SEMICONDUCTOR
TOSHIBA
TECHNICAL DATA

TOSHIBA FIELD EFFECT TRANSISTOR
2SK2039
SILICON N CHANNEL MOS TYPE
(π-MOSII.5)

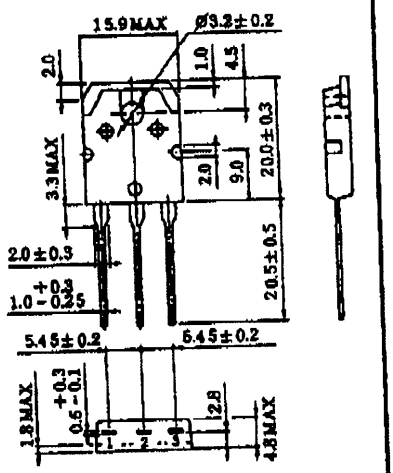
317-5431

INDUSTRIAL APPLICATIONS

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.
DC-DC CONVERTER AND MOTOR DRIVE
APPLICATIONS.

- Low Drain-Source ON Resistance : $R_{DS(ON)} = 1.9\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 1.7S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 300\mu A$ (Max.) @$V_{DS} = 720V$
- Enhancement-Mode : $V_{th} = 1.5 \sim 3.5V$ @$V_{DS} = 10V$, $I_D = 1mA$

Unit in mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	SC-65
TOSHIBA	2-16C1B

Weight : 4.6g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	900	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	900	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	5	A
	Pulse	I_{DP}	15	
Drain Power Dissipation (Tc = 25°C)		P_D	150	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	0.833	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	50	°C/W

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

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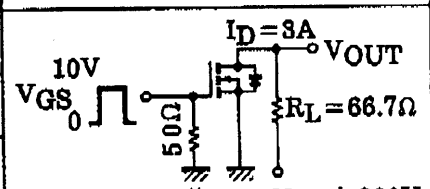
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm30V$, $V_{DS}=0V$	—	—	±100	nA
Drain Cut-off Current		I_{DSS}	$V_{DS}=720V$, $V_{GS}=0V$	—	—	300	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	900	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	1.5	—	3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=3A$	—	1.9	2.5	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=20V$, $I_D=3A$	1.0	3.0	—	S
Input Capacitance		C_{iss}	$V_{DS}=25V$, $V_{GS}=0V$, $f=1MHz$	—	690	980	pF
Reverse Transfer Capacitance		C_{rss}		—	65	110	
Output Capacitance		C_{oss}		—	120	180	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f<5ns$, $V_{DD}\fallingdotseq200V$ Duty≦1%, $t_w=10\mu s$	—	30	60	ns
	Turn-on Time	t_{on}		—	70	140	
	Fall Time	t_f		—	40	80	
	Turn-off Time	t_{off}		—	210	420	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq400V$, $V_{GS}=10V$, $I_D=5A$	—	55	110	nC
Gate-Source Charge		Q_{gs}		—	25	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	30	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	15	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=5A$, $V_{GS}=0V$	—	—	−1.9	V
Reverse Recovery Time	t_{rr}	$I_{DR}=5A$, $V_{GS}=0V$ $dI_{DR}/dt=100A/\mu s$	—	1450	—	ns
Reverse Recovered Charge	Q_{rr}		—	20	—	μC

