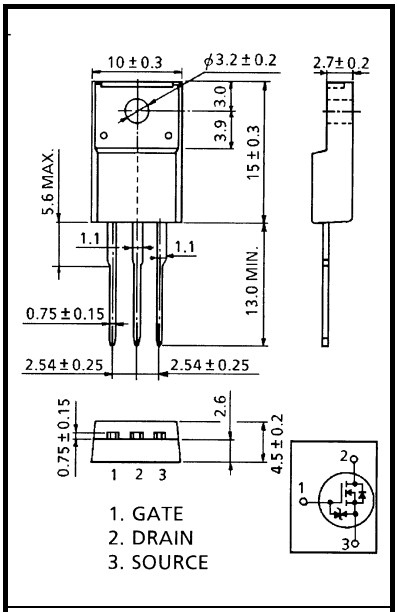
2SK3662

Switching Regulator, DC−DC Converter, Motor Drive Applications

- Low drain-source ON-resistance: $R_{DS\ (ON)}$ = 9.4 mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 55 S (typ.)
- Low leakage current: I_{DSS} = 100 μA (max) (V_{DS} = 60 V)
- Enhancement mode : V_{th} = 1.3 to 2.5 V (V_{DS} = 10 V, I_D = 1 mA)

Unit: mm



JEDEC	—
JEITA	SC-67
TOSHIBA	2-10R1B

Weight: 1.9 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	60	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	60	V
Gate-source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	35	A
	Pulse (Note 1)	I_{DP}	105	
Drain power dissipation (Tc = 25°C)		P_D	35	W
Single pulse avalanche energy (Note 2)		E_{AS}	204	mJ
Avalanche current		I_{AR}	35	A
Repetitive avalanche energy (Note 3)		E_{AR}	3.5	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°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	°C/ W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	°C/ W

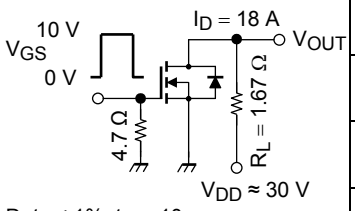
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: V_{DD} = 25 V, T_{ch} = 25°C (initial), L = 227 μH, I_{AR} = 35 A, R_G = 25 Ω

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

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

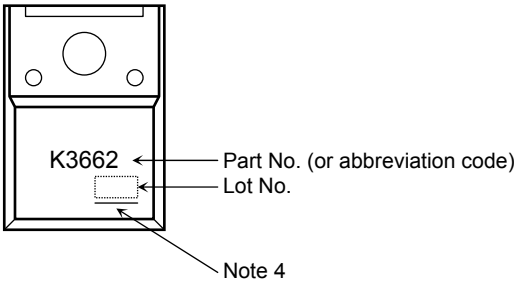
Electrical Characteristics (Ta = 25°C)

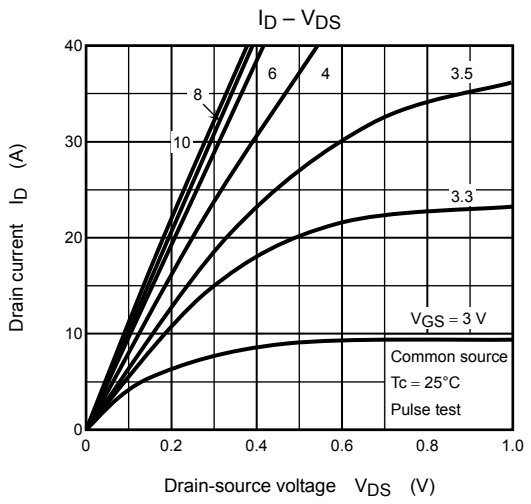
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut-off current		I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	60	—	—	V
		$V_{(BR)\ DSX}$	I_D = 10 mA, V_{GS} = −20 V	40	—	—	
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	1.3	—	2.5	V
Drain-source ON-resistance		$R_{DS\ (ON)}$	V_{GS} = 4 V, ID = 18 A	—	12.5	19	mΩ
			V_{GS} = 10 V, I_D = 18 A	—	9.4	12.5	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 18 A	28	55	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	5120	—	pF
Reverse transfer capacitance		C_{rss}		—	300	—	
Output capacitance		C_{oss}		—	500	—	
Switching time	Rise time	t_r	 Duty ≤ 1%, t_w = 10 μs	—	6	—	ns
	Turn-on time	t_{on}		—	19	—	
	Fall time	t_f		—	20	—	
	Turn-off time	t_{off}		—	115	—	
Total gate charge (gate-source plus gate-drain)		Q_g	V_{DD} ≈ 48 V, V_{GS} = 10 V, I_D = 35 A	—	91	—	nC
Gate-source charge		Q_{gs}		—	70	—	
Gate-drain ("miller") charge		Q_{gd}		—	21	—	

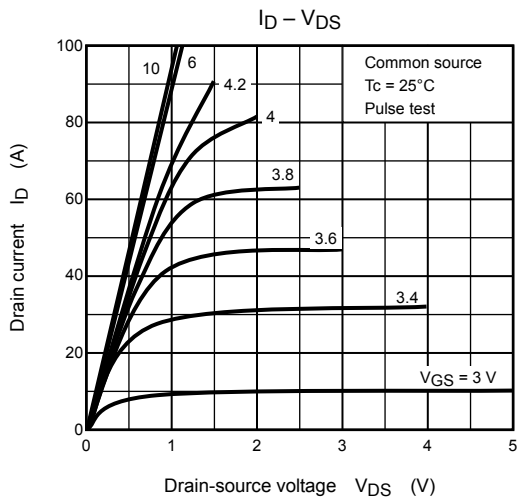
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

