

# 2SK2662

DC-DC Converter, Relay Drive and Motor Drive Applications

- Low drain-source ON resistance :  $R_{DS(ON)} = 1.35 \Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 4.0 S$  (typ.)
- Low leakage current :  $I_{DSS} = 100 \mu A$  (max) ( $V_{DS} = 500 V$ )
- Enhancement mode :  $V_{th} = 2.0 \sim 4.0 V$  ( $V_{DS} = 10 V, I_D = 1 mA$ )

## Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	500	V
Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )		$V_{DGR}$	500	V
Gate-source voltage		$V_{GSS}$	$\pm 30$	V
Drain current	DC (Note 1)	$I_D$	5	A
	Pulse (Note 1)	$I_{DP}$	20	A
Drain power dissipation ( $T_c = 25^\circ C$ )		$P_D$	35	W
Single pulse avalanche energy (Note 2)		$E_{AS}$	180	mJ
Avalanche current		$I_{AR}$	5	A
Repetitive avalanche energy (Note 3)		$E_{AR}$	3.5	mJ
Channel temperature		$T_{ch}$	150	$^\circ C$
Storage temperature range		$T_{stg}$	$-55 \sim 150$	$^\circ C$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	3.57	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	$^\circ C / W$

Note 1: Ensure that the channel temperature does not exceed  $150^\circ C$ .

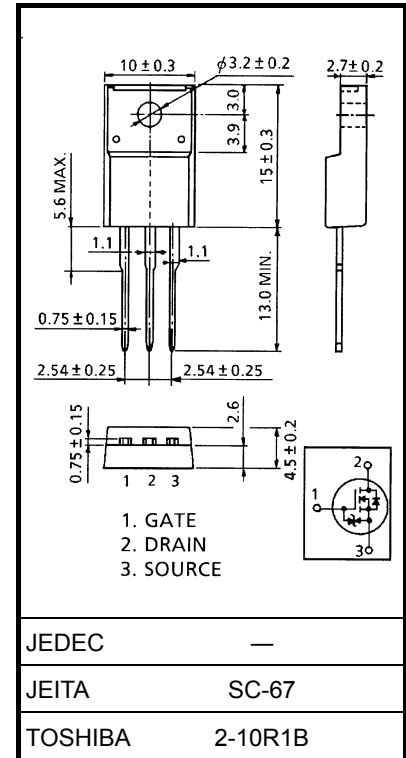
Note 2:  $V_{DD} = 90 V, T_{ch} = 25^\circ C$  (initial),  $L = 12.2 mH, R_G = 25 \Omega, I_{AR} = 5 A$

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

This transistor is an electrostatic-sensitive device.

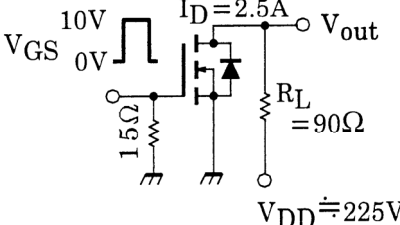
Please handle with caution.

Unit: mm



Weight: 1.9 g (typ.)

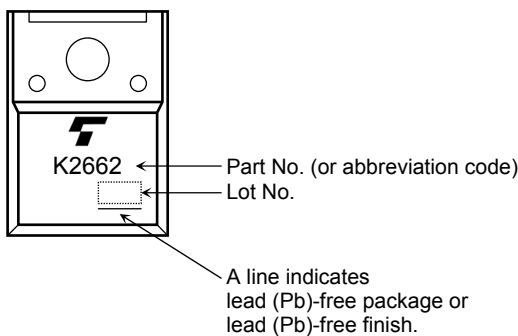
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V	—	—	±10	μA
Gate-source breakdown voltage		V <sub>(BR)GSS</sub>	I <sub>G</sub> = ±10 μA, V <sub>DS</sub> = 0 V	±30	—	—	V
Drain cut-off current		I <sub>DSS</sub>	V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0 V	—	—	100	μA
Drain-source breakdown voltage		V <sub>(BR)DSS</sub>	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	500	—	—	V
Gate threshold voltage		V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	2.0	—	4.0	V
Drain-source ON resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 2.5 A	—	1.35	1.50	Ω
Forward transfer admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 2.5 A	2.5	4.0	—	S
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	780	—	pF
Reverse transfer capacitance		C <sub>rss</sub>		—	60	—	
Output capacitance		C <sub>oss</sub>		—	200	—	
Switching time	Rise time	t <sub>r</sub>	 <p>Duty ≤ 1%, t<sub>w</sub> = 10 μs</p>	—	12	—	ns
	Turn-on time	t <sub>on</sub>		—	25	—	
	Fall time	t <sub>f</sub>		—	15	—	
	Turn-off time	t <sub>off</sub>		—	60	—	
Total gate charge (gate-source plus gate-drain)		Q <sub>g</sub>	V <sub>DD</sub> ≈ 400 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5 A	—	17	—	nC
Gate-source charge		Q <sub>gs</sub>		—	11	—	
Gate-drain ("miller") Charge		Q <sub>gd</sub>		—	6	—	

