TOSHIBA POWER MOS FET MODULE SILICON N & P CHANNEL MOS TYPE (L^2-π-MOSⅣ 6 IN 1)

MP6801

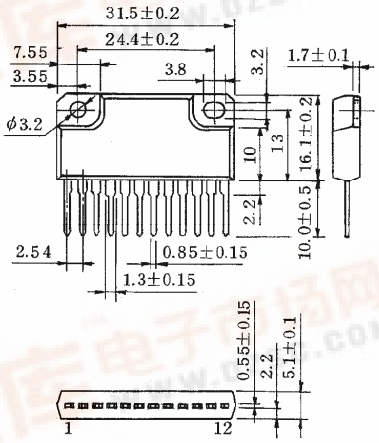
HIGH POWER, HIGH SPEED SWITCHING APPLICATIONS.

3-PHASE MOTOR DRIVE AND BIPOLAR DRIVE OF PULSE MOTOR.

INDUSTRIAL APPLICATIONS

- 4-Volt Gate Drive.
- Package with Heat Sink Isolated to Lead. (SIP 12Pin)
- High Drain Power Dissipation.
  : P_T = 40W @Tc = 25°C (6 Device Operation)
- Low Drain-Source ON Resistance
  : $R_{DS\,(ON)}$ = 55mΩ (Typ.) (N-ch)
  90mΩ (Typ.) (P-ch)
- Low Leakage Current : I_{GSS} = ±10μA (Max.) @V_{DS} = ±16V
  : I_{DSS} = 100μA (Max.) @V_{DS} = 60V
- Enhancement-Mode : V_{th} = 0.8~2.0V @I_D = 1mA

Unit in mm

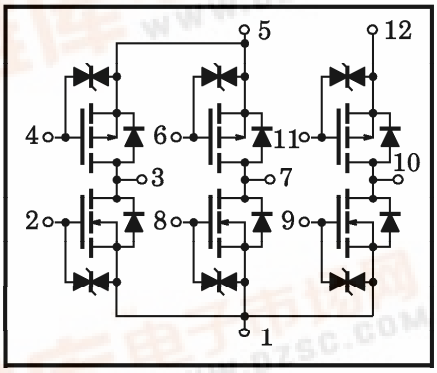


2, 4, 6, 8, 9, 11	Gate
3, 7, 10	Drain
1, 5, 12	Source

JEDEC	—
EIAJ	—
TOSHIBA	2-32B3A

Weight : 6g

ARRAY CONFIGURATION



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING N-ch	RATING P-ch	UNIT
Drain-Source Voltage		V_{DSS}	60	−60	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Drain Current		I_D	10	−10	A
Peak Drain Current		I_{DP}	30	−30	A
Drain Power Dissipation (1 Device Operation, Ta = 25°C)		P_D	3.0		W
Drain Power Dissipation (6 Devices Operation)	Ta = 25°C	P_T	5.0		W
	Tc = 25°C		40		
Channel Temperature		T_{ch}	150		°C
Storage Temperature Range		T_{stg}	−55~150		°C

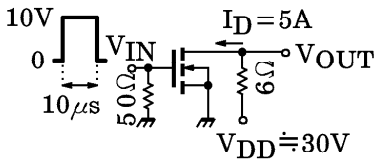
THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Junction to Ambient (6 Devices Operation, Ta = 25°C)	$\Sigma R_{th\,(j\text{-}a)}$	25	°C / W
Thermal Resistance of Junction to Case (6 Devices Operation, Tc = 25°C)	$\Sigma R_{th\,(j\text{-}c)}$	3.12	°C / W
Maximum Lead Temperature for Soldering Purposes (3.2mm from Case for 10s)	T_L	260	°C

This transistor is an electrostatic sensitive device. Please handle with caution.

