

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ( $\pi$ -MOSV)

## 2SK2551

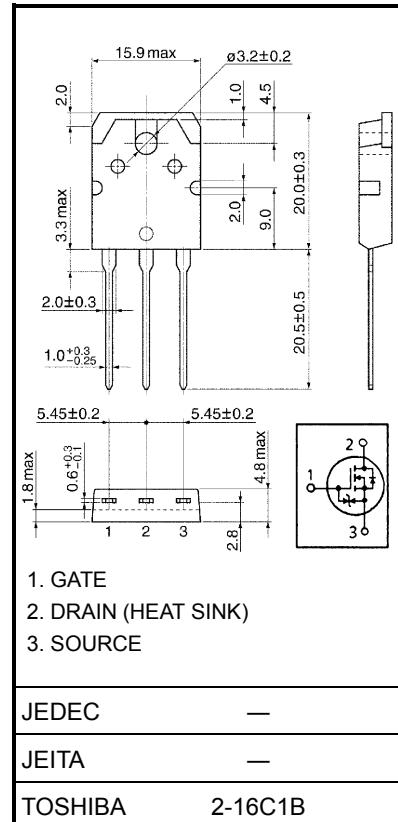
Chopper Regulator, DC-DC Converter and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance :  $R_{DS(ON)} = 7.2 \text{ m}\Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 50 \text{ S}$  (typ.)
- Low leakage current :  $I_{DSS} = 100 \text{ }\mu\text{A}$  (max) ( $V_{DS} = 50 \text{ V}$ )
- Enhancement-mode :  $V_{th} = 1.5 \sim 3.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	50	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	50	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	A
	Pulse (Note 1)	$I_{DP}$	A
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	150	W
Single pulse avalanche energy (Note 2)	$E_{AS}$	894	mJ
Avalanche current	$I_{AR}$	50	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	15	mJ
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~150	$^\circ\text{C}$



Weight: 4.6 g (typ.)

## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	0.833	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C} / \text{W}$

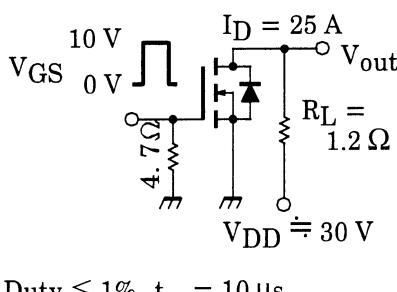
Note 1: Please use devices on condition that the channel temperature is below  $150^\circ\text{C}$ .Note 2:  $V_{DD} = 25 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 440 \text{ }\mu\text{H}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 50 \text{ A}$ 

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

This transistor is an electrostatic sensitive device.

Please handle with caution.

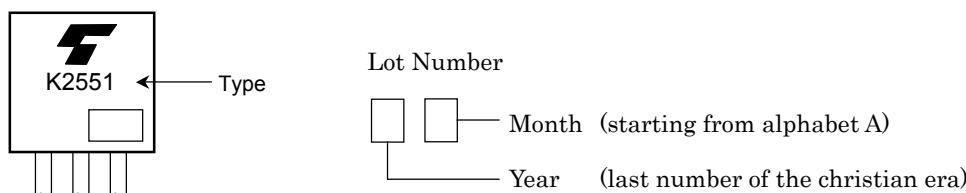
## Electrical Characteristics (Ta = 25°C)