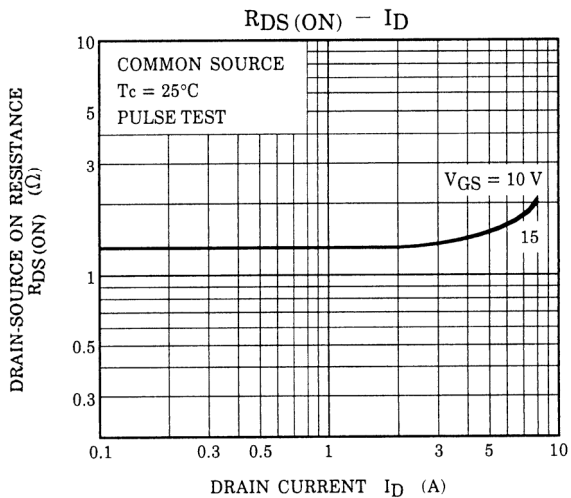
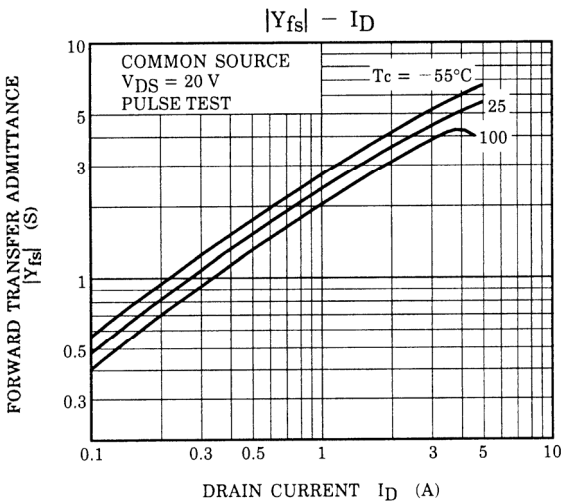
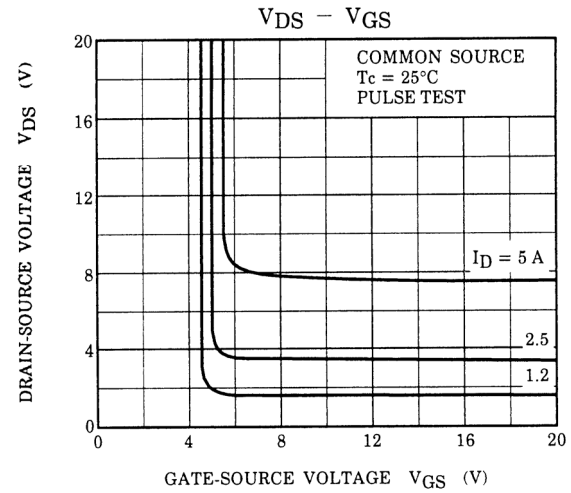
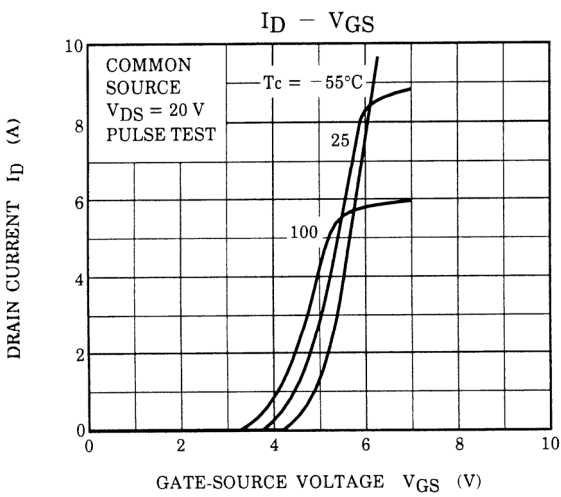
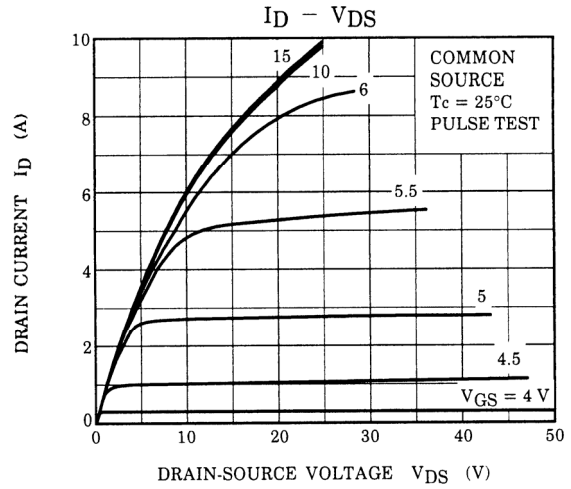
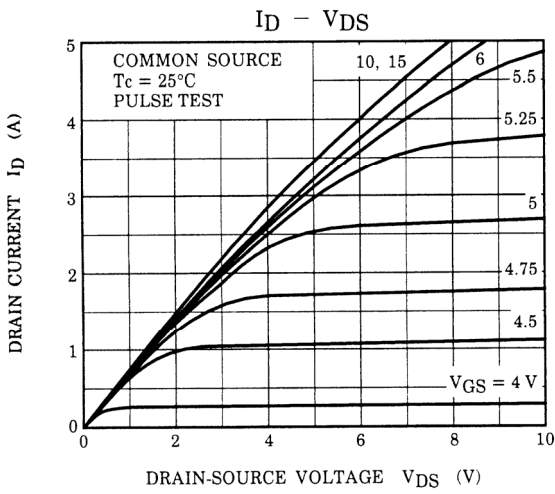
Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I <sub>DR</sub>	—	—	—	5	A
Pulse drain reverse current (Note 1)	I <sub>DRP</sub>	—	—	—	20	A
Forward voltage (diode)	V <sub>DSF</sub>	I <sub>DR</sub> = 5 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse recovery time	t <sub>rr</sub>	I <sub>DR</sub> = 5 A, V <sub>GS</sub> = 0 V	—	1400	—	ns
Reverse recovery charge	Q <sub>rr</sub>	dI <sub>DR</sub> / dt = 100 A / μs	—	9	—	μC

