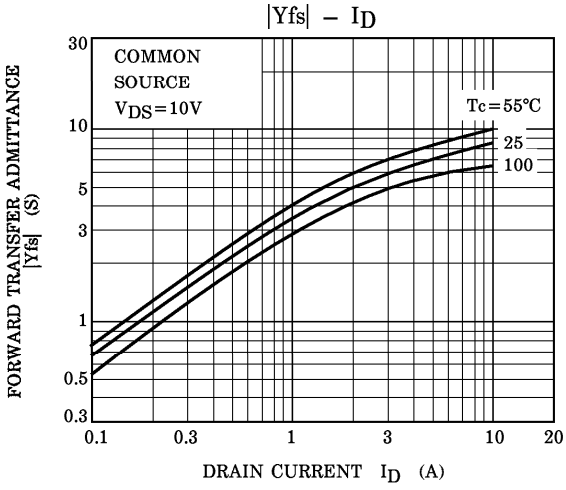
$I_D - V_{DS}$



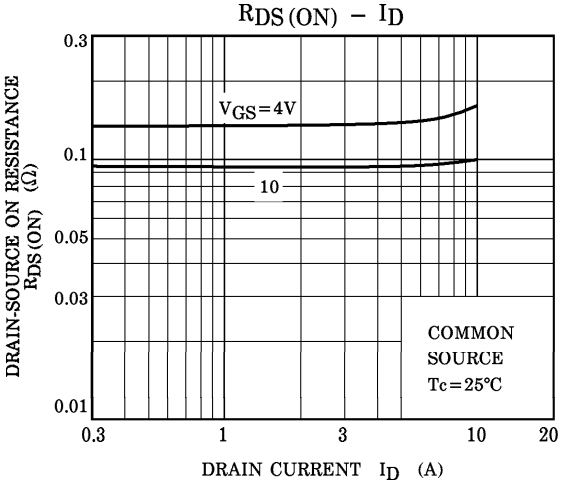
$I_D - V_{GS}$



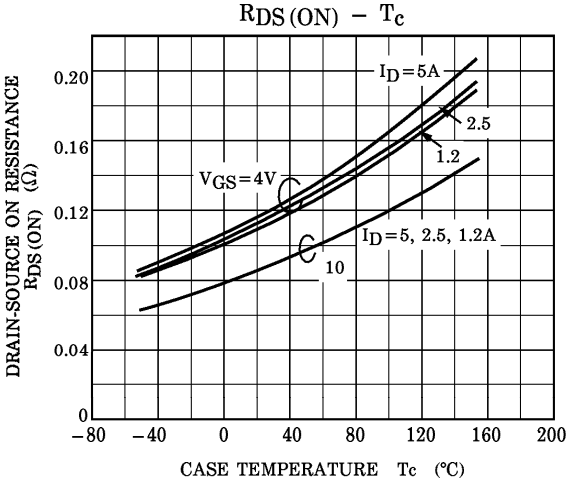
$|Yfs| - I_D$



$R_{DS(ON)} - I_D$

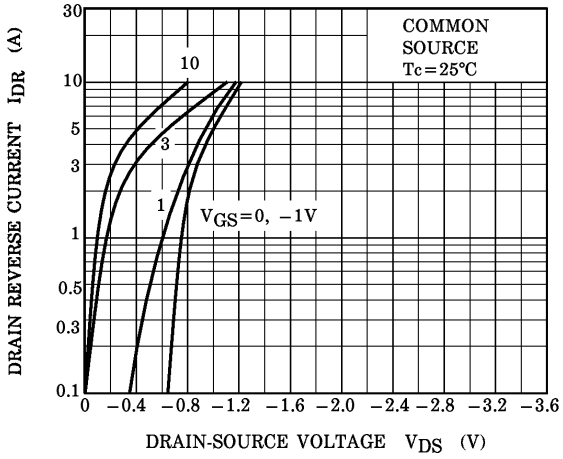


$R_{DS(ON)} - T_c$

