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

2SK2992

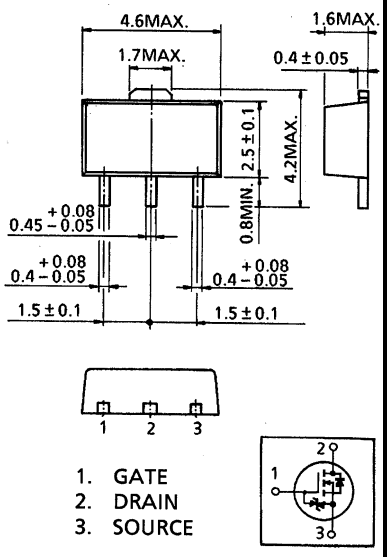
Chopper Regulator, DC−DC Converter and Motor Drive Applications

- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 2.2 Ω (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 0.9 S (typ.)
- Low leakage current : I_{DSS} = 100 μA (max) (V_{DS} = 200 V)
- Enhancement−mode : V_{th} = 2.0~3.5 V (V_{DS} = 10 V, I_D = 1 mA)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	200	V
Drain−gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	200	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	0.5	W
Drain power dissipation (Note 2)		P_D	1.5	W
Single pulse avalanche energy (Note 3)		E_{AS}	36	mJ
Avalanche current		I_{AR}	1	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.05	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Unit: mm



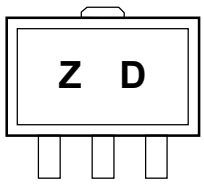
JEDEC	—
JEITA	SC-62
TOSHIBA	2-5K1B

Weight: 0.05 g (typ.)

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	250	°C / W

Marking



(The two digits represent the part number.)

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

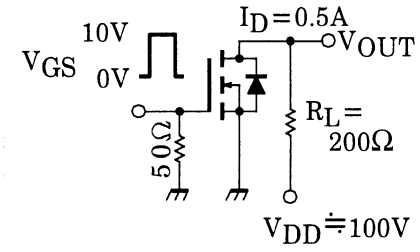
Note 2: Mounted on ceramic substrate (25.4 mm × 25.4 mm × 0.8 mm)

Note 3: V_{DD} = 50 V, T_{ch} = 25°C (initial), L = 56.7 mH, R_G = 25 Ω, I_{AR} = 1 A

Note 4: Repetitive rating: Pulse width limited by maximum channel temperature

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

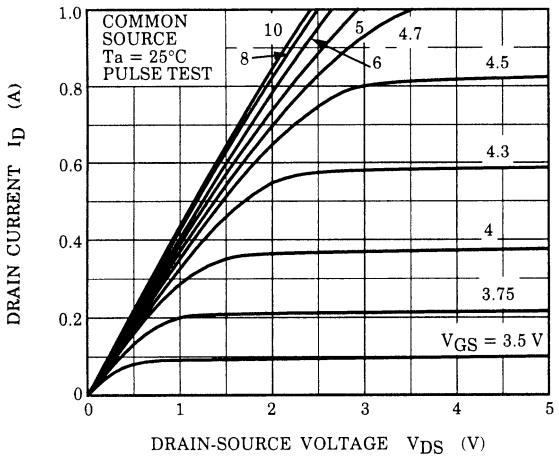
Electrical Characteristics (Ta = 25°C)

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} = 200 V, V_{GS} = 0 V	—	—	100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	200	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	2.0	—	3.5	V
Drain−source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 0.5 A	—	2.2	3.5	Ω
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 0.5 A	0.5	0.9	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	90	—	pF
Reverse transfer capacitance		C_{rss}		—	10	—	
Output capacitance		C_{oss}		—	30	—	
Switching time	Rise time	t_r	 Duty ≦ 1%, t_w = 10μs	—	9	—	ns
	Turn−on time	t_{on}		—	17	—	
	Fall time	t_f		—	16	—	
	Turn−off time	t_{off}		—	45	—	
Total gate charge (gate−source plus gate−drain)		Q_g	V_{DD} ≈ 160 V, V_{GS} = 10 V, I_D = 1 A	—	3.0	—	nC
Gate−source charge		Q_{gs}		—	1.8	—	
Gate−drain (“miller”) Charge		Q_{gd}		—	1.2	—	

