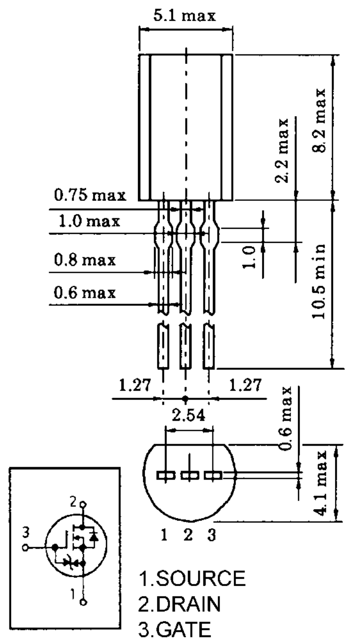
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L^2−π−MOSV)

2SK2962

Chopper Regulator, DC−DC Converter and Motor Drive Applications

Unit: mm



JEDEC	TO-92MOD
JEITA	―
TOSHIBA	2-5J1C

Weight: 0.36 (typ.)

- 4 V gate drive
- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 0.5 Ω (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 1.2 S (typ.)
- Low leakage current : I_{DSS} = 100 μA (max) (V_{DS} = 100 V)
- Enhancement−mode : V_{th} = 0.8~2.0 V (V_{DS} = 10 V, I_D = 1 mA)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	100	V
Drain−gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	100	V
Gate−source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	1	A
	Pulse (Note 1)	I_{DP}	3	A
Drain power dissipation		P_D	0.9	W
Single pulse avalanche energy (Note 2)		E_{AS}	137	mJ
Avalanche current		I_{AR}	1	A
Repetitive avalanche energy (Note 3)		E_{AR}	0.09	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	138	°C / W

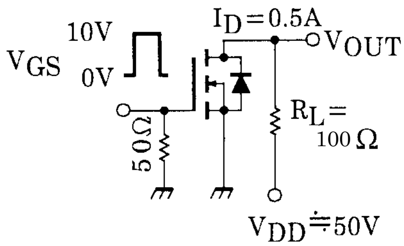
Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: V_{DD} = 25 V, T_{ch} = 25°C (initial), L = 221 mH, R_G = 25 Ω, I_{AR} = 1 A

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

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

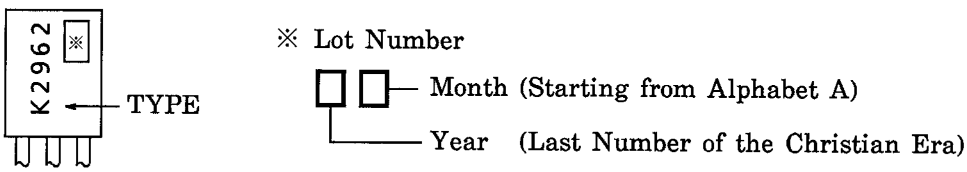
Electrical Characteristics (Ta = 25°C)

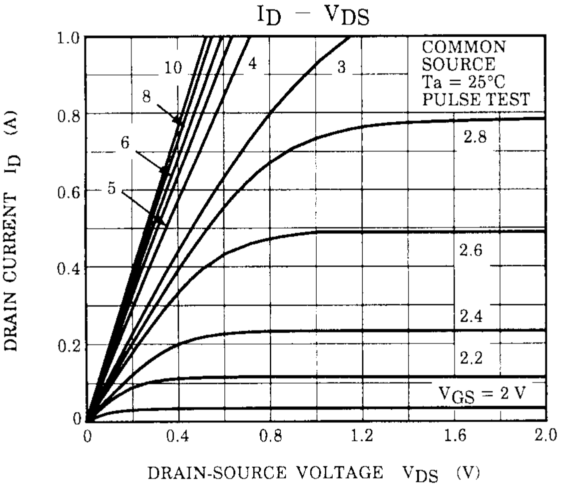
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut−off current		I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V	—	—	100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	100	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	0.8	—	2.0	V
Drain−source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 4 V, I_D = 0.5 A	—	0.65	0.95	Ω
			V_{GS} = 10 V, I_D = 0.5 A	—	0.5	0.7	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 0.5 A	0.6	1.2	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	140	—	pF
Reverse transfer capacitance		C_{rss}		—	20	—	
Output capacitance		C_{oss}		—	45	—	
Switching time	Rise time	t_r		—	8	—	ns
	Turn−on time	t_{on}		—	13	—	
	Fall time	t_f		—	45	—	
	Turn−off time	t_{off}	Duty ≤ 1%, t_w = 10 μs	—	175	—	
Total gate charge (gate−source plus gate−drain)		Q_g	V_{DD} ≈ 80 V, V_{GS} = 10 V, I_D = 1 A	—	6.3	—	nC
Gate−source charge		Q_{gs}		—	4.3	—	
Gate−drain ("miller") Charge		Q_{gd}		—	2	—	

