TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π-MOSV)

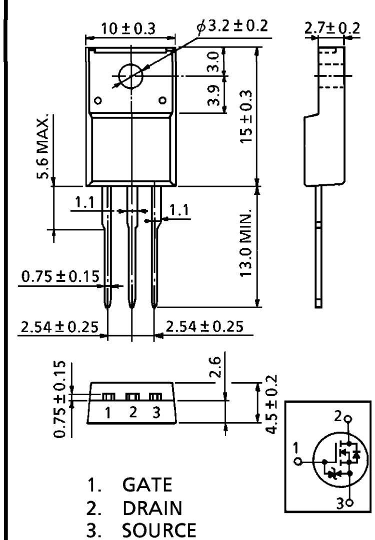
2SK2679

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm



JEDEC	—
EIAJ	SC-67
TOSHIBA	2-10R1B

Weight : 1.9g

- Low Drain-Source ON Resistance : $R_{DS\,(ON)} = 0.84\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 4.4S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\mu A$ (Max.) ($V_{DS} = 400V$)
- Enhancement-Mode : $V_{th} = 2.0 \sim 4.0V$ ($V_{DS} = 10V$, $I_D = 1mA$)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	400	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)		V_{DGR}	400	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	5.5	A
	Pulse	I_{DP}	22	A
Drain Power Dissipation (Tc = 25°C)		P_D	35	W
Single Pulse Avalanche Energy**		E_{AS}	223	mJ
Avalanche Current		I_{AR}	5.5	A
Repetitive Avalanche Energy*		E_{AR}	3.5	mJ
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	$R_{th\,(ch\text{-}c)}$	3.57	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$	62.5	°C / W

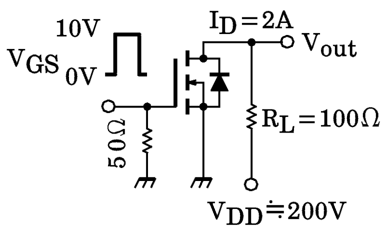
Note ;

* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD} = 90V$, Starting $T_{ch} = 25°C$, $L = 12mH$
$R_G = 25\Omega$, $I_{AR} = 5.5A$

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

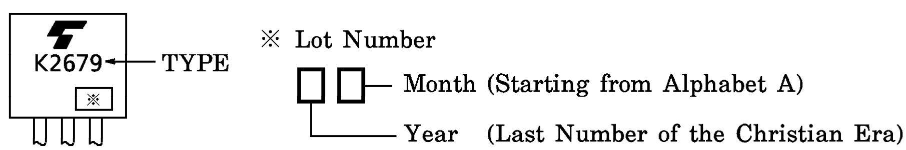
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 25V$, $V_{DS} = 0V$	—	—	±10	μA
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	$I_G = \pm 10\mu A$, $V_{DS} = 0V$	±30	—	—	V
Drain Cut-off Current	I_{DSS}	$V_{DS} = 400V$, $V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 10mA$, $V_{GS} = 0V$	400	—	—	V
Gate Threshold Voltage	V_{th}	$V_{DS} = 10V$, $I_D = 1mA$	2.0	—	4.0	V
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V$, $I_D = 3A$	—	0.84	1.2	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$	$V_{DS} = 10V$, $I_D = 3A$	2.0	4.4	—	S
Input Capacitance	C_{iss}	$V_{DS} = 10V$, $V_{GS} = 0V$, $f = 1MHz$	—	720	—	pF
Reverse Transfer Capacitance	C_{rss}		—	80	—	
Output Capacitance	C_{oss}		—	250	—	
Switching Time: Rise Time	t_r		—	15	—	ns
Switching Time: Turn-on Time	t_{on}		—	30	—	
Switching Time: Fall Time	t_f		—	25	—	
Switching Time: Turn-off Time	t_{off}	V_{IN} : t_r, $t_f < 5ns$ Duty ≦ 1%, $t_w = 10\mu s$	—	110	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} ≒ 320V$, $V_{GS} = 10V$, $I_D = 5.5A$	—	17	—	nC
Gate-Source Charge	Q_{gs}		—	10	—	
Gate-Drain ("Miller") Charge	Q_{gd}		—	7	—	