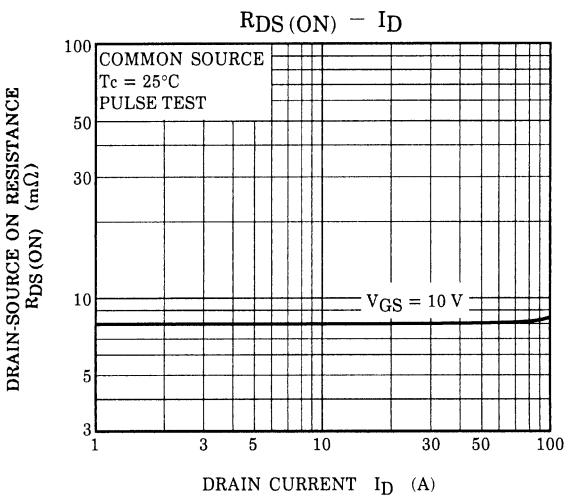
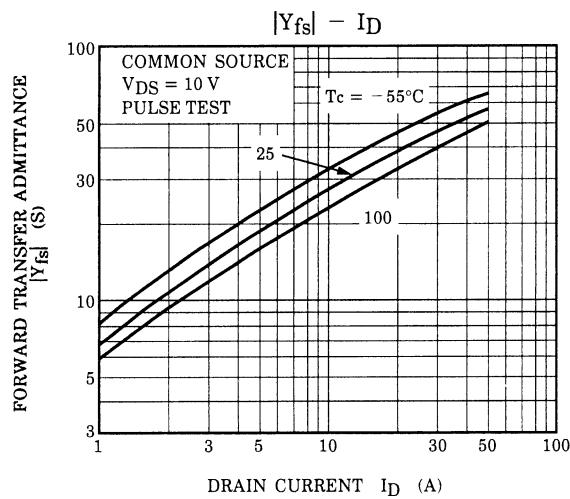
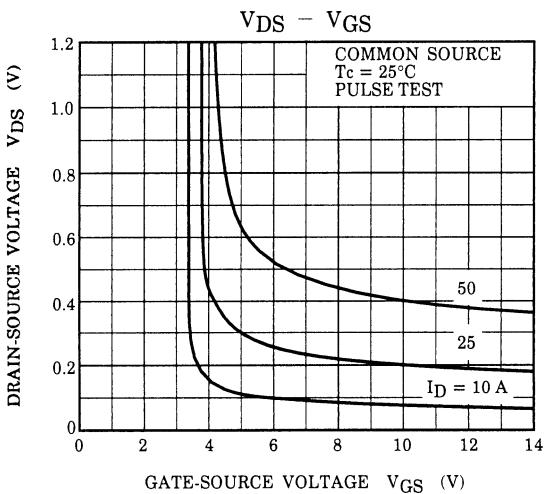
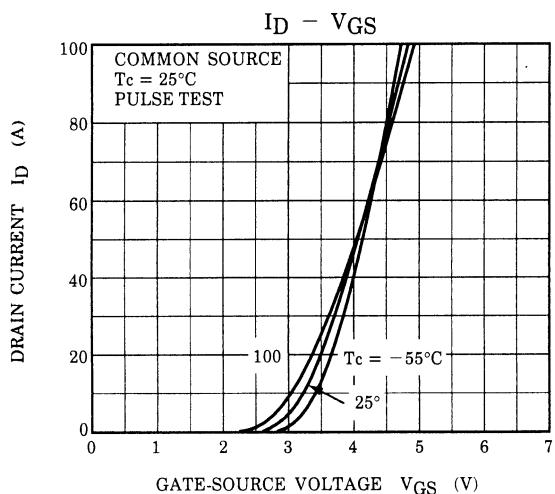
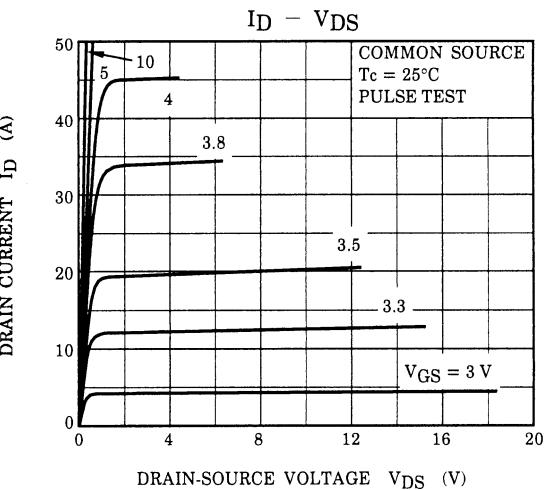
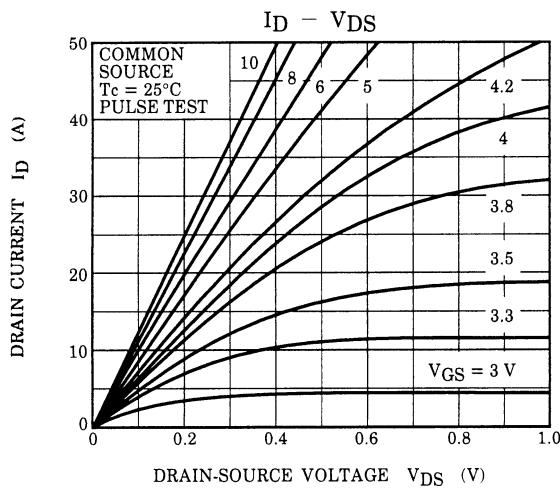
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V	—	—	±10	µA
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V	—	—	100	µA
Drain-source breakdown voltage	V (BR) DSS	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	50	—	—	V
Gate threshold voltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.5	—	3.0	V
Drain-source ON resistance	R <sub>D5</sub> (ON)	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 25 A	—	7.2	11	mΩ
Forward transfer admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 25 A	30	50	—	S
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	4000	—	pF
Reverse transfer capacitance	C <sub>rss</sub>		—	800	—	
Output capacitance	C <sub>oss</sub>		—	2000	—	
Switching time	Rise time	t <sub>r</sub>	 Duty $\leq 1\%$ , $t_w = 10 \mu s$	—	25	—
	Turn-on time	t <sub>on</sub>		—	40	—
	Fall time	t <sub>f</sub>		—	120	—
	Turn-off time	t <sub>off</sub>		—	360	—
Total gate charge (Gate-source plus gate-drain)	Q <sub>g</sub>	V <sub>DD</sub> ≈ 40 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A	—	130	—	nC
Gate-source charge	Q <sub>gs</sub>		—	90	—	
Gate-drain ("miller") charge	Q <sub>gd</sub>		—	40	—	