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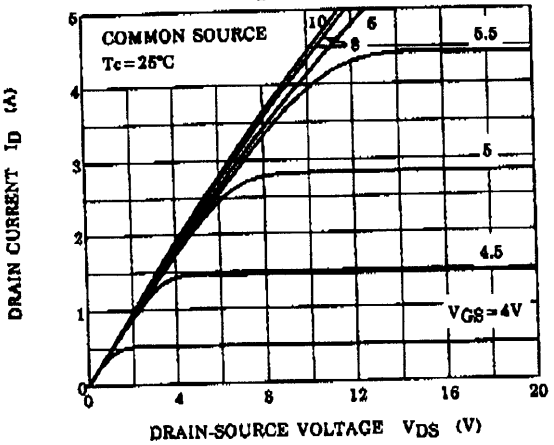
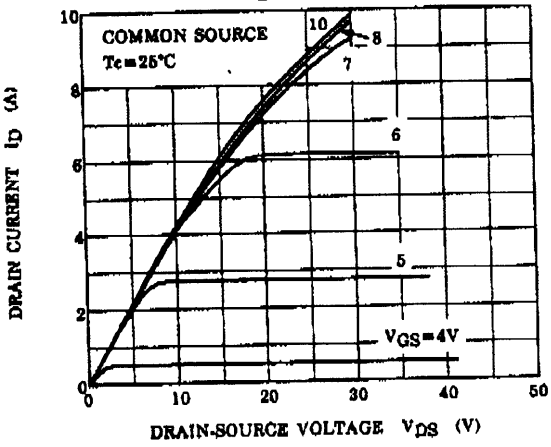
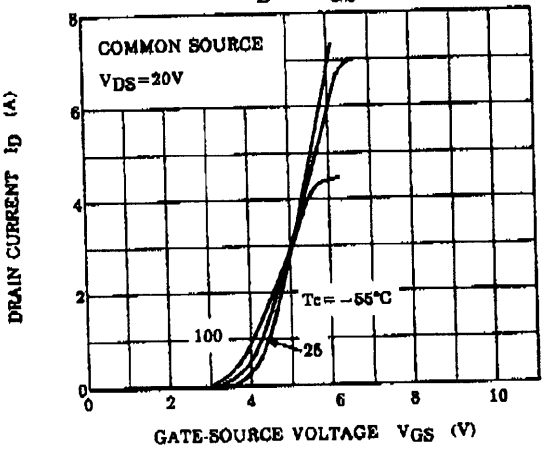
I_D – V_{DS}