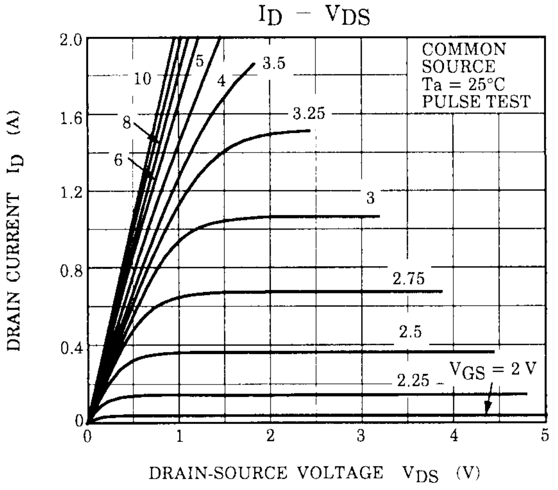
Source−Drain Ratings and Characteristics (Ta = 25°C)

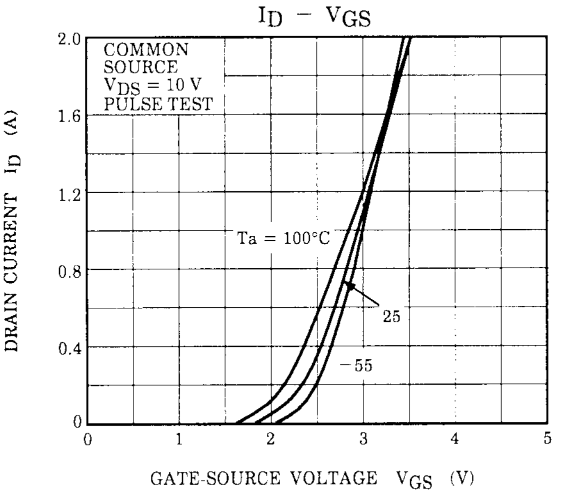
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	1	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	3	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 1 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse recovery time	t_{rr}	I_{DR} = 1 A, V_{GS} = 0 V, dI_{DR} / dt = 50 A / μs	—	80	—	ns
Reverse recovery charge	Q_{rr}		—	140	—	nC

