TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π-MOSIII.5)

2SK2146

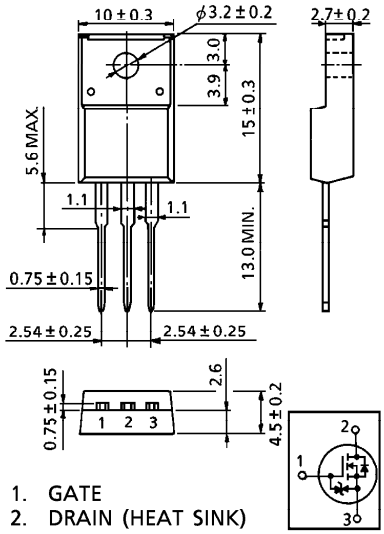
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- Low Drain-Source ON Resistance : $R_{DS\,(ON)}=1.2\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=1.4S$ (Typ.)
- Low Leakage Current : $I_{DSS}=300\mu A$ (Max.) ($V_{DS}=250V$)
- Enhancement-Mode : $V_{th}=2.0\sim4.0V$ ($V_{DS}=10V$, $I_D=1mA$)

Unit in mm



JEDEC	—
EIAJ	SC-67
TOSHIBA	2-10R1B

Weight : 1.9g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	250	V
Drain-Gate Voltage ($R_{GS}=20k\Omega$)		V_{DGR}	250	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	2	A
	Pulse (t=1ms)	I_{DP}	5	A
	Pulse (t=100μs)		12	A
Drain Power Dissipation (Tc=25°C)		P_D	25	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	$R_{th\,(ch-c)}$	5.0	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch-a)}$	62.5	°C / W

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

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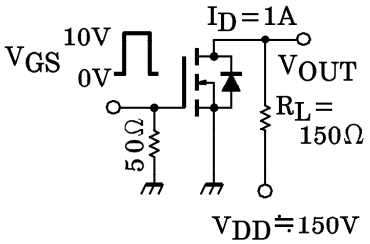
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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}	$V_{DS}=250V$, $V_{GS}=0V$	—	—	300	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	$I_D=10mA$, $V_{GS}=0V$	250	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	2.0	—	4.0	V
Drain-Source ON Resistance		$R_{DS\,(ON)}$	$V_{GS}=10V$, $I_D=1A$	—	1.2	2.0	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=1A$	0.5	1.1	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f = 1MHz	—	220	—	pF
Reverse Transfer Capacitance		C_{rss}		—	35	—	
Output Capacitance		C_{oss}		—	80	—	
Switching Time	Rise Time	t_r	 V_{IN} : t_r, $t_f<5ns$, Duty ≦ 1%, $t_w=10\mu s$	—	25	—	ns
	Turn-on Time	t_{on}		—	40	—	
	Fall Time	t_f		—	30	—	
	Turn-off Time	t_{off}		—	90	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq200V$, $V_{GS}=10V$, $I_D=2A$	—	8	—	nC
Gate-Source Charge		Q_{gs}		—	4	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	4	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	2	A
Pulse Drain Reverse Current	I_{DRP}	t = 1ms	—	—	5	A
		t = 100μs	—	—	12	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=2A$, $V_{GS}=0V$	—	—	−1.5	V
Reverse Recovery Time	t_{rr}	$I_{DR}=2A$, $V_{GS}=0V$, $dI_{DR}/dt=100A/\mu s$	—	180	—	ns
Reverse Recovered Charge	Q_{rr}		—	0.61	—	μC

