TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L^2-π-MOSIII)

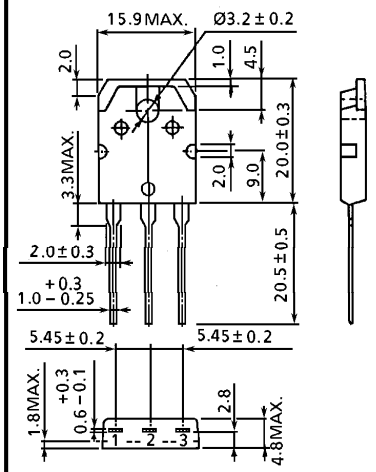
2SK1381

HIGH SPEED SWITCHING APPLICATIONS
RELAY DRIVE, MOTOR DRIVE AND DC-DC CONVERTER APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm

- 4V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}$ = 25mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 33S (Typ.)
- Low Leakage Current : I_{DSS} = 100μA (Max.) (V_{DS} = 100V)
- Enhancement-Mode : V_{th} = 0.8~2.0V (V_{DS} = 10V, I_D = 1mA)



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

JEDEC	—
EIAJ	SC-65
TOSHIBA	2-16C1B

Weight : 4.6g

MAXIMUM RATINGS (Ta = 25°C)

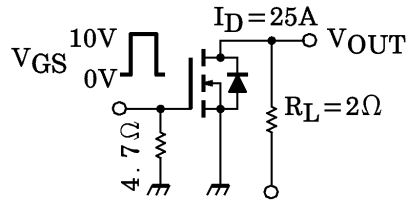
CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	100	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	50	A
	Pulse	I_{DP}	200	
Drain Power Dissipation (Tc = 25°C)		P_D	150	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

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

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

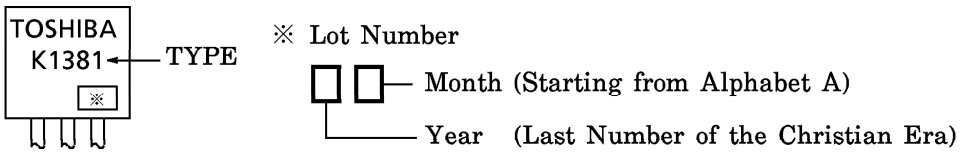
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm20V$, $V_{DS}=0V$	—	—	±10	nA
Drain Cut-off Current		I_{DSS}	$V_{DS}=100V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	100	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS}=10V$, $I_D=1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS}=4V$, $I_D=25A$	—	31	46	mΩ
			$V_{GS}=10V$, $I_D=25A$	—	25	32	
Forward Transfer Admittance		$\|Y_{fs}\|$	$V_{DS}=10V$, $I_D=25A$	20	33	—	S
Input Capacitance		C_{iss}	$V_{DS}=10V$, $V_{GS}=0V$, f=1MHz	—	3700	—	pF
Reverse Transfer Capacitance		C_{rss}		—	580	—	
Output Capacitance		C_{oss}		—	1500	—	
Switching Time	Rise Time	t_r		—	16	—	ns
	Turn-on Time	t_{on}		—	46	—	
	Fall Time	t_f		—	60	—	
	Turn-off Time	t_{off}	V_{IN} : t_r, $t_f<5ns$, Duty ≦ 1%, $t_w=10\mu s$	—	185	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq80V$, $V_{GS}=10V$, $I_D=50A$	—	88	—	nC
Gate-Source Charge		Q_{gs}		—	62	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	26	—	

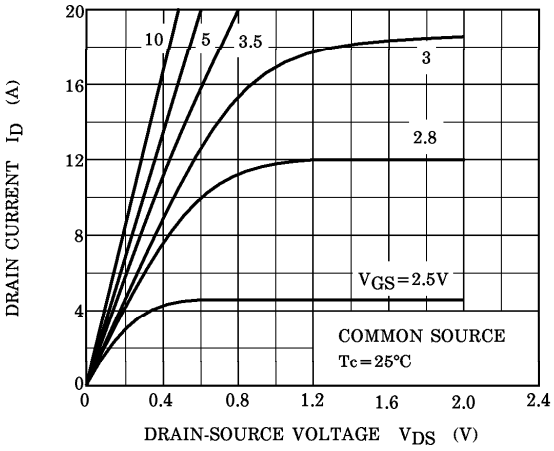
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	50	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	200	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=50A$, $V_{GS}=0V$	—	—	−1.6	V
Reverse Recovery Time	t_{rr}	$I_{DR}=50A$, $V_{GS}=0V$	—	280	—	ns
Reverse Recovered Charge	Q_{rr}	$dI_{DR}/dt=50A/\mu s$	—	0.56	—	μC