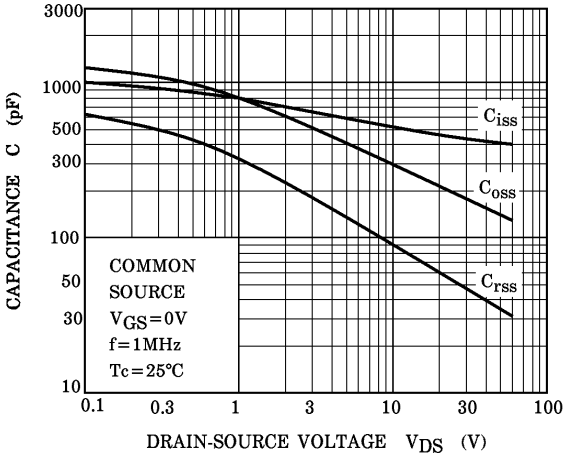


Nch FET

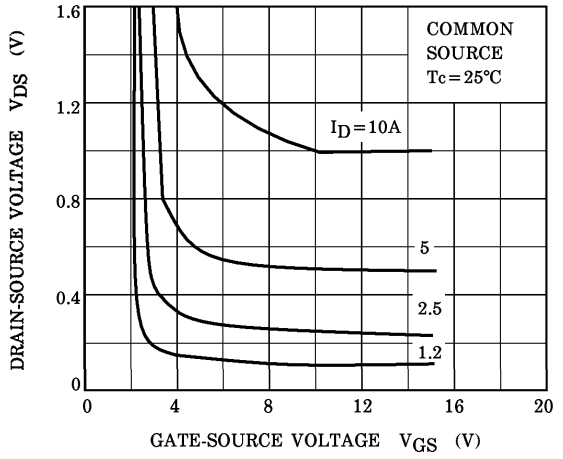
I_{DR} – V_{DS}



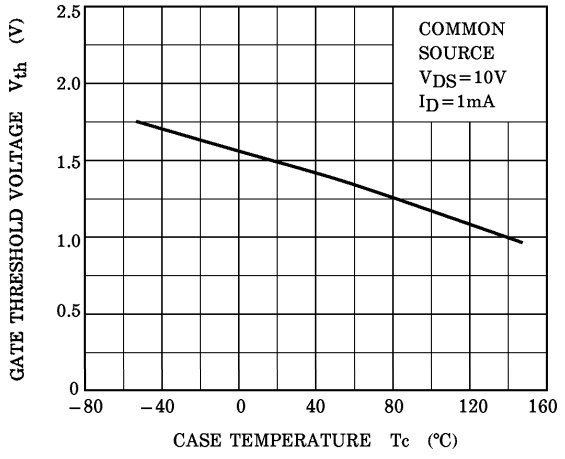
CAPACITANCE – V_{DS}



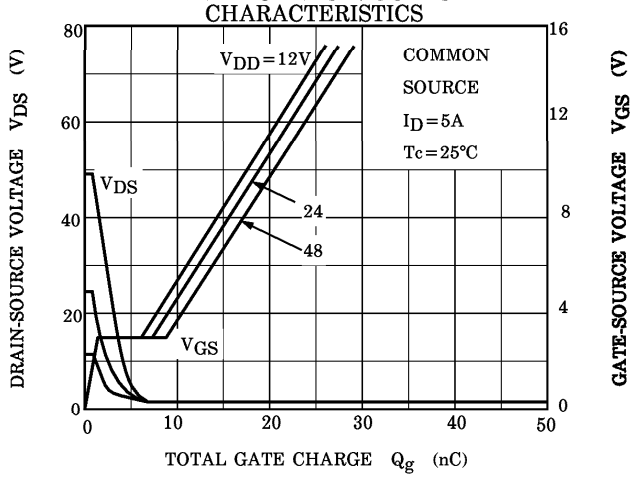
V_{DS} – V_{GS}



V_{th} – T_c