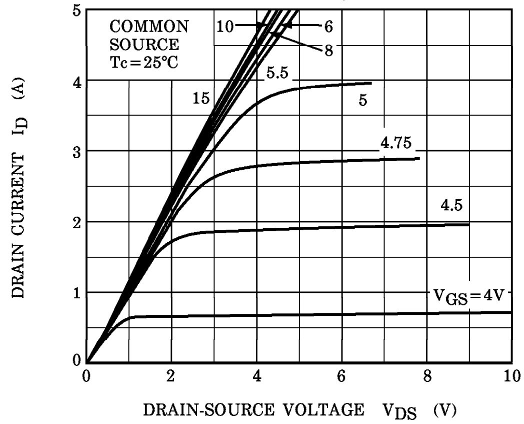
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5.5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	22	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5.5A$, $V_{GS} = 0V$	—	—	−1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5.5A$, $V_{GS} = 0V$	—	350	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 100A/\mu s$	—	2.1	—	μC

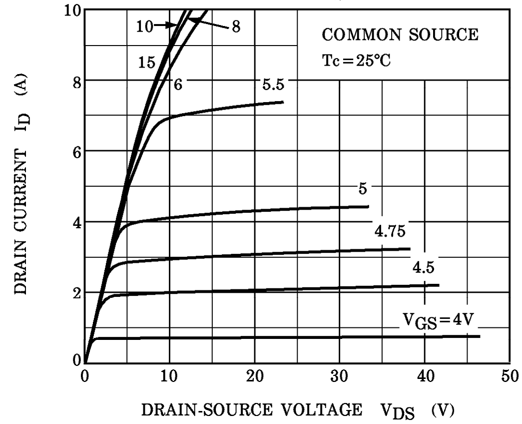
MARKING



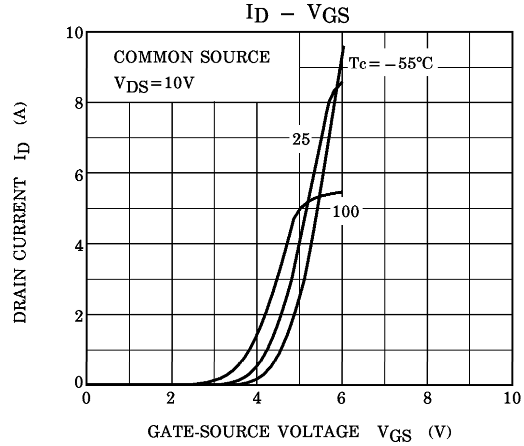
I_D – V_{DS}



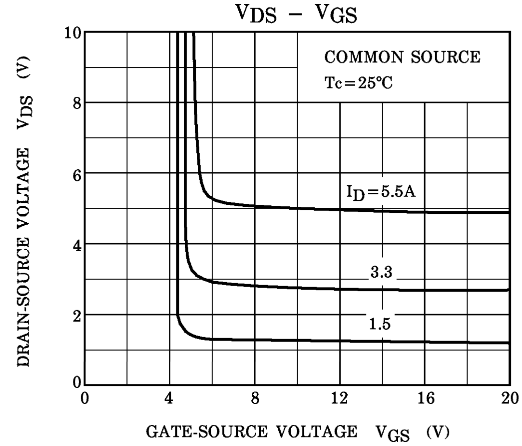
I_D – V_{DS}



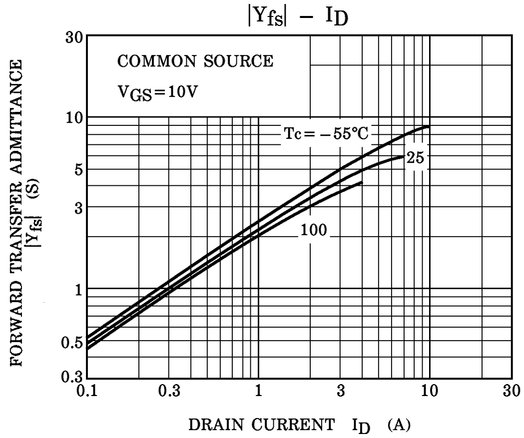
I_D – V_{GS}



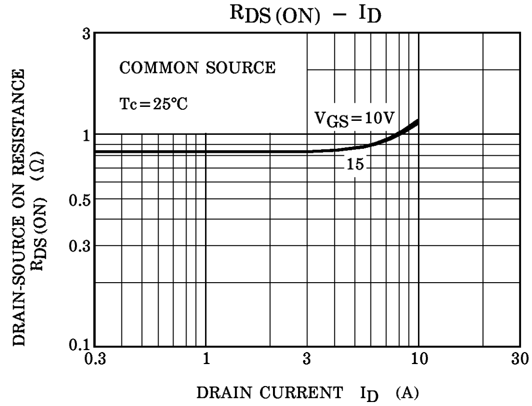
V_{DS} – V_{GS}