961001EAA2

ELECTRICAL CHARACTERISTICS (Ta = 25°C) (N-ch MOS FET)

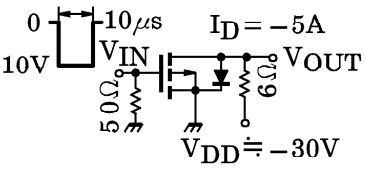
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16V$, $V_{DS} = 0$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 60V$, $V_{GS} = 0$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D = 10mA$, $V_{GS} = 0$	60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V$, $I_D = 1mA$	0.8	—	2.0	V
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = 10V$, $I_D = 5A$	5	11	—	S
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D = 5A$, $V_{GS} = 4V$	—	80	115	mΩ
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D = 5A$, $V_{GS} = 10V$	—	55	80	mΩ
Input Capacitance		C_{iss}	$V_{DS} = 10V$, $V_{GS} = 0$, f = 1MHz	—	750	—	pF
Reverse Transfer Capacitance		C_{rss}		—	170	—	pF
Output Capacitance		C_{oss}		—	450	—	pF
Switching Time	Rise Time	t_r		—	60	—	ns
	Turn-on Time	t_{on}		—	80	—	ns
	Fall Time	t_f		—	150	—	ns
	Turn-off Time	t_{off}		—	400	—	ns
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$I_D = 10A$, $V_{GS} = 10V$, $V_{DD} = 48V$	—	30	—	nC
Gate-Source Charge		Q_{gs}		—	20	—	nC
Gate-Drain ("Miller") Charge		Q_{gd}		—	10	—	nC

V_{IN} : t_r, $t_f < 5ns$
Du. ≦ 1% ($Z_{OUT} = 50\Omega$)

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Drain Reverse Current	I_{DR}	—	—	—	−10	A
Peak Drain Reverse Current	I_{DRP}	—	—	—	−30	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 10A$, $V_{GS} = 0$	—	−1.0	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 10A$, $V_{GS} = 0$, $dI_{DR}/dt = -50A/\mu s$	—	110	—	ns
Reverse Recovery Charge	Q_{rr}		—	0.27	—	μC

ELECTRICAL CHARACTERISTICS (Ta = 25°C) (P-ch MOS FET)

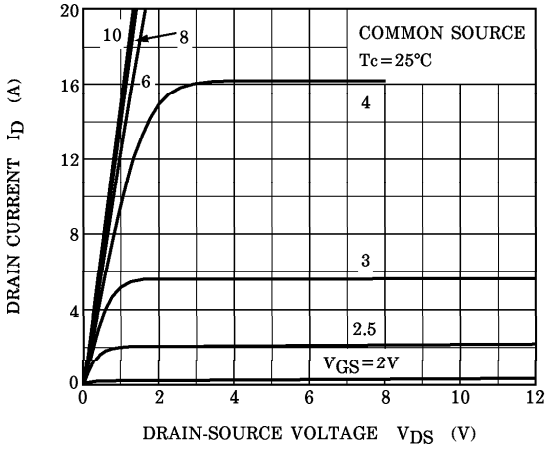
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16V$, $V_{DS} = 0$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = -60V$, $V_{GS} = 0$	—	—	−100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D = -10mA$, $V_{GS} = 0$	−60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = -10V$, $I_D = -1mA$	−0.8	—	−2.0	V
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS} = -10V$, $I_D = -5A$	3.5	8.0	—	S
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D = -5A$, $V_{GS} = -4V$	—	145	200	mΩ
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$I_D = -5A$, $V_{GS} = -10V$	—	90	125	mΩ
Input Capacitance		C_{iss}	$V_{DS} = -10V$, $V_{GS} = 0$, f = 1MHz	—	1200	—	pF
Reverse Transfer Capacitance		C_{rss}		—	220	—	pF
Output Capacitance		C_{oss}		—	550	—	pF
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f < 5ns$ Du. ≦ 1% ($Z_{OUT} = 50\Omega$)	—	60	—	ns
	Turn-on Time	t_{on}		—	80	—	ns
	Fall Time	t_f		—	120	—	ns
	Turn-off Time	t_{off}		—	350	—	ns
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$I_D = -10A$, $V_{GS} = -10V$ $V_{DD} = -48V$	—	45	—	nC
Gate-Source Charge		Q_{gs}		—	30	—	nC
Gate-Drain ("Miller") Charge		Q_{gd}		—	15	—	nC