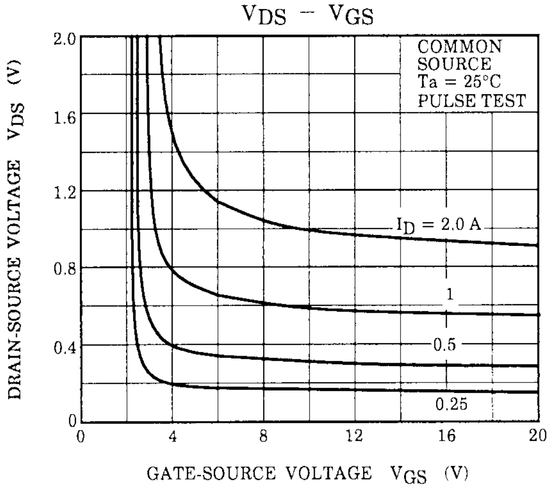
Marking

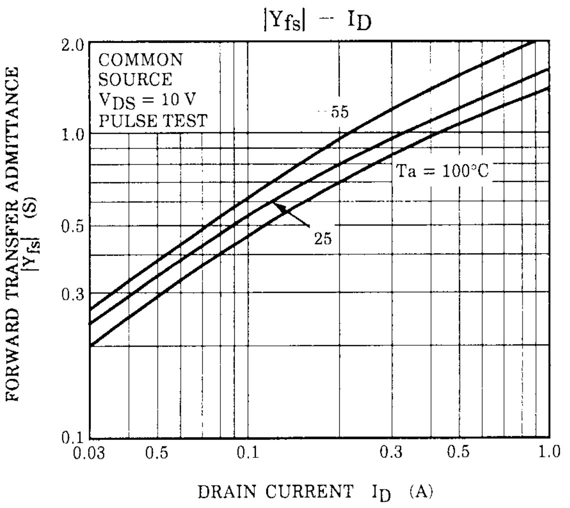


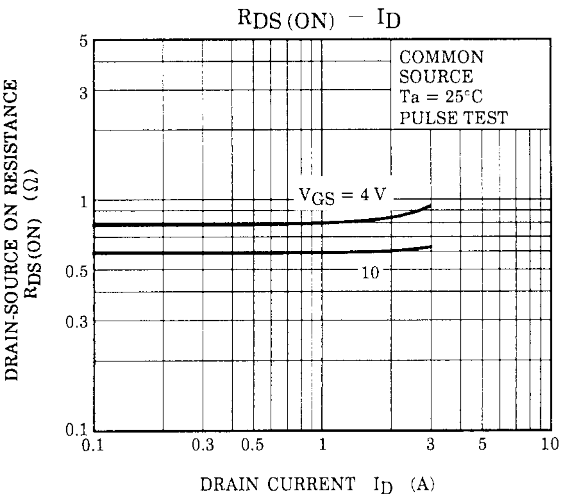

ID – VDS
COMMON SOURCE Ta = 25°C PULSE TEST
10 8 6 5 4 3 2.8 2.6 2.4 2.2 VGS = 2 V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)


ID – VDS
COMMON SOURCE Ta = 25°C PULSE TEST
10 8 6 5 4 3.5 3.25 3 2.75 2.5 2.25 VGS = 2 V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)

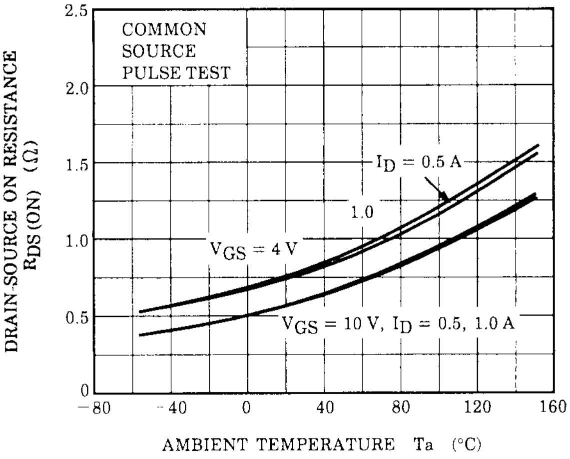

ID – VGS
COMMON SOURCE VDS = 10 V PULSE TEST
Ta = 100°C
25
−55
DRAIN CURRENT ID (A)
GATE-SOURCE VOLTAGE VGS (V)


VDS – VGS
COMMON SOURCE Ta = 25°C PULSE TEST
ID = 2.0 A
1
0.5
0.25
DRAIN-SOURCE VOLTAGE VDS (V)
GATE-SOURCE VOLTAGE VGS (V)

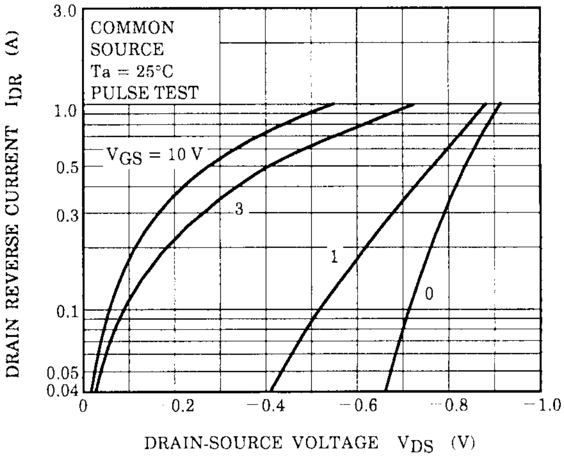

|Yfs| – ID
COMMON SOURCE VDS = 10 V PULSE TEST
−55
Ta = 100°C
25
FORWARD TRANSFER ADMITTANCE |Yfs| (S)
DRAIN CURRENT ID (A)