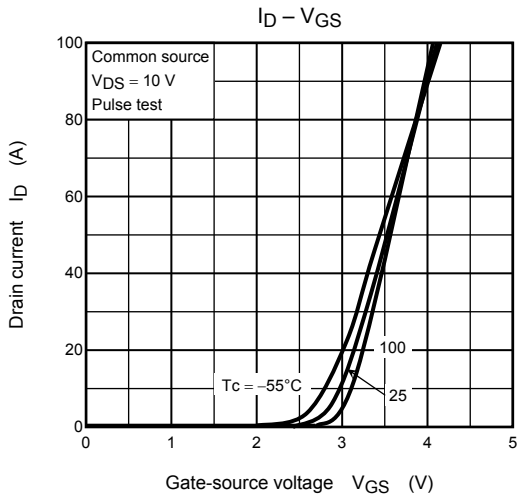
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	35	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	105	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 35 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse recovery time	t_{rr}	I_{DR} = 35 A, V_{GS} = 0 V, dI_{DR}/dt = 50 A/μs	—	60	—	ns
Reverse recovery charge	Q_{rr}		—	58	—	nC

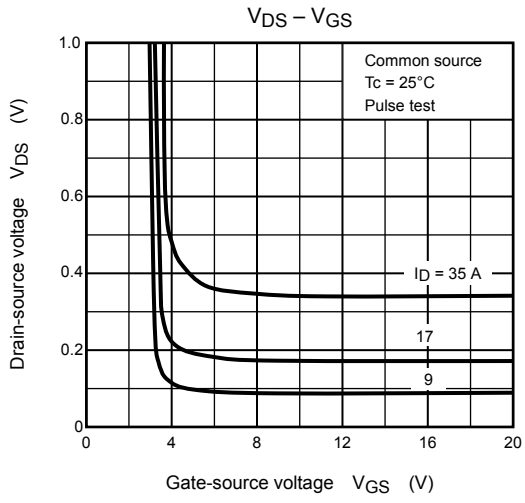
Marking

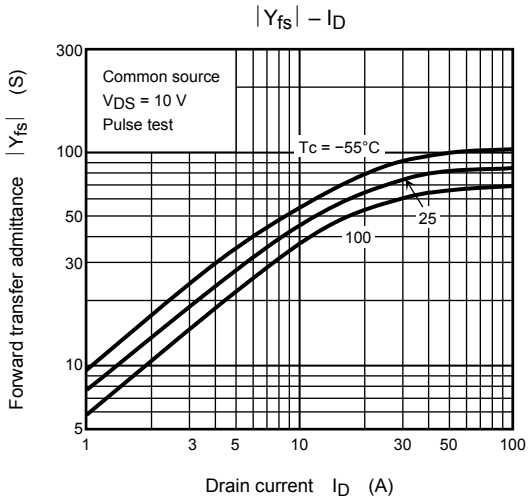


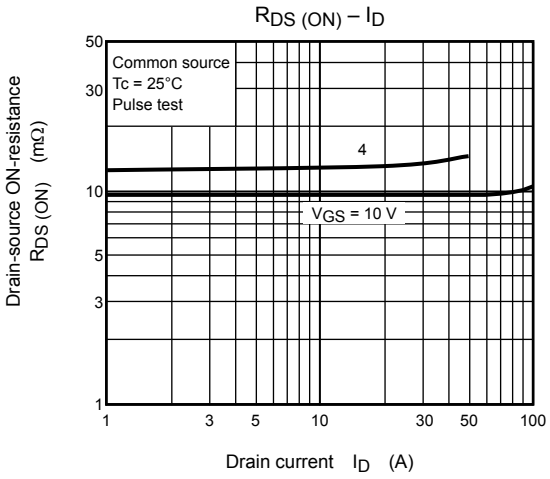

ID – VDS
Drain current ID (A)
Drain-source voltage VDS (V)
8
10
6
4
3.5
3.3
VGS = 3 V
Common source
Tc = 25°C
Pulse test


ID – VDS
Drain current ID (A)
Drain-source voltage VDS (V)
10
6
4.2
4
3.8
3.6
3.4
VGS = 3 V
Common source
Tc = 25°C
Pulse test


ID – VGS
Drain current ID (A)
Gate-source voltage VGS (V)
Common source
VDS = 10 V
Pulse test
100
25
Tc = –55°C


VDS – VGS
Drain-source voltage VDS (V)
Gate-source voltage VGS (V)
Common source
Tc = 25°C
Pulse test
ID = 35 A
17
9


|Yfs| – ID
Forward transfer admittance |Yfs| (S)
Drain current ID (A)
Common source
VDS = 10 V
Pulse test
Tc = –55°C
25
100


RDS (ON) – ID
Drain-source ON-resistance RDS (ON) (mΩ)
Drain current ID (A)
Common source
Tc = 25°C
Pulse test
4
VGS = 10 V