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

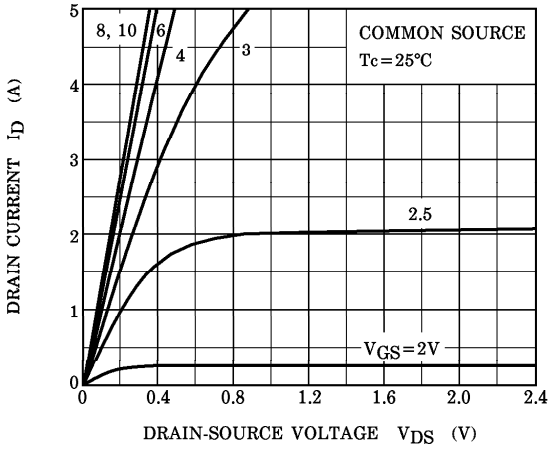
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Drain Reverse Current	I_{DR}	—	—	—	−10	A
Peak Drain Reverse Current	I_{DRP}	—	—	—	−30	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -10A$, $V_{GS} = 0$	—	−0.9	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -10A$, $V_{GS} = 0$ $dI_{DR}/dt = 50A/\mu s$	—	110	—	ns
Reverse Recovery Charge	Q_{rr}		—	0.18	—	μC

N-ch

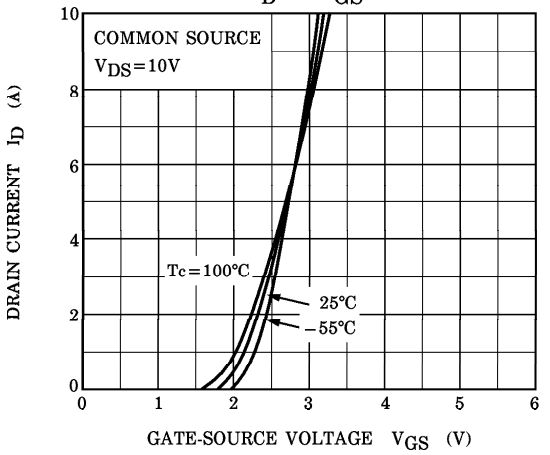
$I_D - V_{DS}$



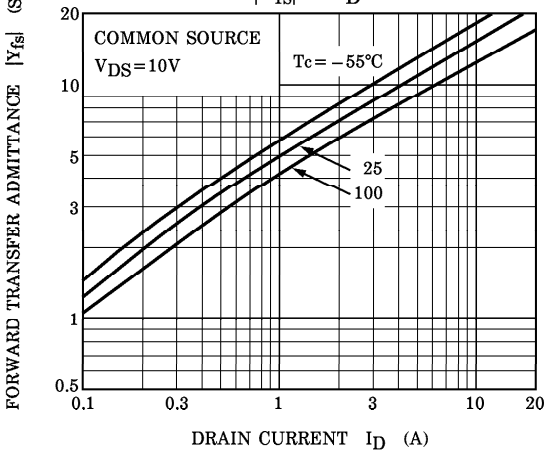
$I_D - V_{DS}$



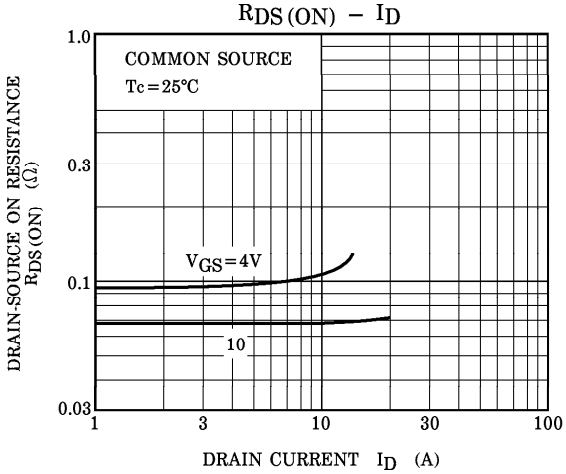
$I_D - V_{GS}$



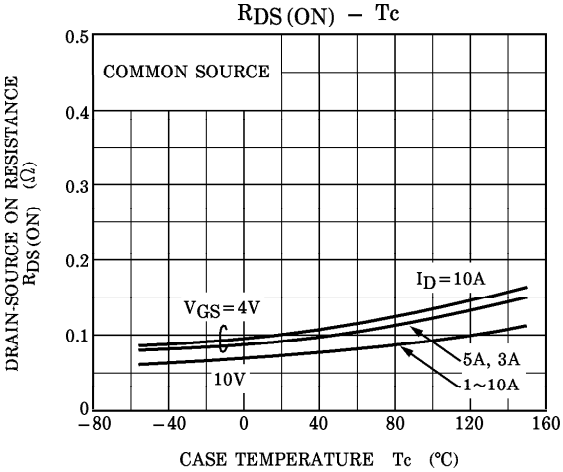
$|Y_{fs}| - I_D$



$R_{DS\,(ON)} - I_D$

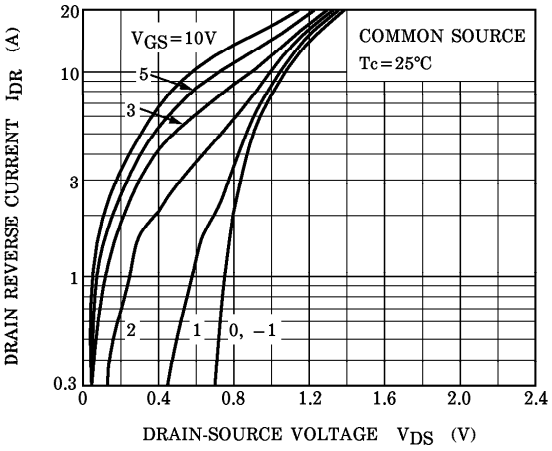