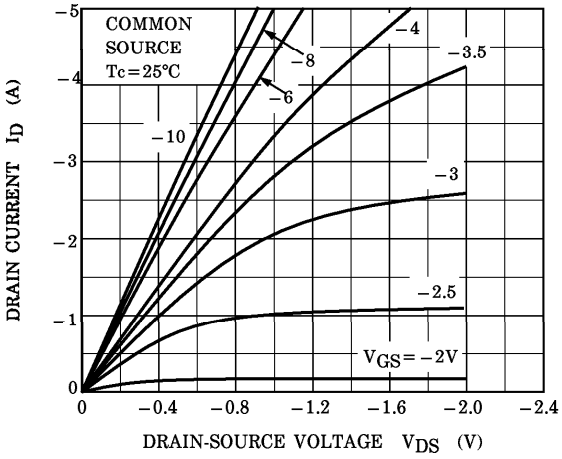


DYNAMIC INPUT / OUTPUT CHARACTERISTICS

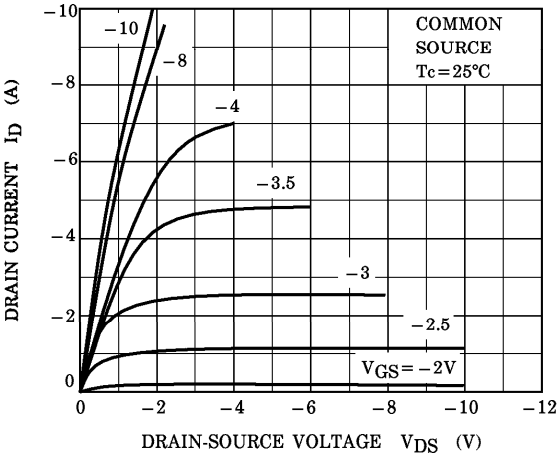


Pch FET

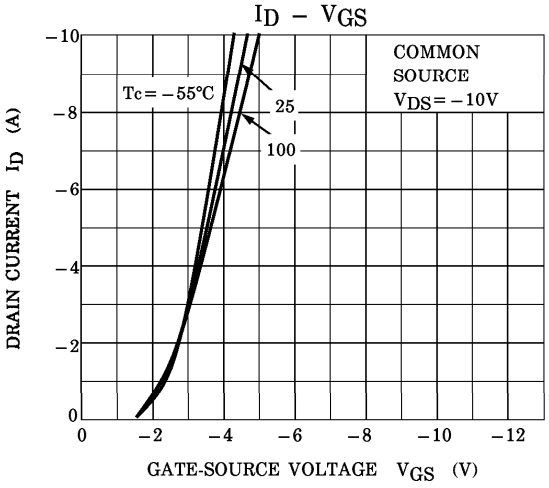
$I_D - V_{DS}$



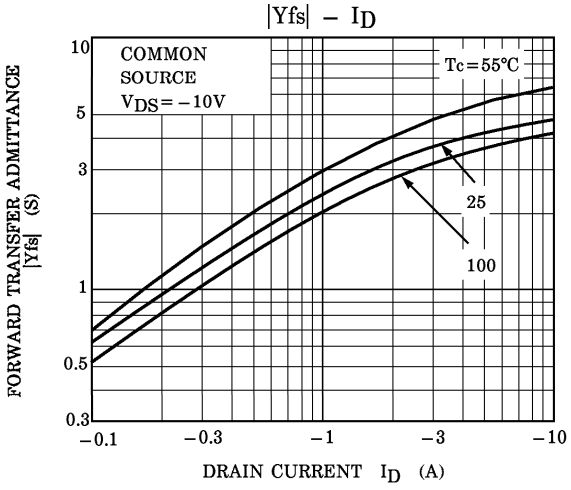
$I_D - V_{DS}$



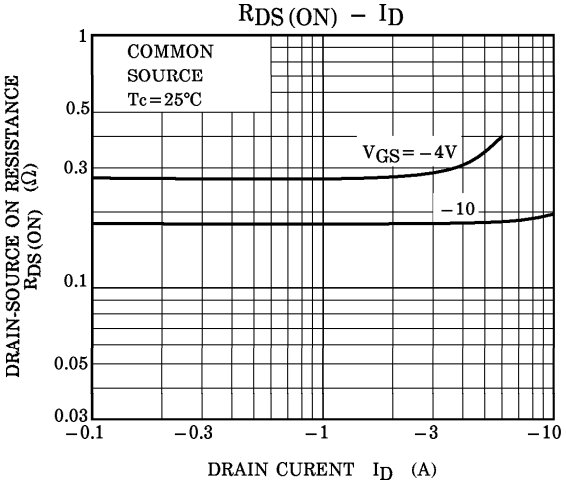