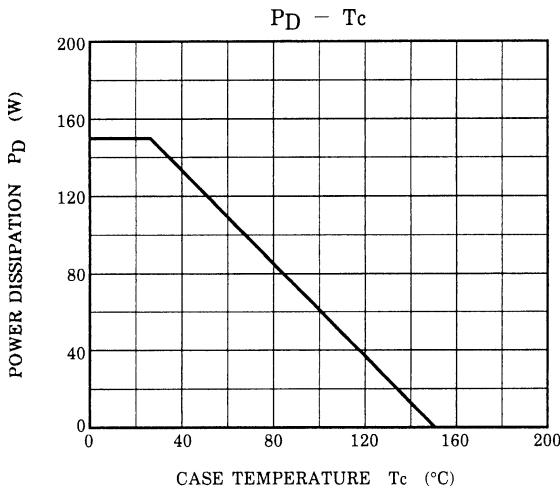
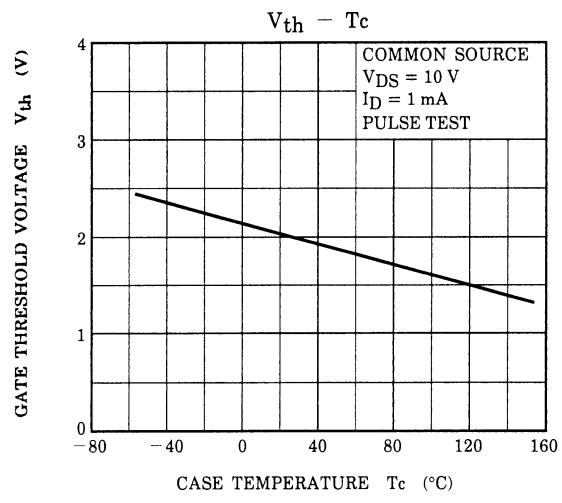
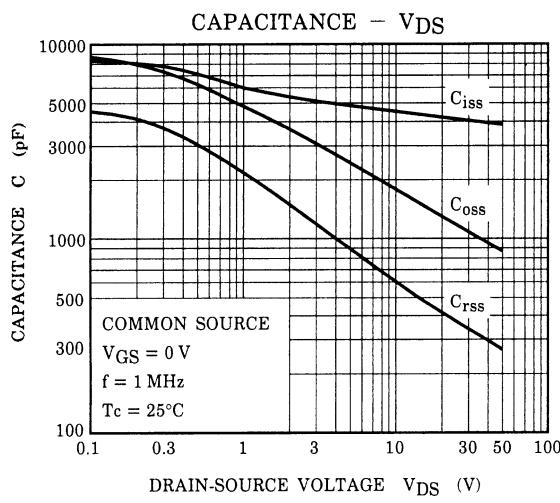
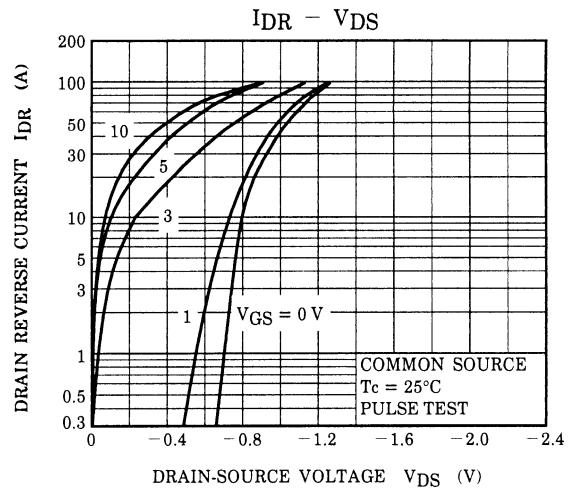
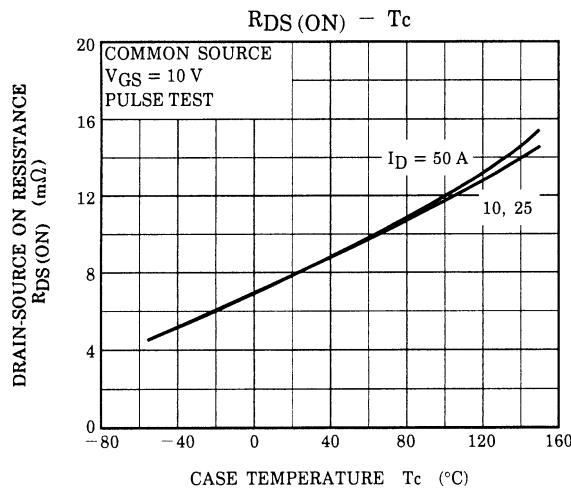
## Source-Drain Ratings and Characteristics (Ta = 25°C)