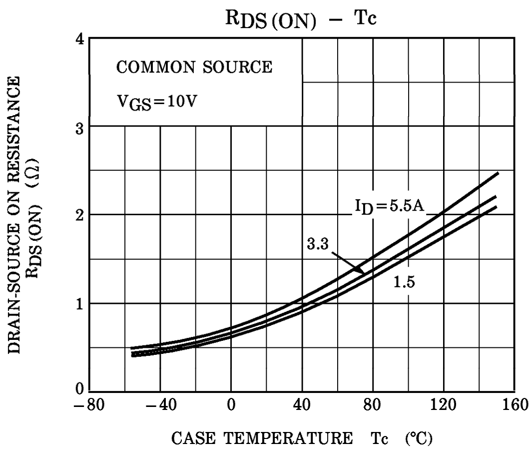


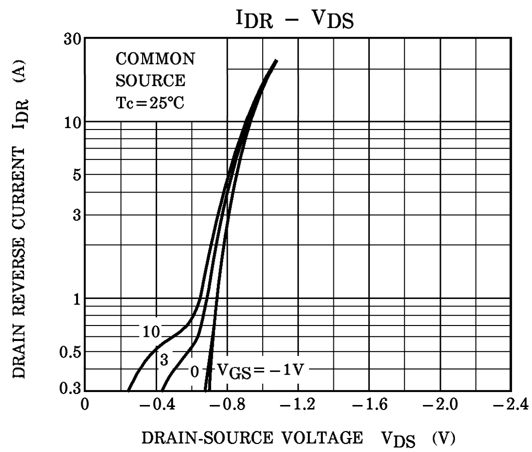
$|Y_{fs}|$ – I_D

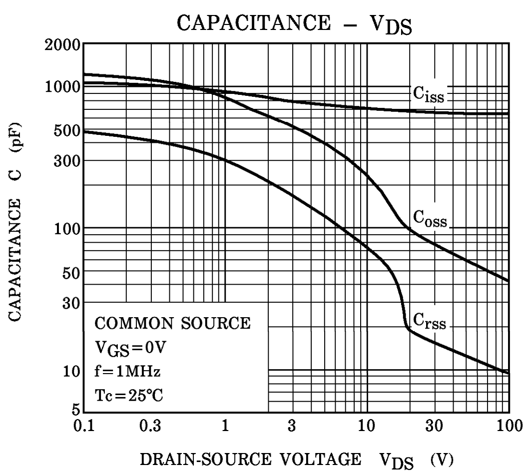


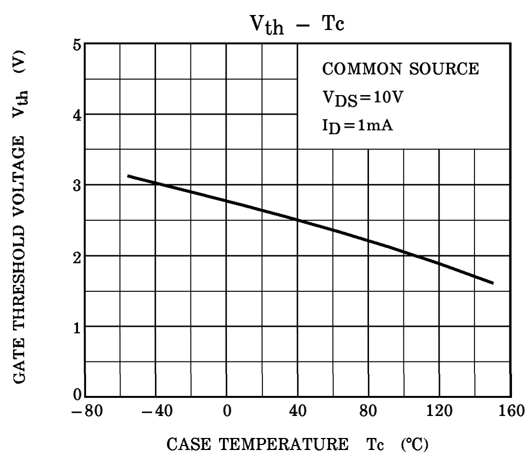
$R_{DS (ON)}$ – I_D

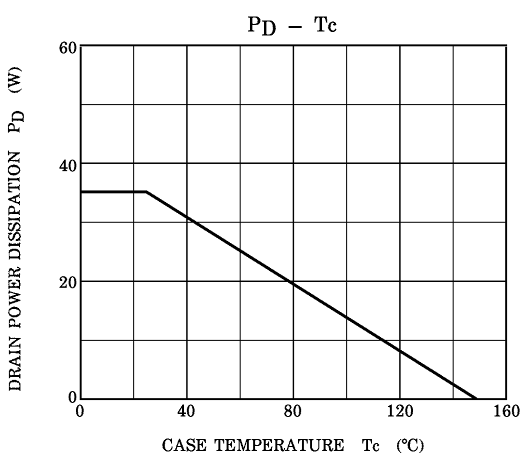


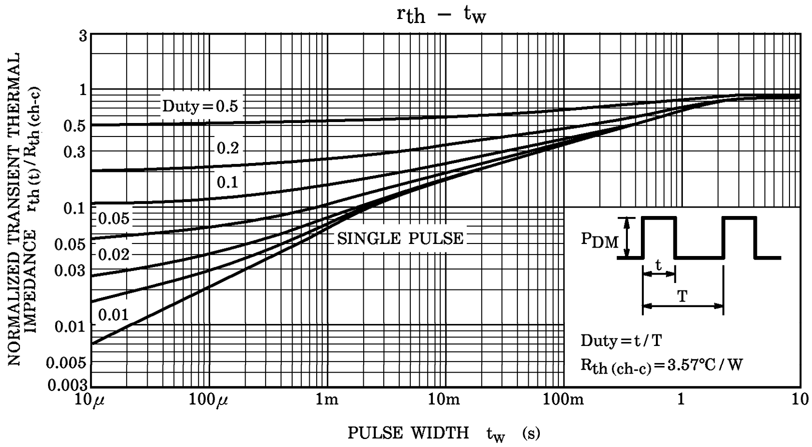

RDS (ON) – Tc
COMMON SOURCE
VGS = 10V
ID = 5.5A
3.3
1.5
DRAIN-SOURCE ON RESISTANCE RDS (ON) (Ω)
CASE TEMPERATURE Tc (°C)
4
3
2
1
0
–80
–40
0
40
80
120
160

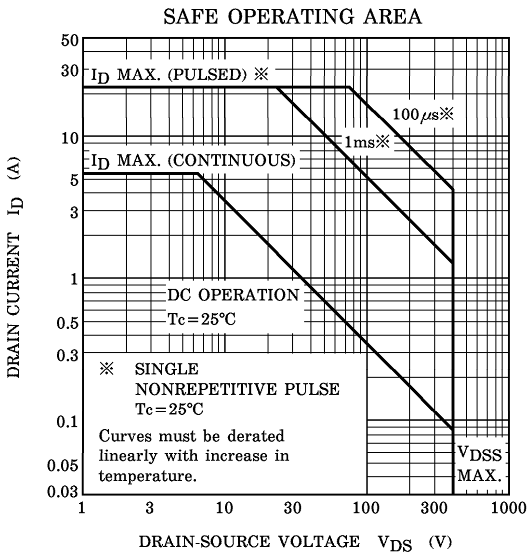

IDR – VDS
COMMON SOURCE
Tc = 25°C
10
3
0
VGS = –1V
DRAIN REVERSE CURRENT IDR (A)
DRAIN-SOURCE VOLTAGE VDS (V)
30
10
5
3
1
0.5
0.3
0
–0.4
–0.8
–1.2
–1.6
–2.0
–2.4