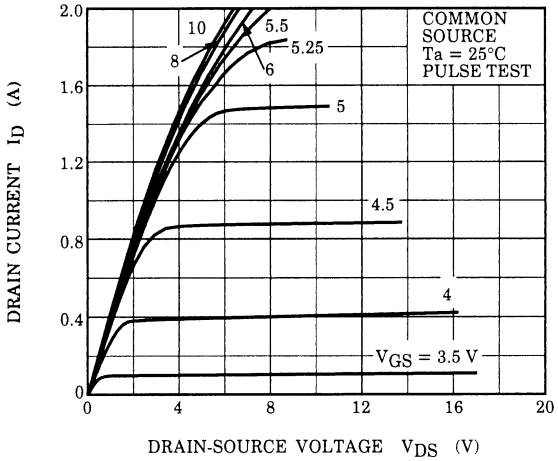
Source−Drain Ratings and Characteristics (Ta = 25°C)

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 = 100 A / μs	—	85	—	ns
Reverse recovery charge	Q_{rr}		—	190	—	nC

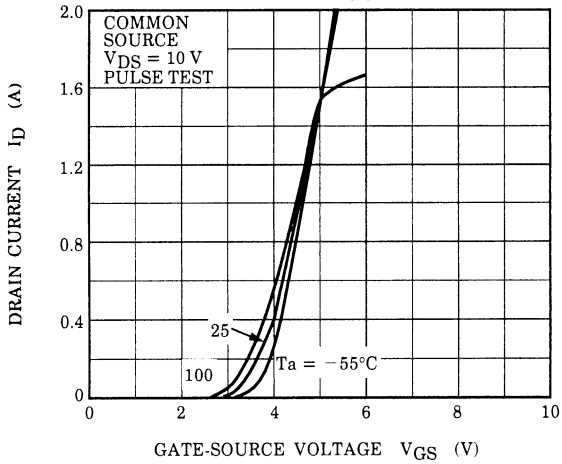
$I_D - V_{DS}$



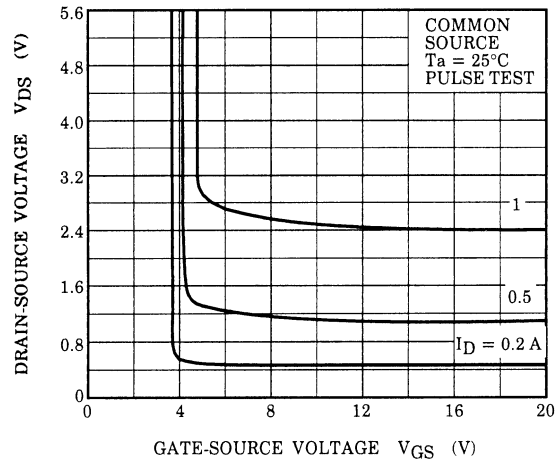
$I_D - V_{DS}$



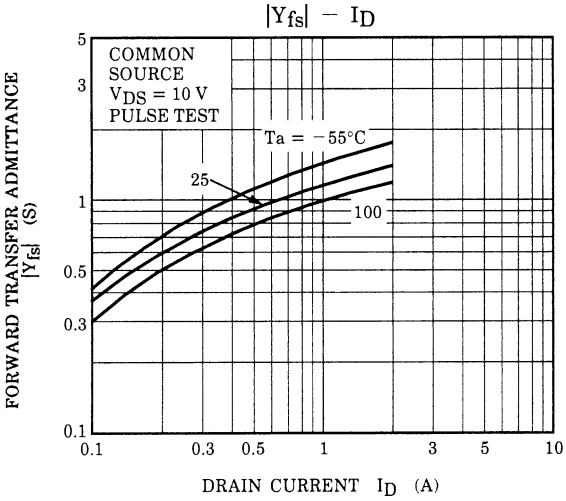
$I_D - V_{GS}$