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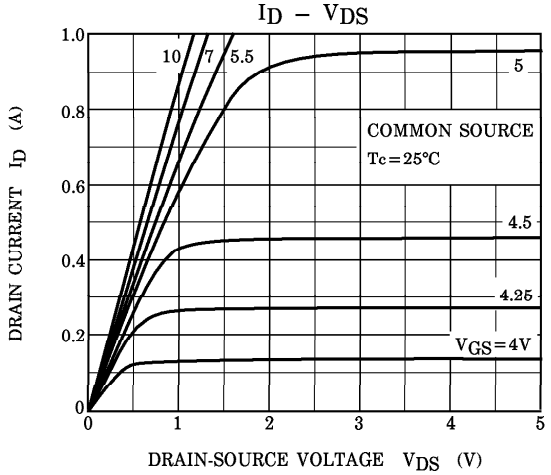
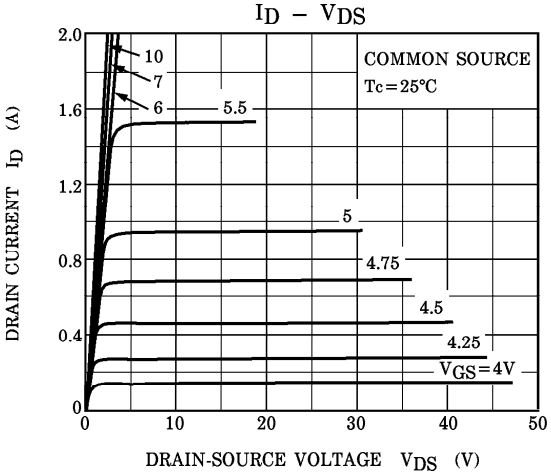
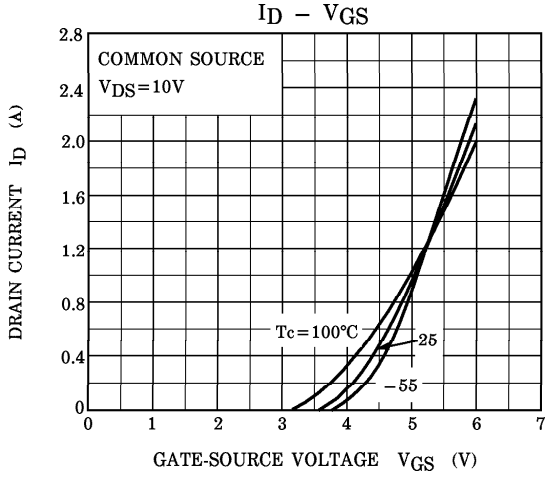
I_D – V_{DS}