$R_{DS\,(ON)} - T_c$

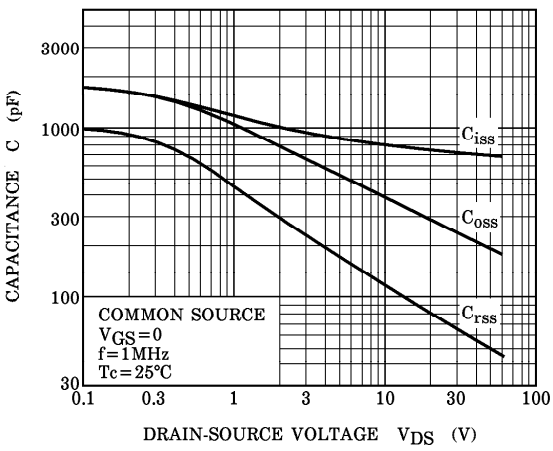


N-ch

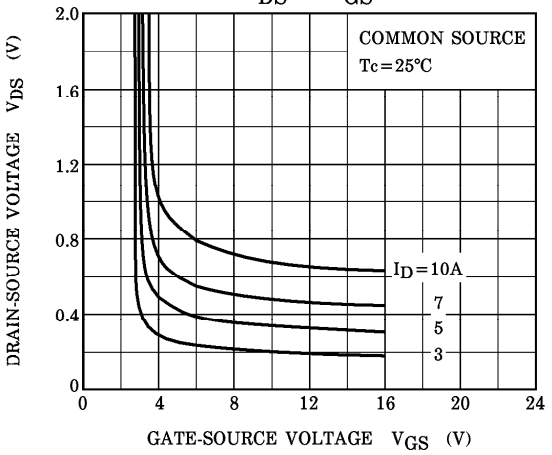
I_{DR} – V_{DS}



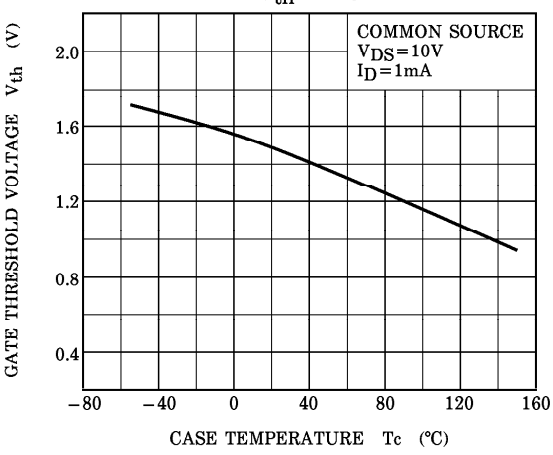
CAPACITANCE – V_{DS}



V_{DS} – V_{GS}

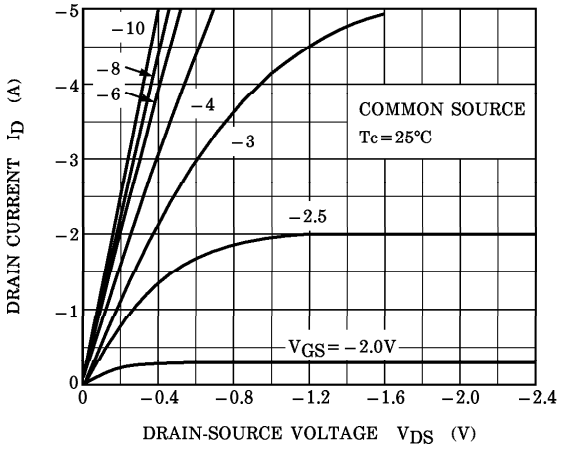


V_{th} – Tc

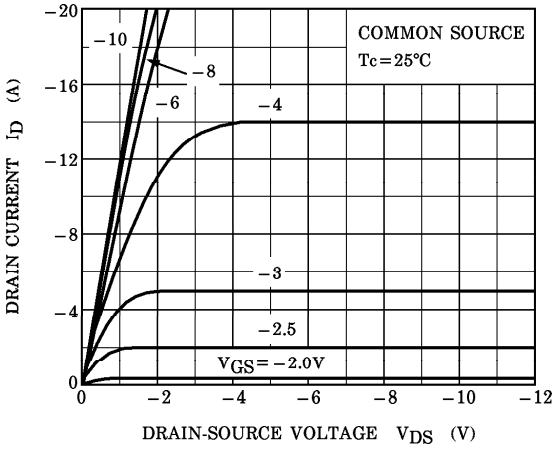


P-ch

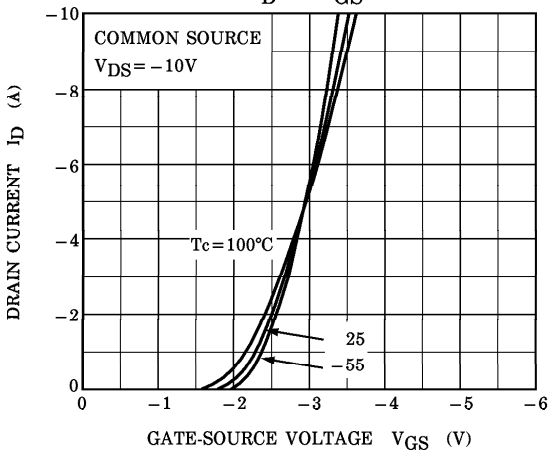