RDS (ON) – ID
COMMON SOURCE Ta = 25°C PULSE TEST
VGS = 4 V
10
DRAIN-SOURCE ON RESISTANCE RDS (ON) (Ω)
DRAIN CURRENT ID (A)

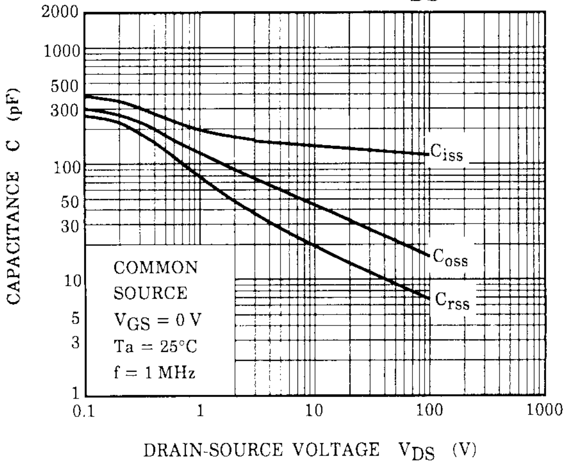
RDS (ON) – Ta



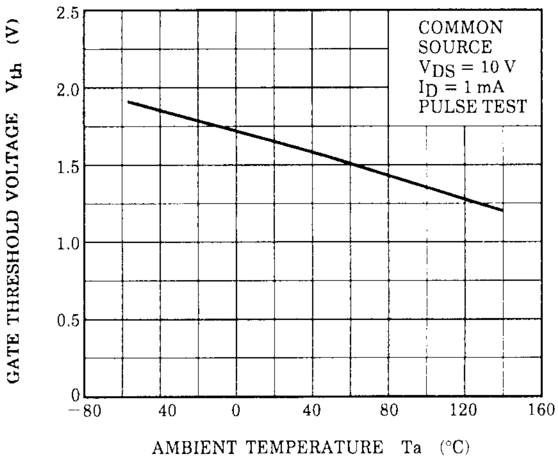
IDR – VDS



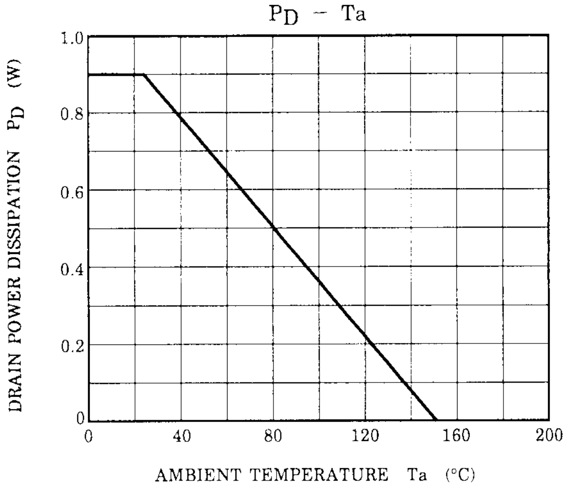
CAPACITANCE – VDS



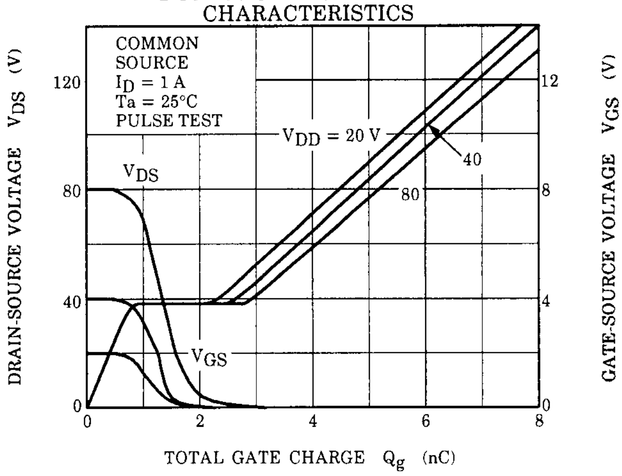
Vth – Ta

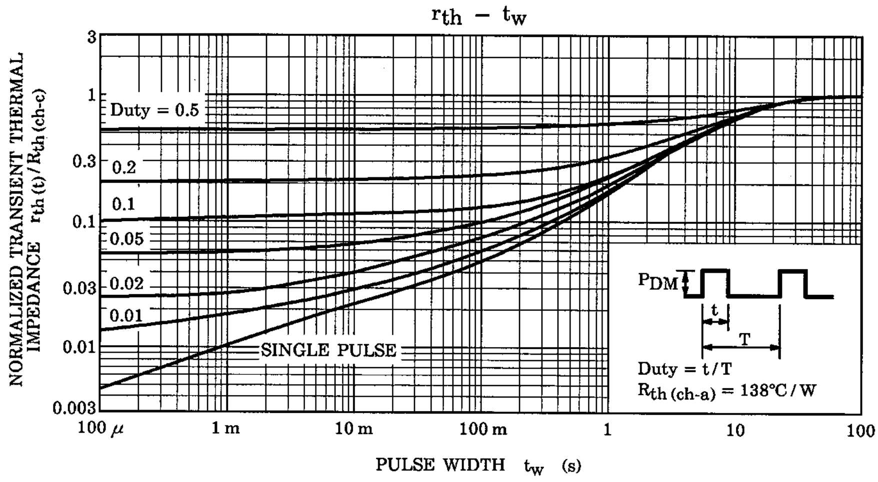


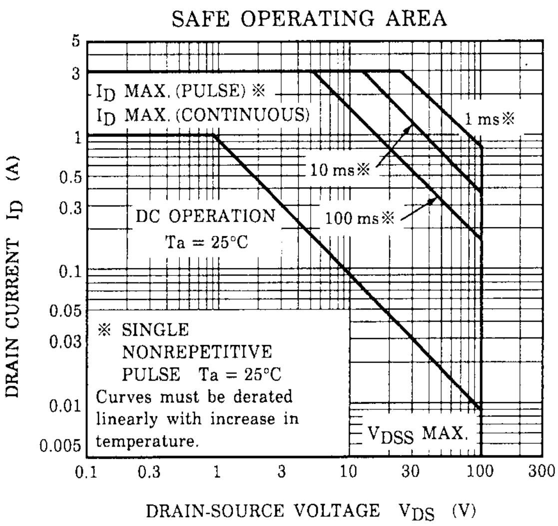