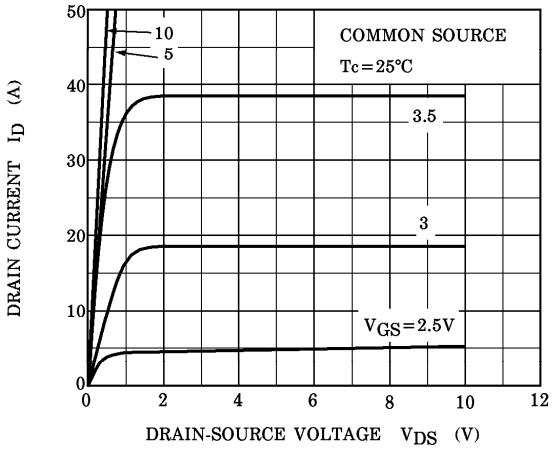
MARKING



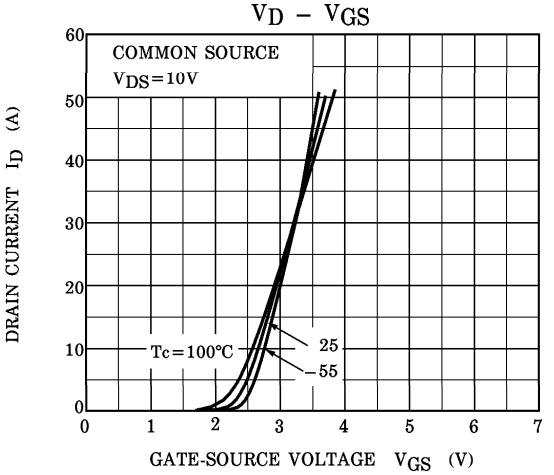
$I_D - V_{DS}$



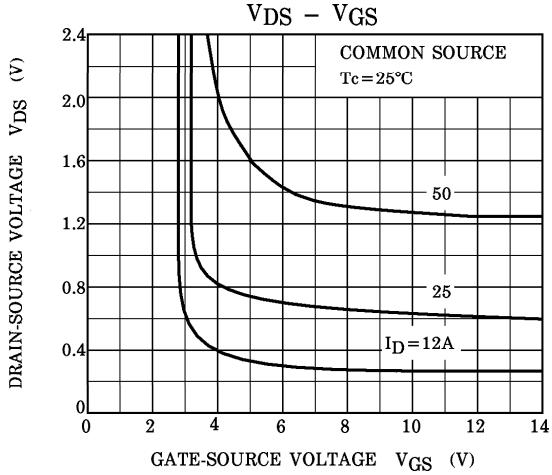
$I_D - V_{DS}$



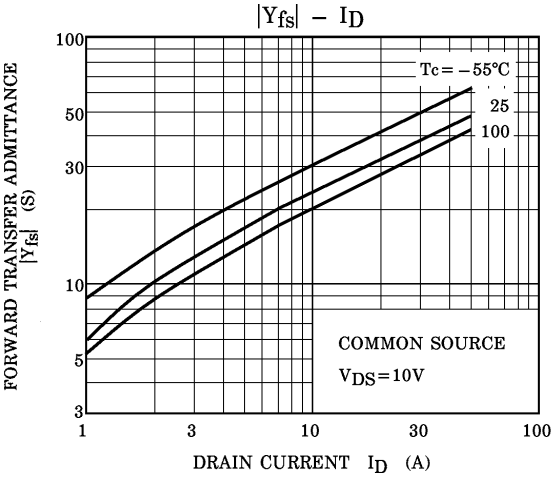
$V_D - V_{GS}$



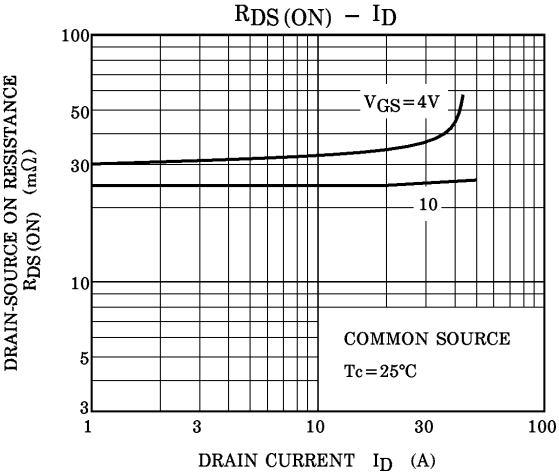
$V_{DS} - V_{GS}$



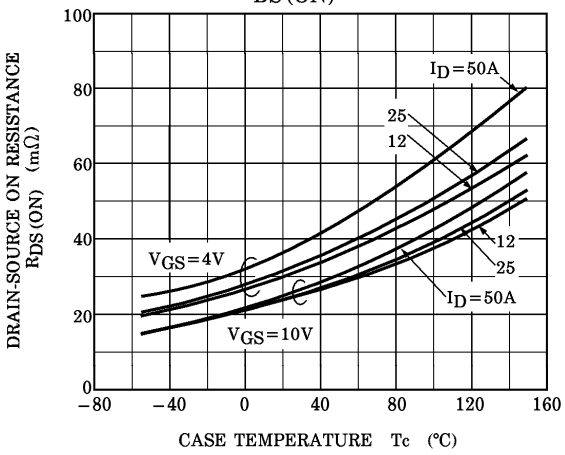
$|Y_{fs}| - I_D$



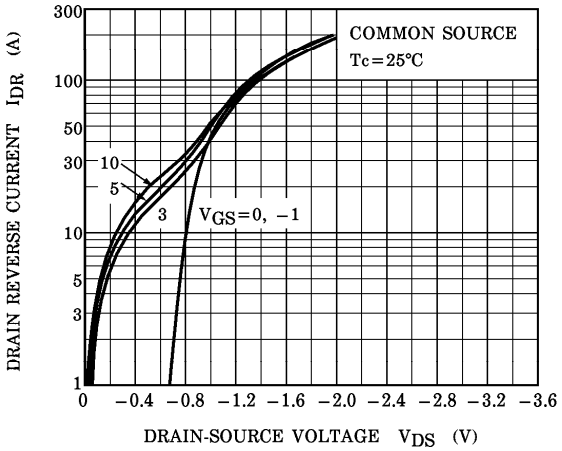