$I_D - V_{DS}$



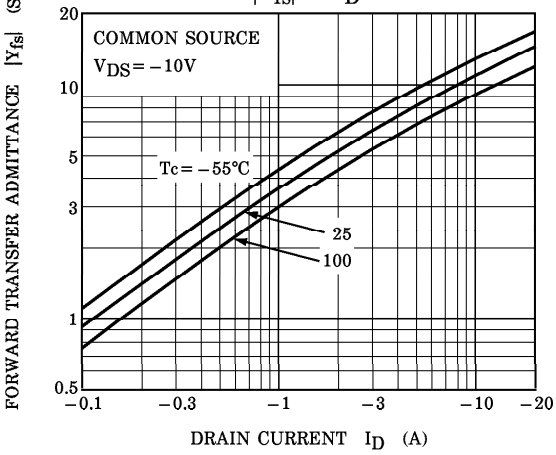
$I_D - V_{DS}$



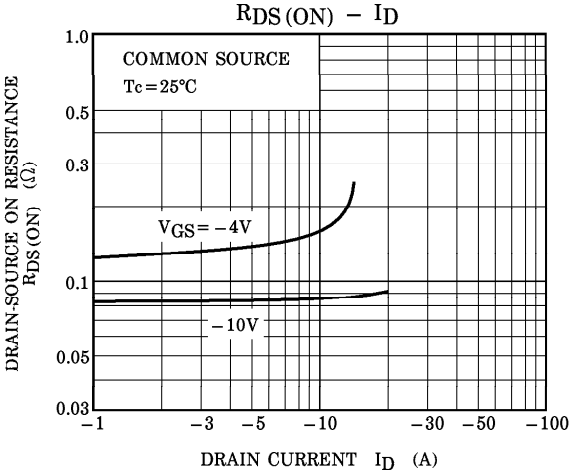
$I_D - V_{GS}$



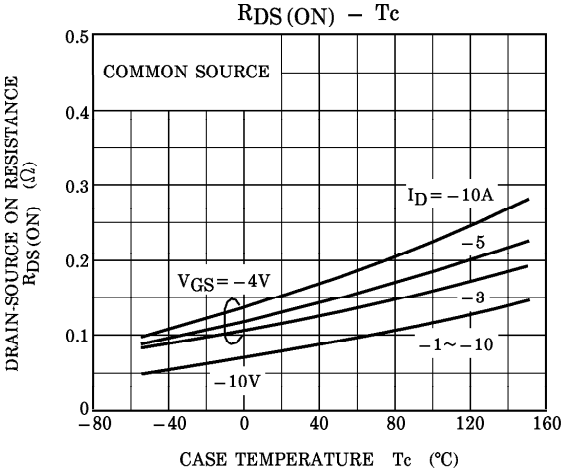
$|Y_{fs}| - I_D$



$R_{DS\,(ON)} - I_D$

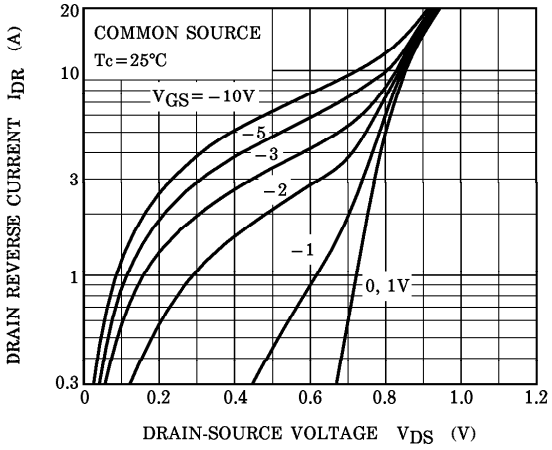


$R_{DS\,(ON)} - T_c$

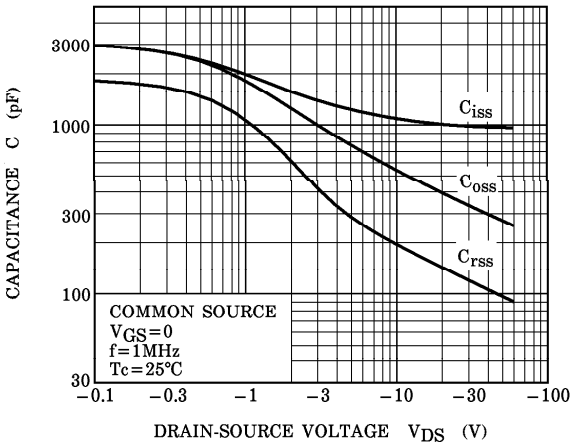


P-ch

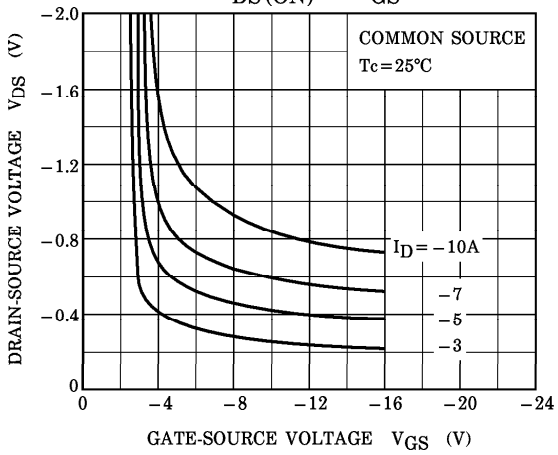
I_{DR} – V_{DS}