$I_D - V_{GS}$



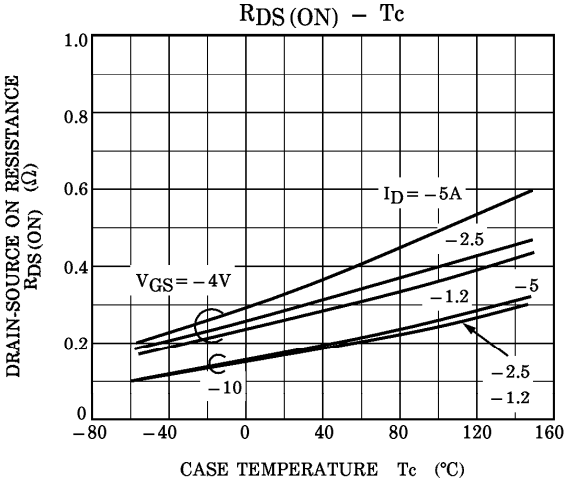
$|Yfs| - I_D$



$R_{DS(ON)} - I_D$

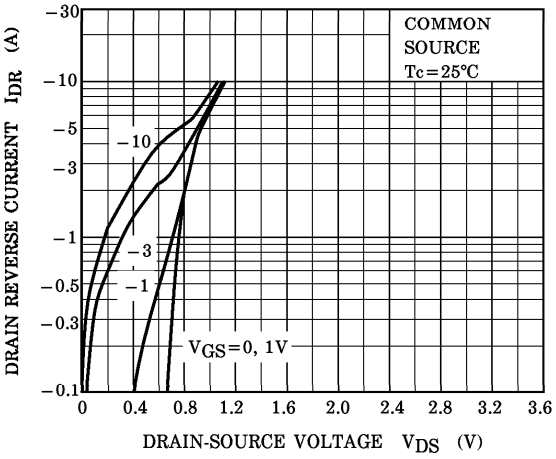


$R_{DS(ON)} - Tc$

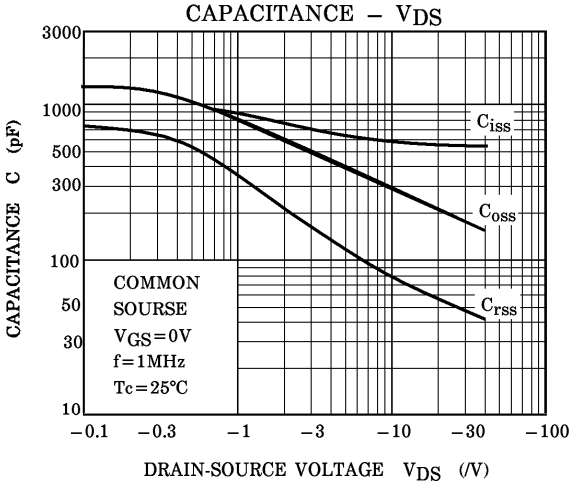


Pch FET

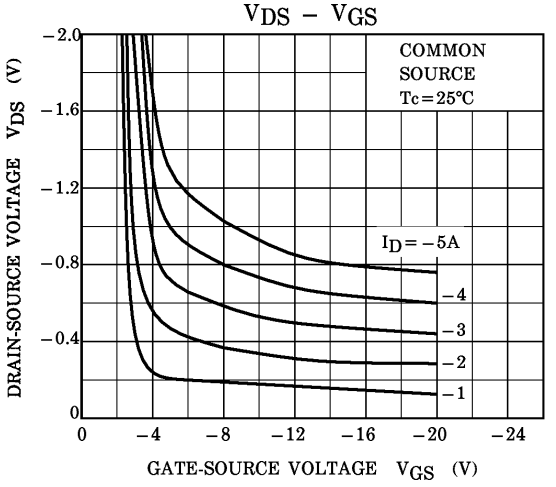