$R_{DS\,(ON)} - I_D$



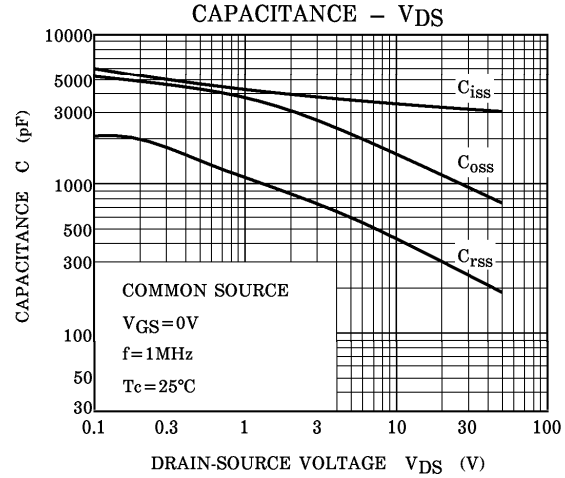
$R_{DS(ON)}$ – Tc



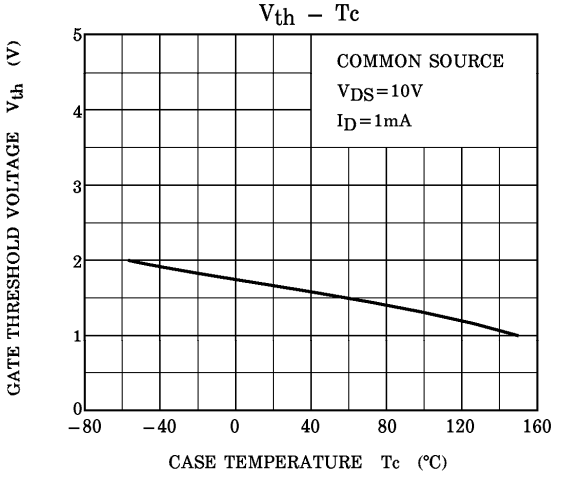
I_{DR} – V_{DS}



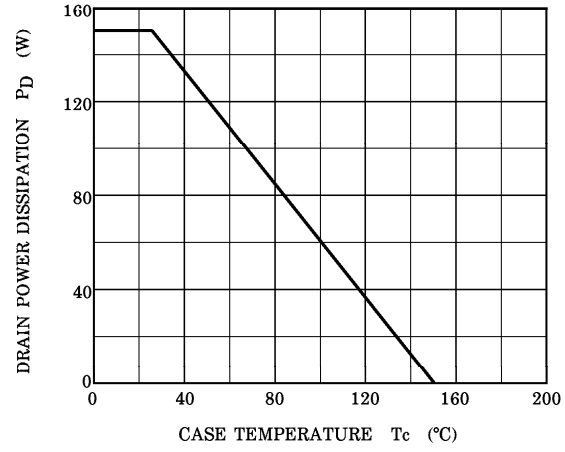
CAPACITANCE – V_{DS}



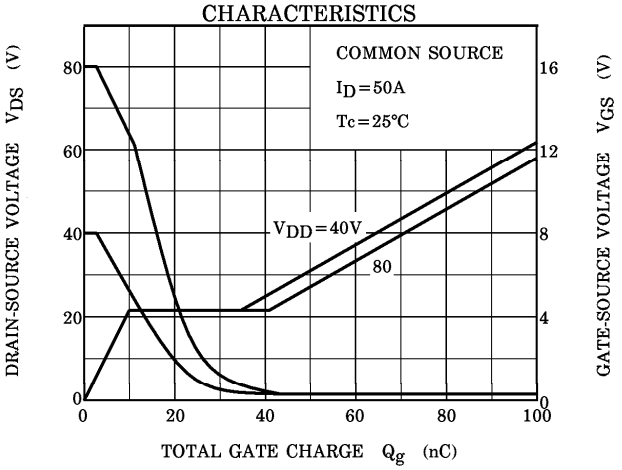
V_{th} – Tc

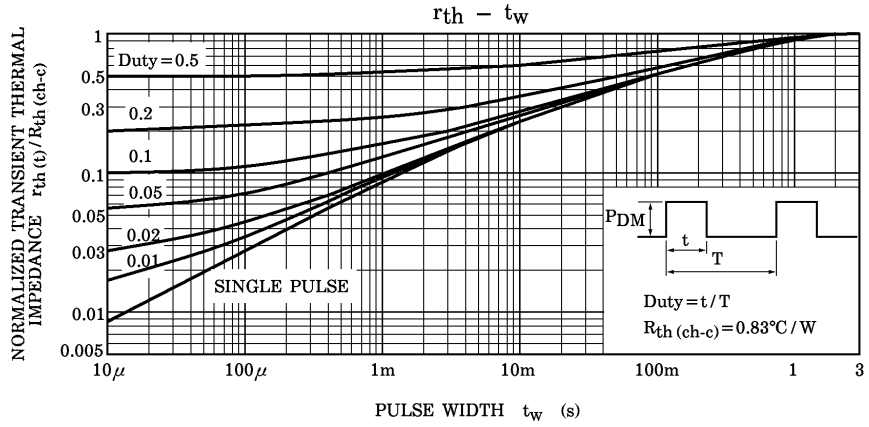


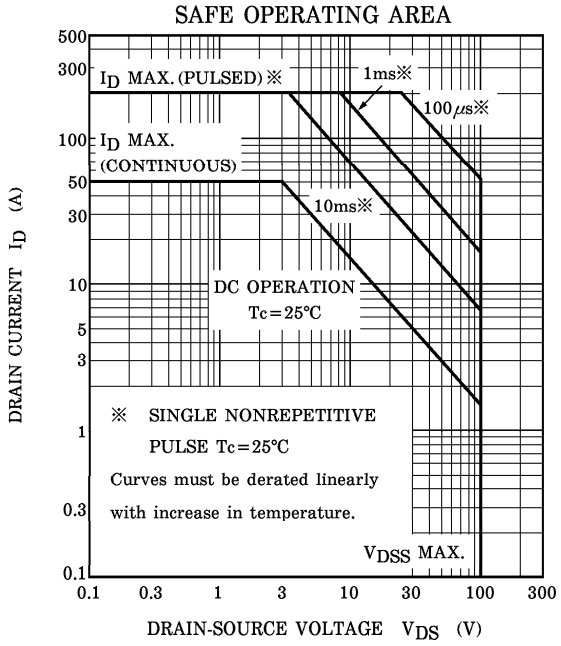
P_D – Tc



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-c) = 0.83°C / W
1
0.5
0.3
0.1
0.05
0.03
0.01
0.005
10μ
100μ
1m
10m
100m
1
3
PULSE WIDTH t_w (s)


SAFE OPERATING AREA
DRAIN CURRENT I_D (A)
I_D MAX. (PULSED) ※
1ms※
100μs※
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.
500
300
100
50
30
10
5
3
1
0.3
0.1
0.1
0.3
1
3
10
30
100
300
DRAIN-SOURCE VOLTAGE V_{DS} (V)