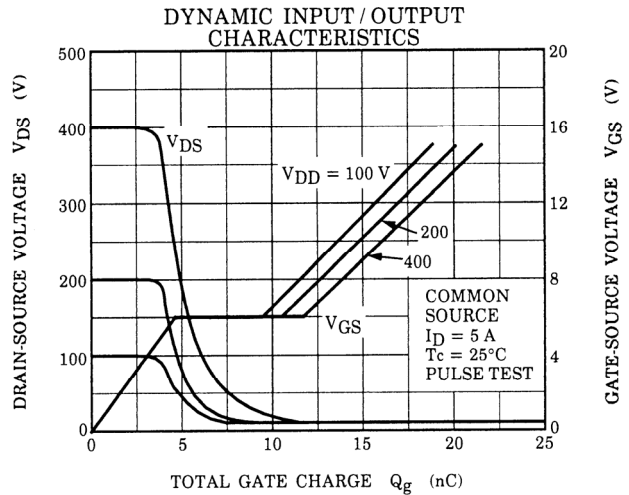
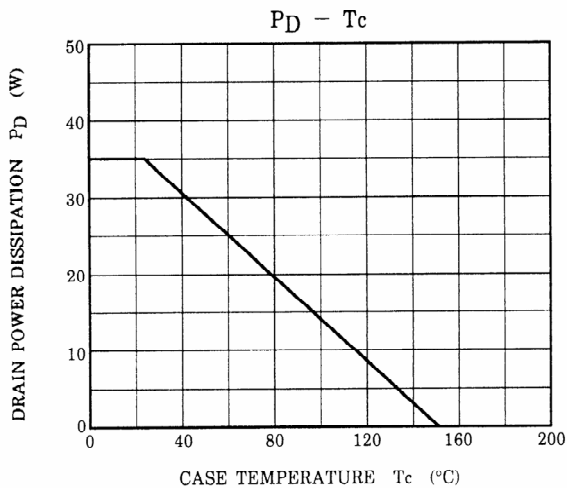
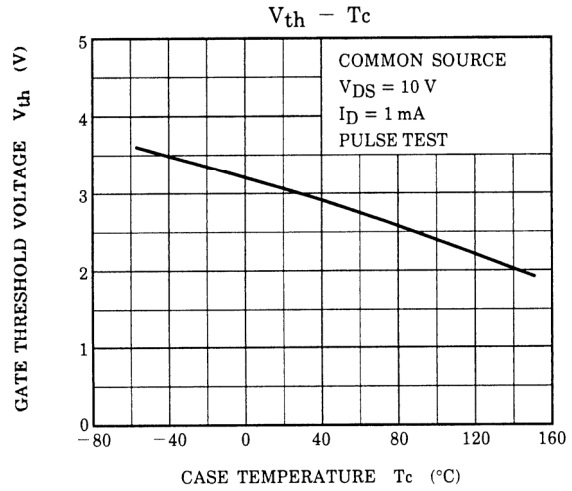
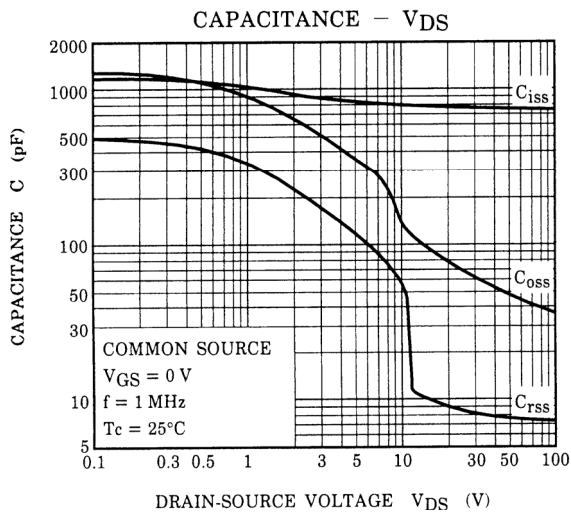
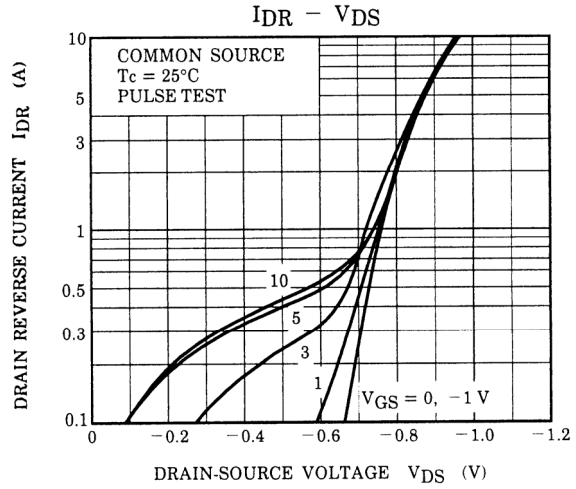
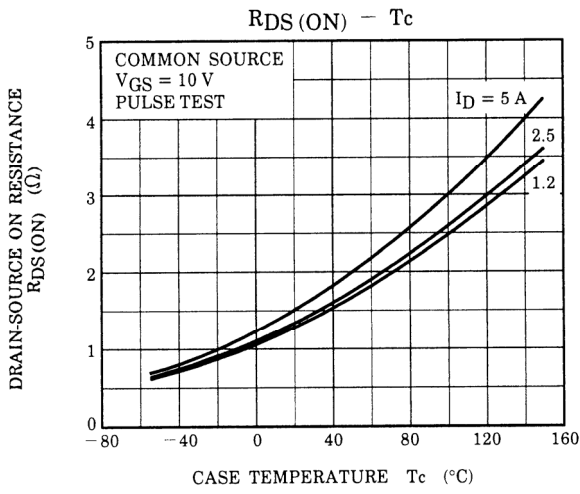
Marking