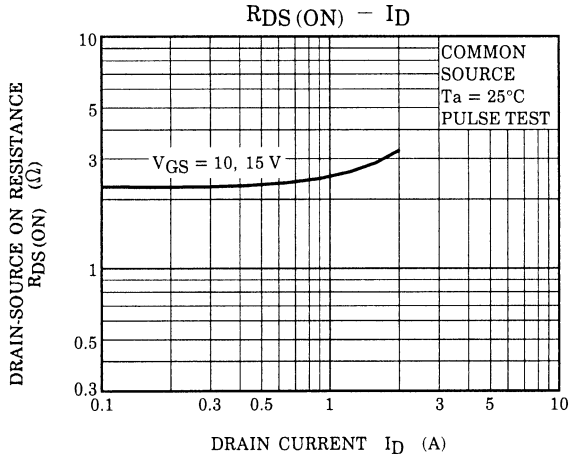
$V_{DS} - V_{GS}$



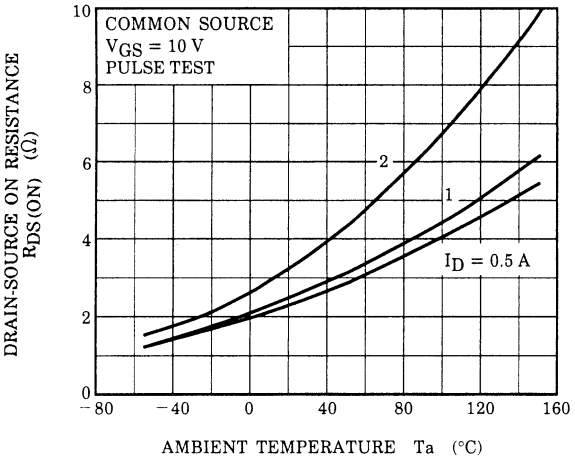
$|Y_{fs}| - I_D$



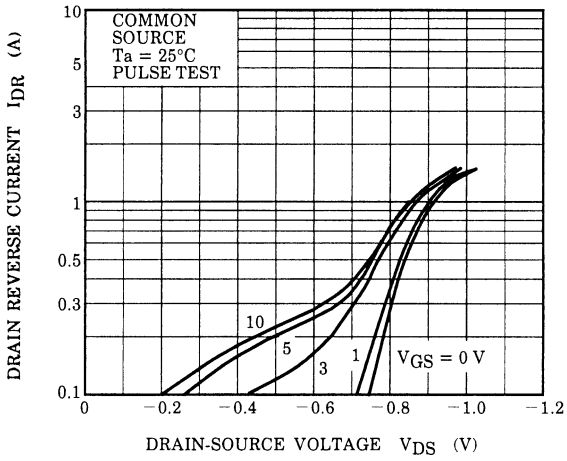
$R_{DS\,(ON)} - I_D$



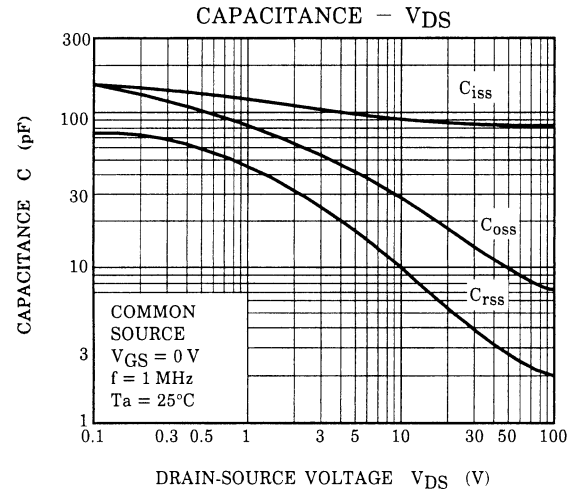
$R_{DS\,(ON)}$ – Ta



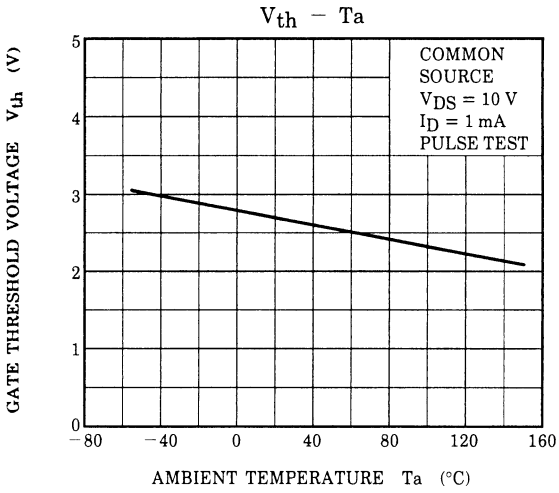
I_{DR} – V_{DS}



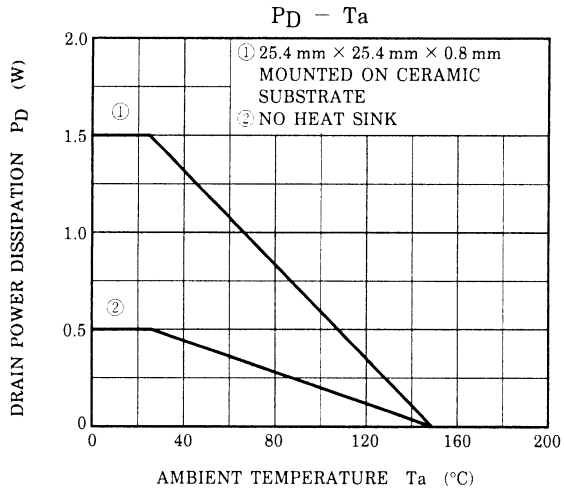
CAPACITANCE – V_{DS}



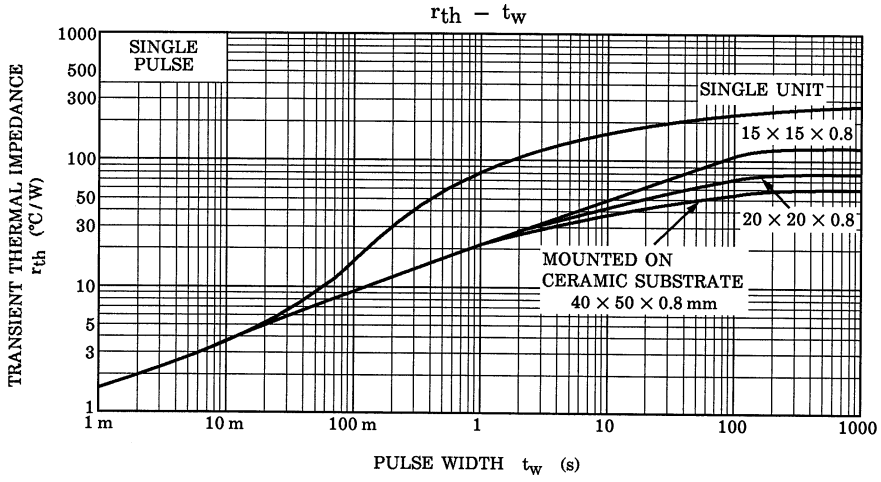