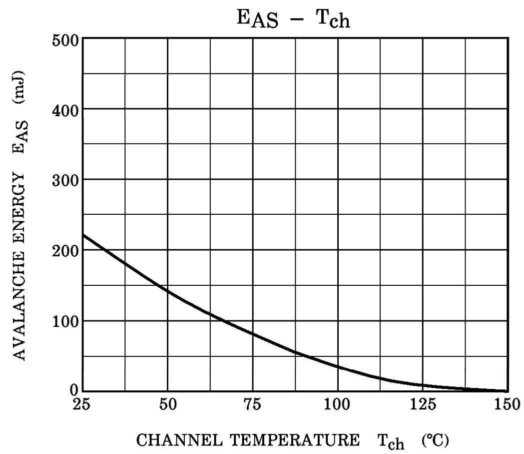

CAPACITANCE – VDS
Ciss
Coss
Crss
COMMON SOURCE
VGS = 0V
f = 1MHz
Tc = 25°C
CAPACITANCE C (pF)
DRAIN-SOURCE VOLTAGE VDS (V)
2000
1000
500
300
100
50
30
10
5
0.1
0.3
1
3
10
30
100

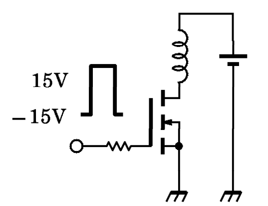

Vth – Tc
COMMON SOURCE
VDS = 10V
ID = 1mA
GATE THRESHOLD VOLTAGE Vth (V)
CASE TEMPERATURE Tc (°C)
5
4
3
2
1
0
–80
–40
0
40
80
120
160


PD – Tc
DRAIN POWER DISSIPATION PD (W)
CASE TEMPERATURE Tc (°C)
60
40
20
0
0
40
80
120
160

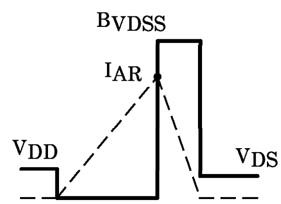








TEST CIRCUIT



WAVE FORM

Peak $I_{AR} = 5.5A$, $R_G = 25\Omega$
$V_{DD} = 90V$, $L = 12mH$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$