I_{DR} – V_{DS}



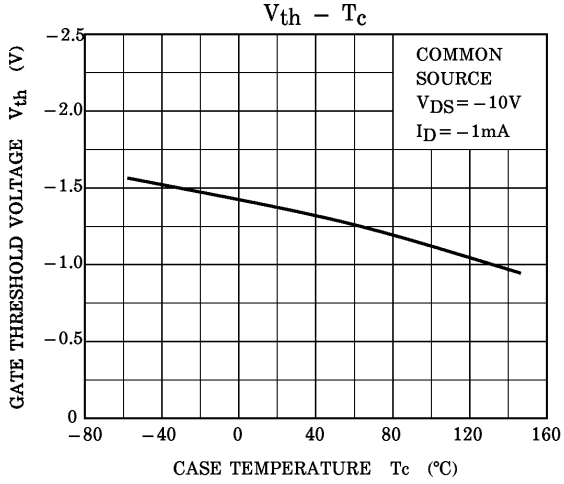
CAPACITANCE – V_{DS}



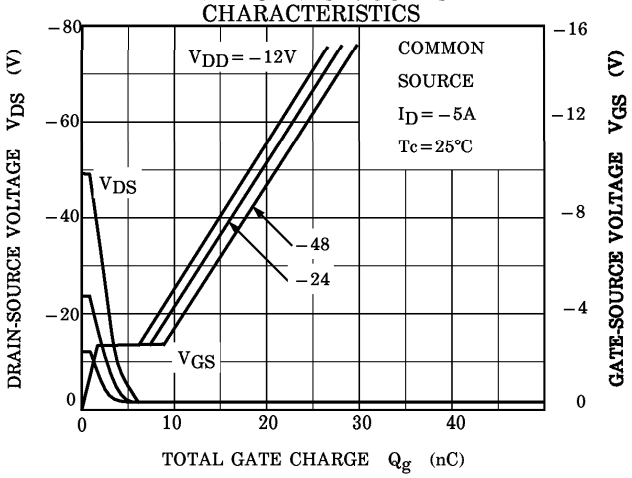
V_{DS} – V_{GS}



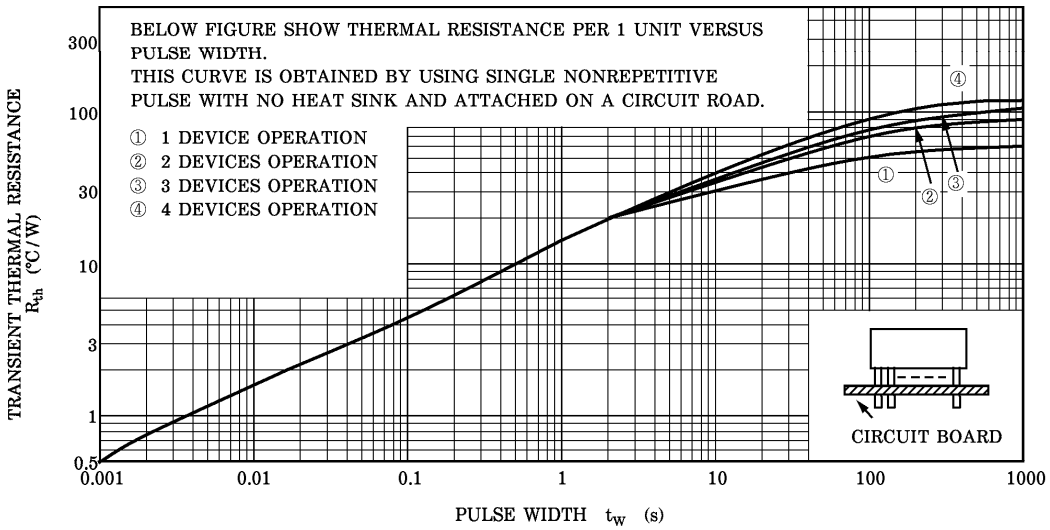
V_{th} – T_c



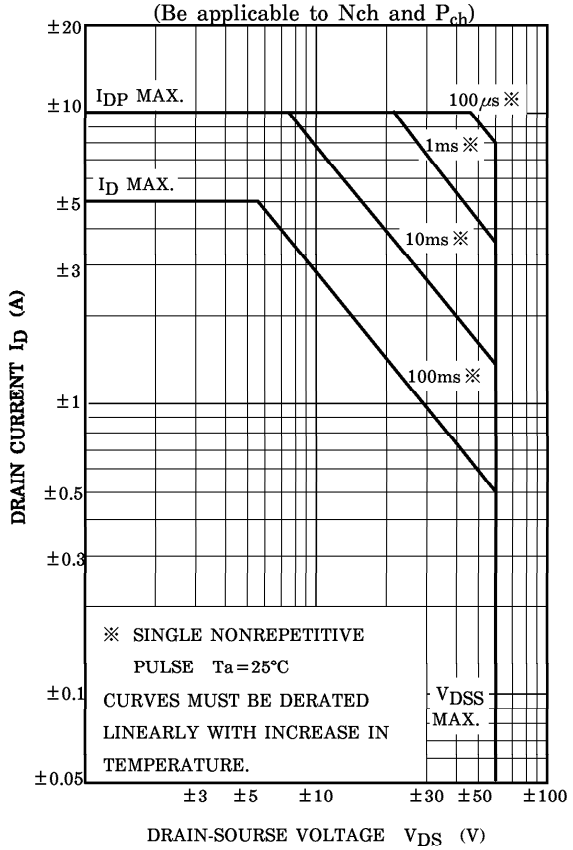