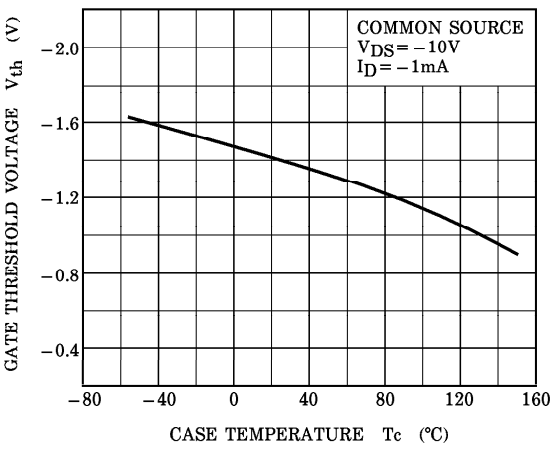
CAPACITANCE – V_{DS}



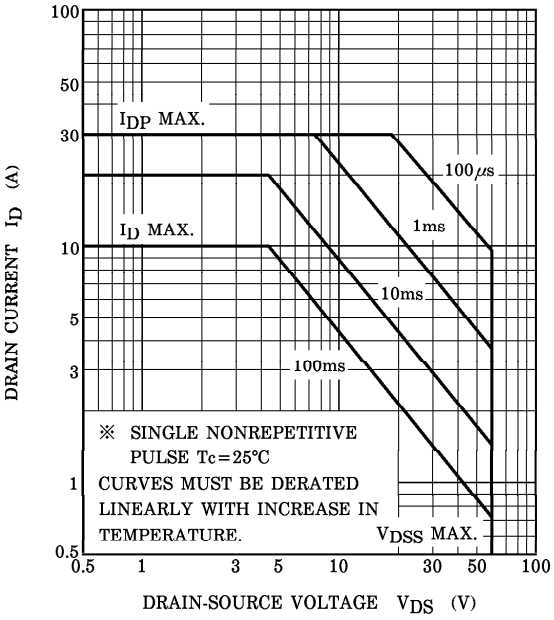
$V_{DS\,(ON)}$ – V_{GS}



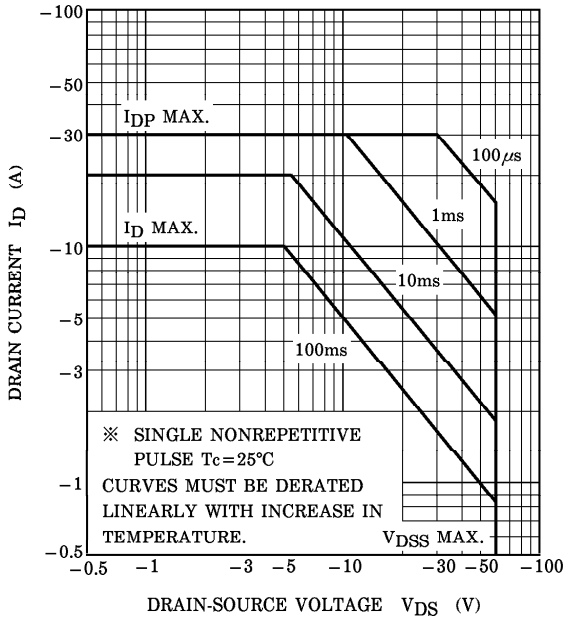
V_{th} – Tc



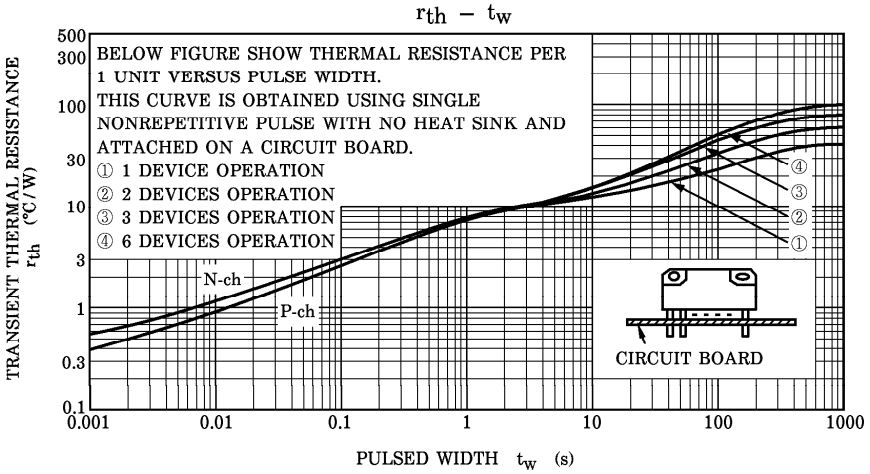
SAFE OPERATION AREA (N-ch)



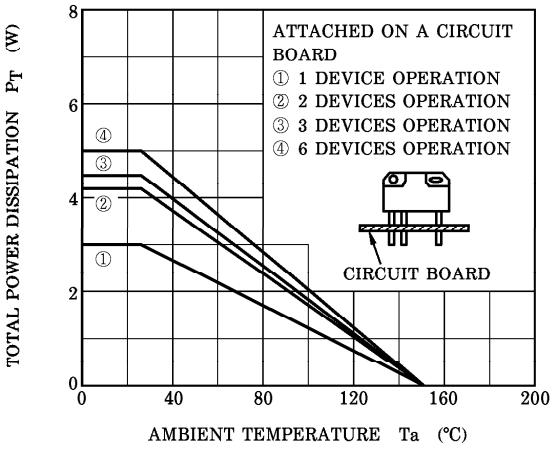
SAFE OPERATION AREA (P-ch)



$r_{th} - t_w$



P_T – Ta



ΔT_j – P_T