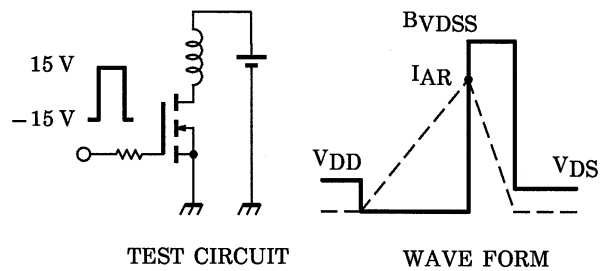
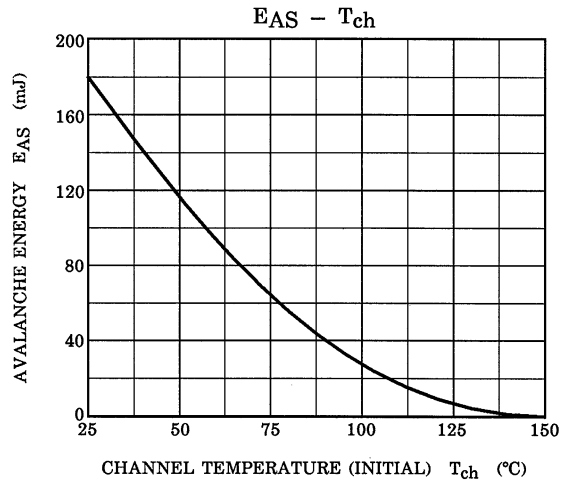
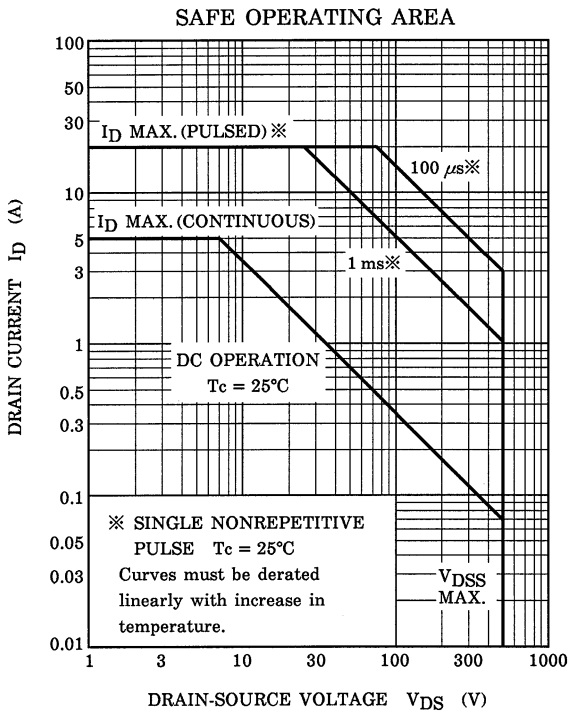
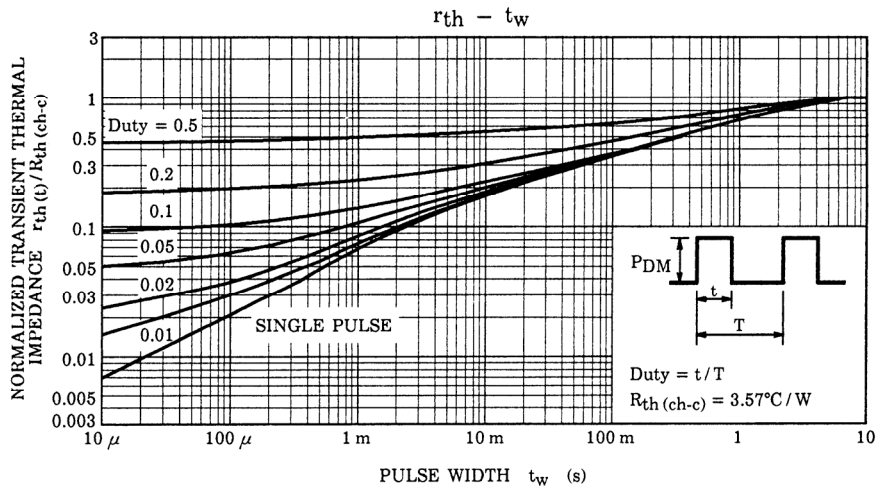
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$R_G = 25 \Omega$   
 $V_{DD} = 90 V, L = 12.2 mH$

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

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