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



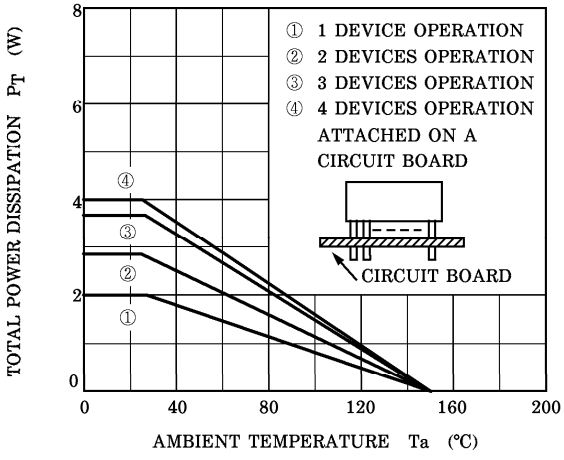
r_{th} – t_w



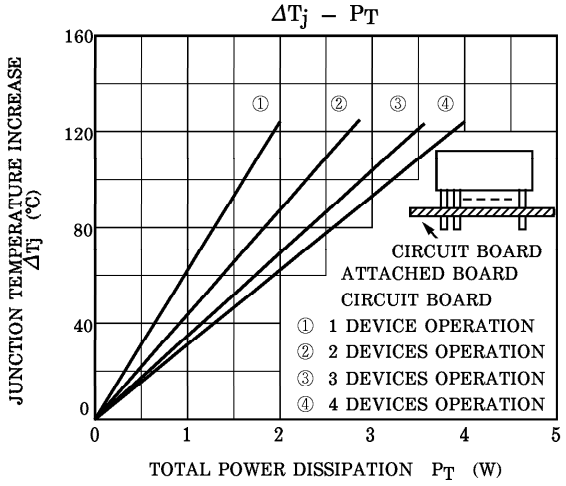
SAFE OPERATING AREA
(Be applicable to Nch and P_{ch})



P_T – Ta



ΔT_j – P_T



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