V_{th} – Ta



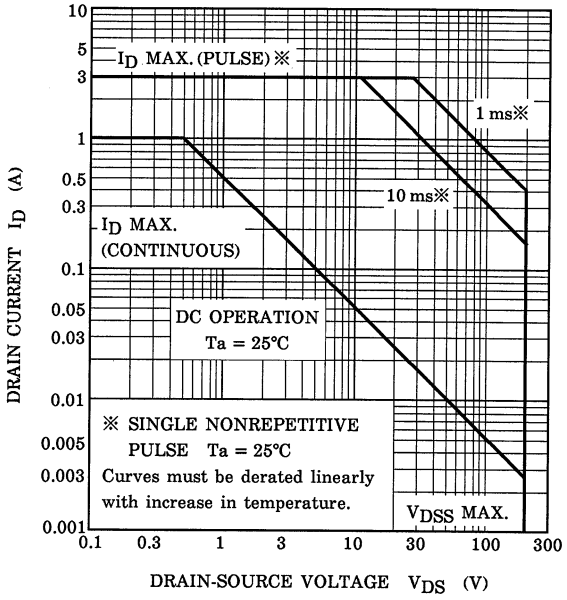
P_D – Ta



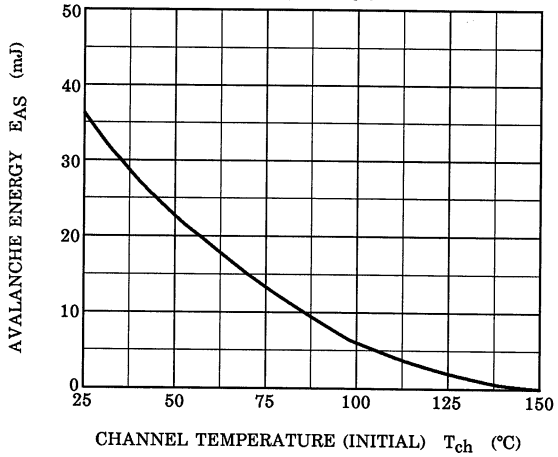
$r_{th} - t_w$

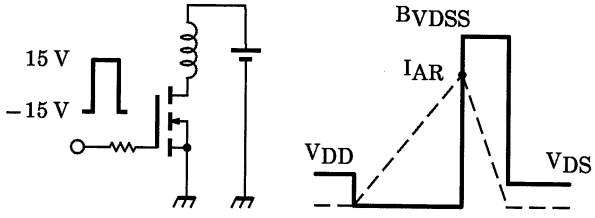


SAFE OPERATING AREA



$E_{AS} - T_{ch}$





TEST CIRCUIT WAVE FORM

$R_G = 25\ \Omega$
$V_{DD} = 50$ V, L = 56.7 mH

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

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