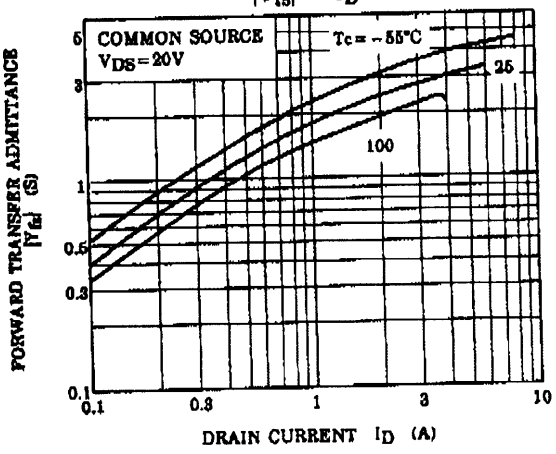
I_D – V_{DS}



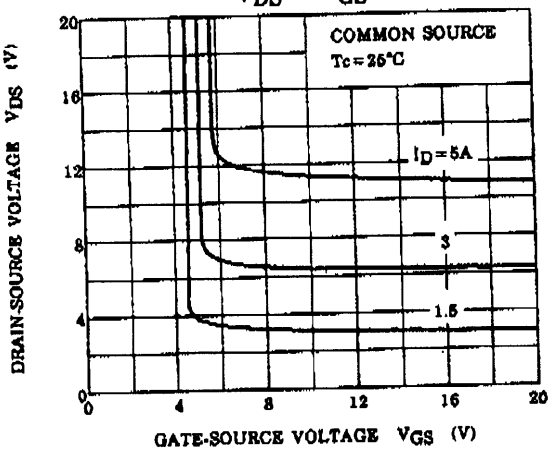
I_D – V_{GS}



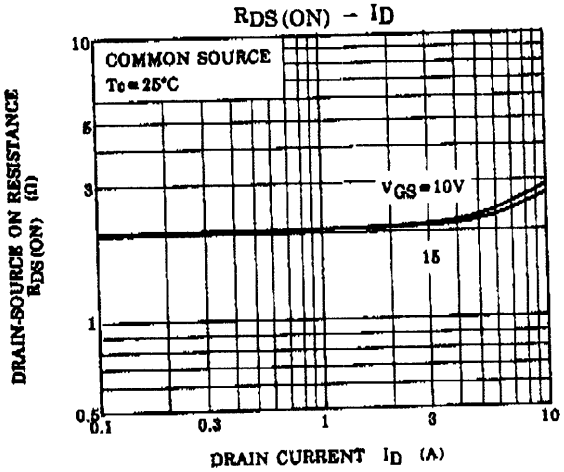
$|Y_{fs}|$ – I_D



V_{DS} – V_{GS}



$R_{DS(ON)}$ – I_D



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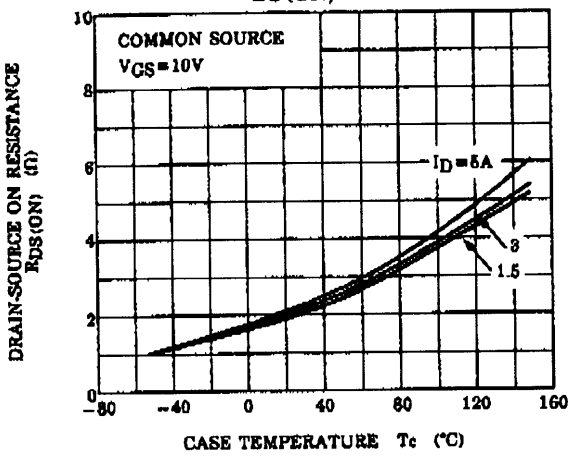
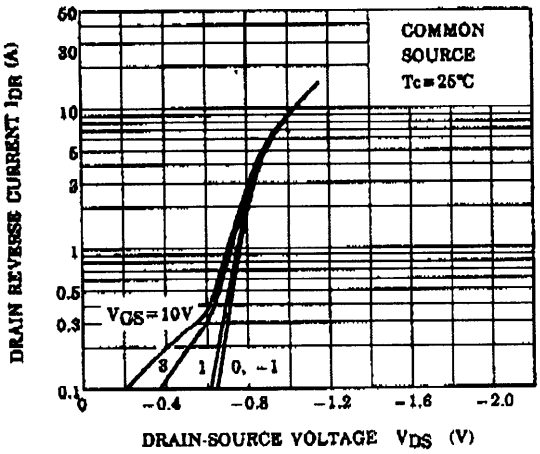
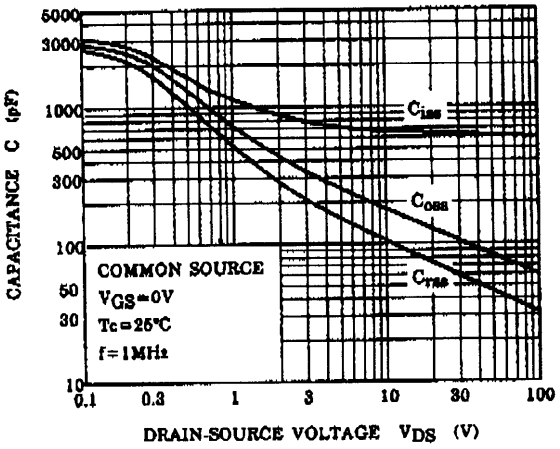
$R_{DS(ON)}$ – Tc