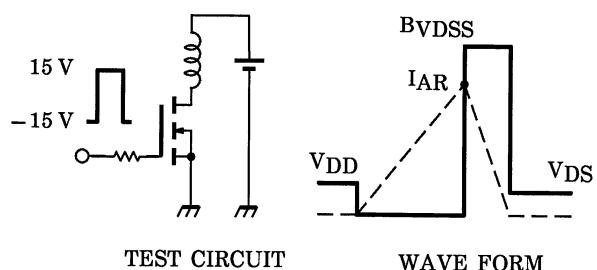
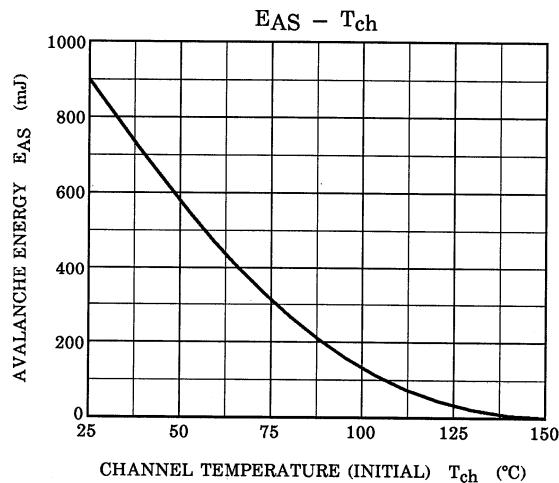
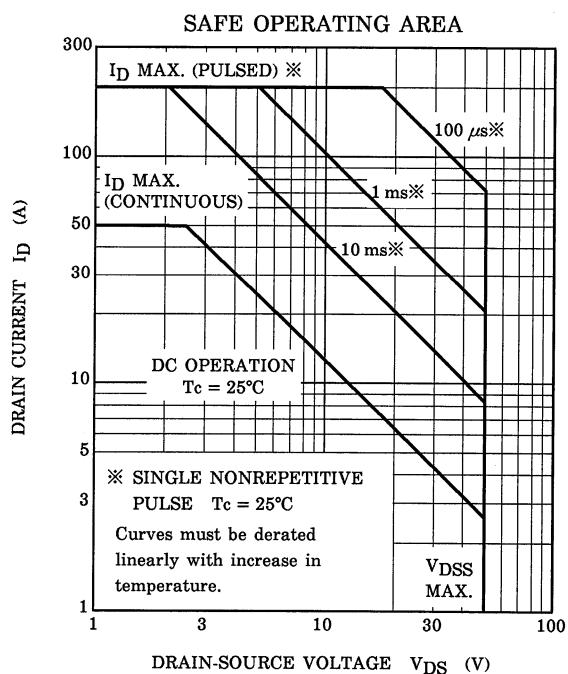
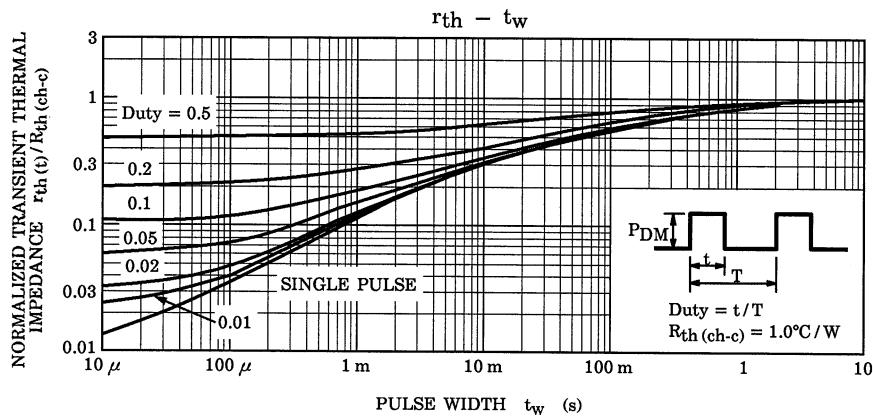
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I <sub>DR</sub>	—	—	—	50	A
Pulse drain reverse current (Note 1)	I <sub>DRP</sub>	—	—	—	200	A
Forward voltage (diode)	V <sub>DSF</sub>	I <sub>DR</sub> = 50 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse recovery time	t <sub>rr</sub>	I <sub>DR</sub> = 50 A, V <sub>GS</sub> = 0 V dI <sub>DR</sub> / dt = 50 A / µs	—	140	—	ns
Reverse recovered charge	Q <sub>rr</sub>		—	77	—	µC

## Marking









$$R_G = 25 \Omega$$

$$V_{DD} = 25 \text{ V}, L = 440 \mu\text{H}$$

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

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