PD – Ta

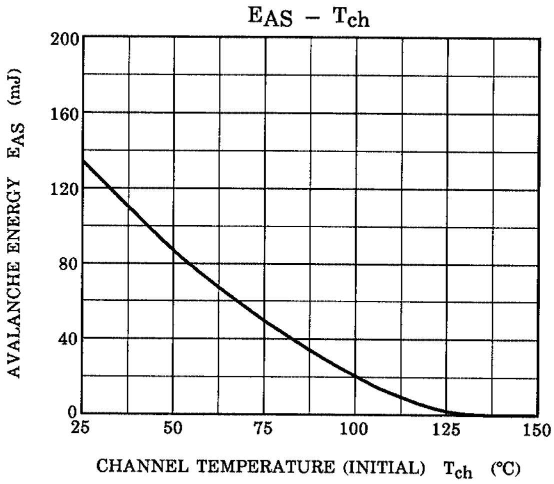


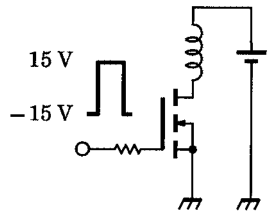
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



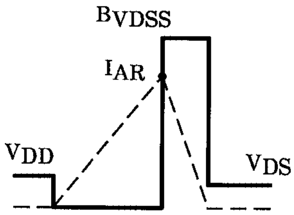








TEST CIRCUIT



WAVE FORM

$R_G = 25\ \Omega$
$V_{DD} = 25\ \text{V},\ L = 221\ \text{mH}$

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

RESTRICTIONS ON PRODUCT USE

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