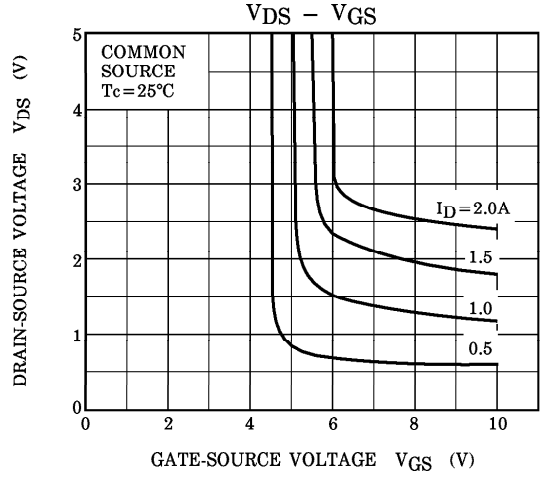
I_D – V_{DS}



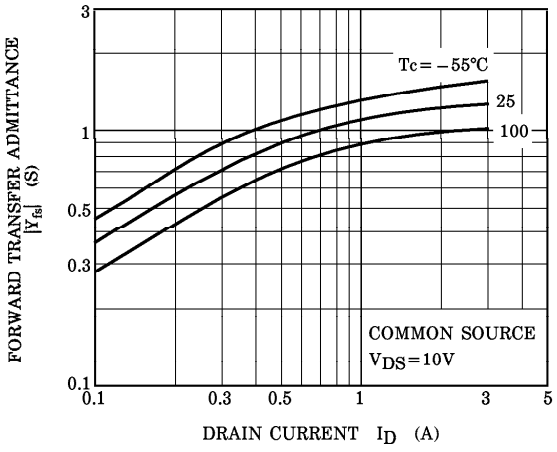
I_D – V_{GS}



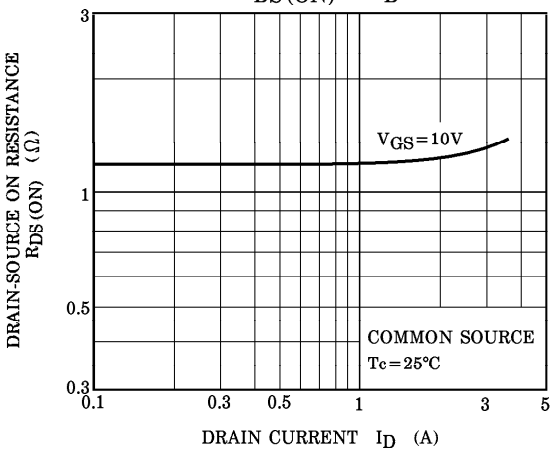
V_{DS} – V_{GS}



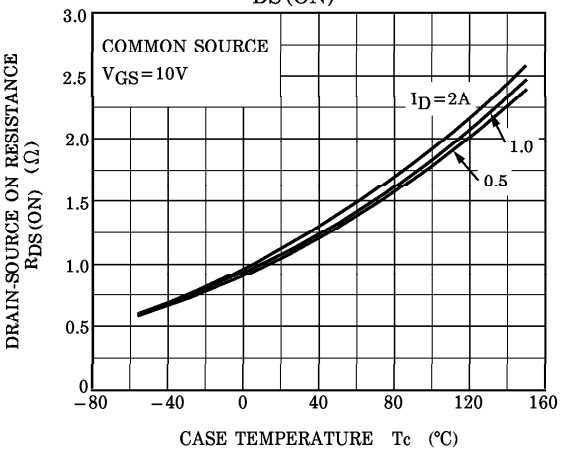
$|Y_{fs}|$ – I_D



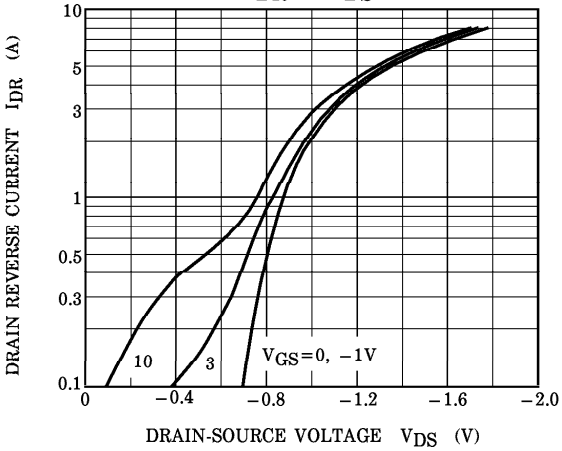
$R_{DS\,(ON)}$ – I_D



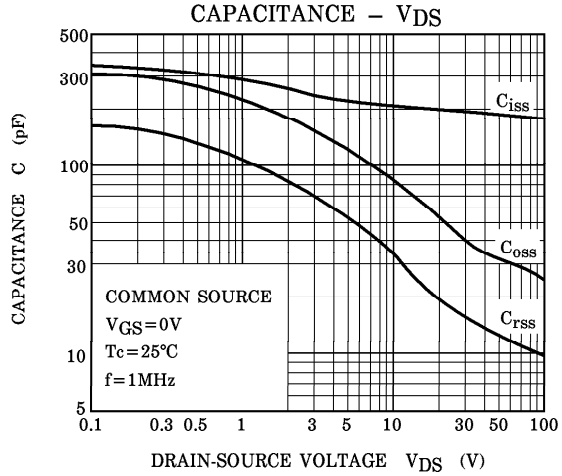
$R_{DS(ON)}$ – Tc



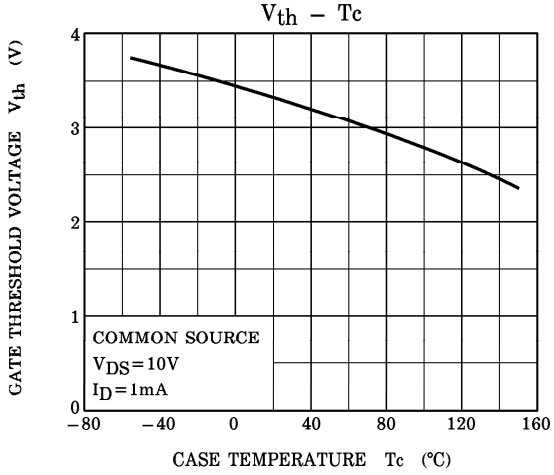
I_{DR} – V_{DS}



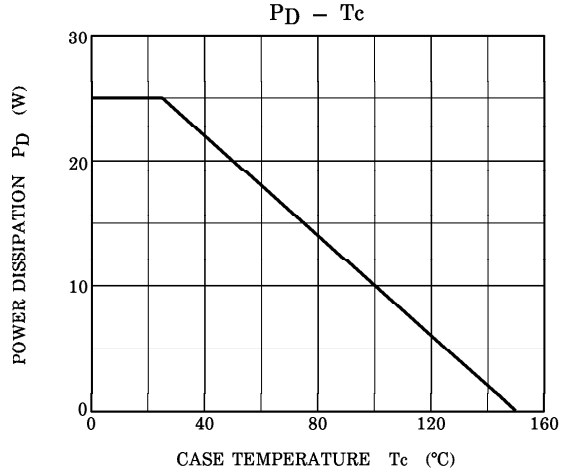
CAPACITANCE – V_{DS}



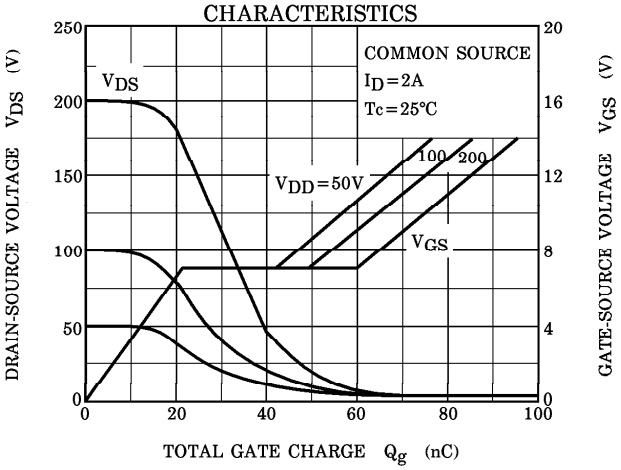
V_{th} – Tc

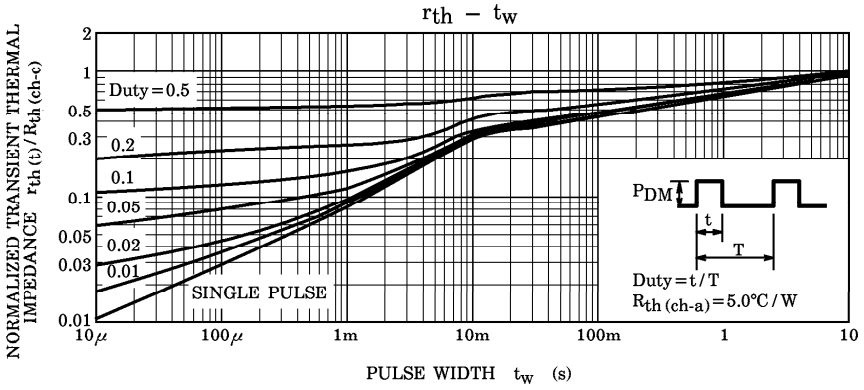