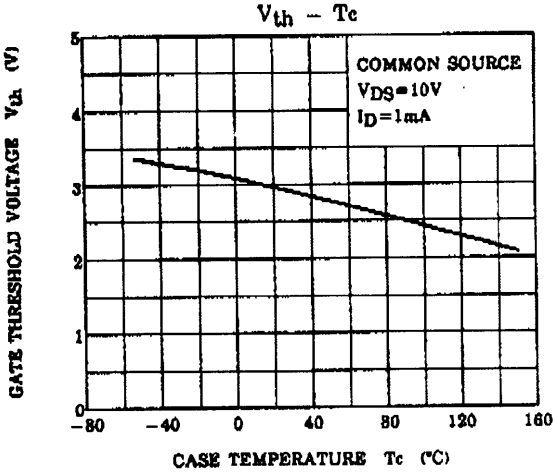
I_{DR} – V_{DS}



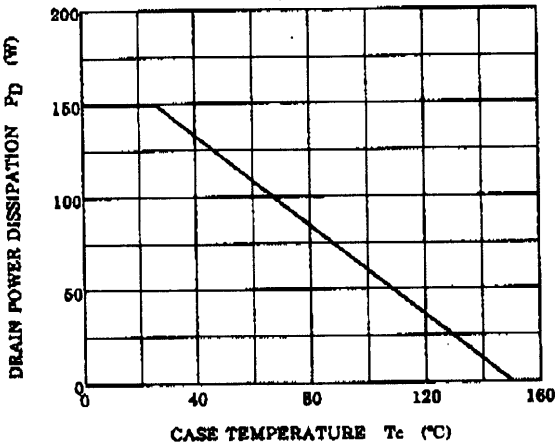
CAPACITANCE – V_{DS}



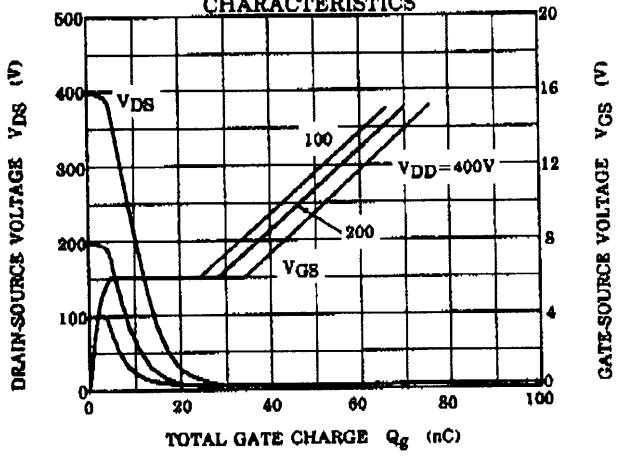
V_{th} – Tc



P_D – Tc



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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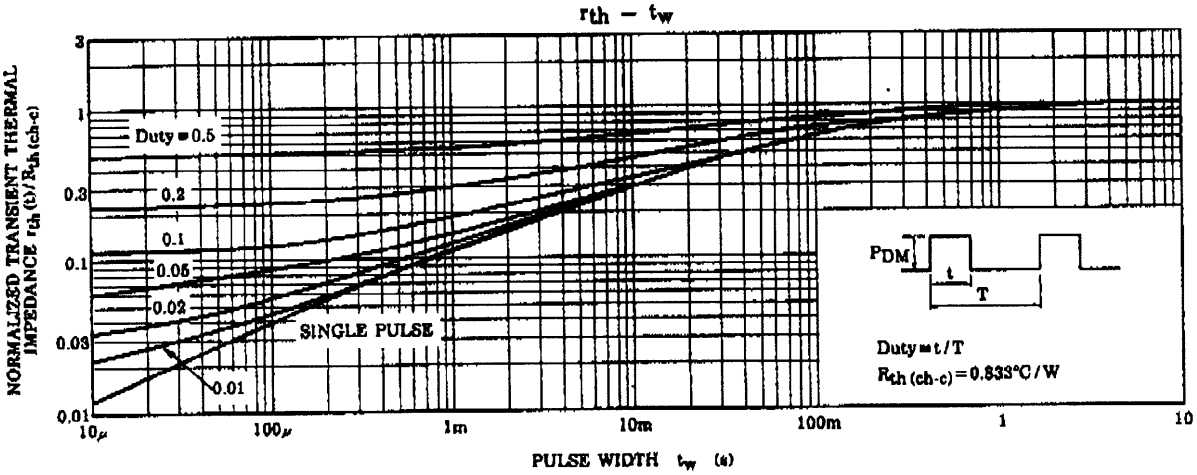
$r_{th} - t_w$



SAFE OPERATING AREA