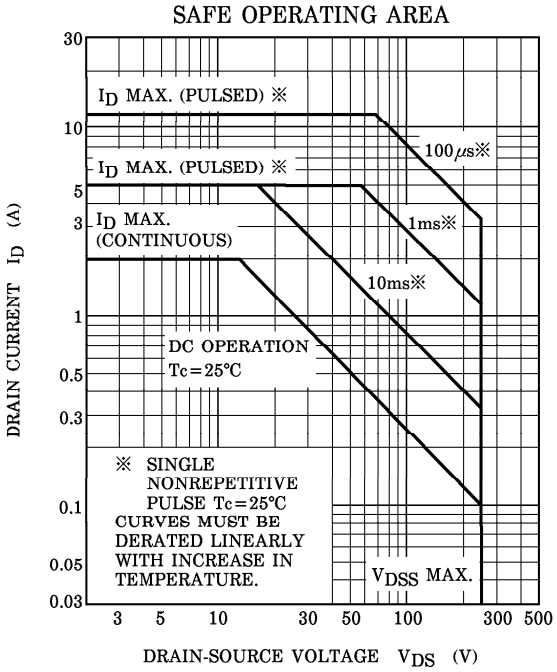
P_D – Tc



DYNAMIC INPUT / OUTPUT CHARACTERISTICS




r_{th} – t_w
NORMALIZED TRANSIENT THERMAL IMPEDANCE $r_{th(t)}/R_{th(ch-c)}$
Duty = 0.5
0.2
0.1
0.05
0.02
0.01
SINGLE PULSE
P_{DM}
t
T
Duty = t/T
$R_{th(ch-a)}$ = 5.0°C/W
PULSE WIDTH t_w (s)


SAFE OPERATING AREA
I_D MAX. (PULSED) ※
100μs※
I_D MAX. (PULSED) ※
1ms※
I_D MAX. (CONTINUOUS)
10ms※
DC OPERATION Tc = 25°C
※ SINGLE NONREPETITIVE PULSE Tc = 25°C CURVES MUST BE DERATED LINEARLY WITH INCREASE IN TEMPERATURE.
V_{DSS} MAX.
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)