



# 2SK3563

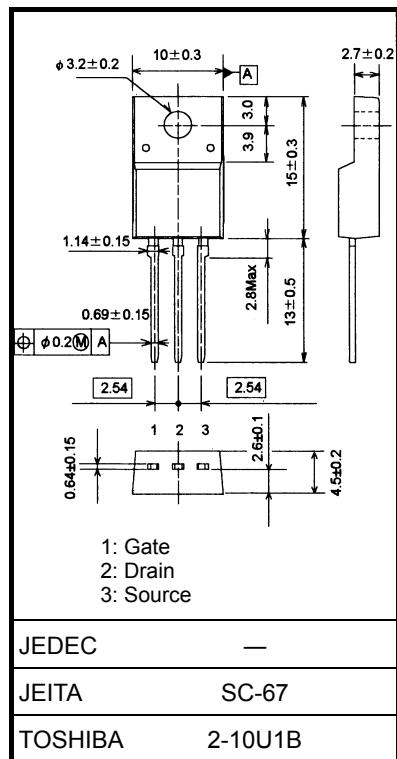
## Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance:  $R_{DS\ (ON)} = 1.35\ \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 3.5\ S$  (typ.)
- Low leakage current:  $I_{DSS} = 100\ \mu A$  (max) ( $V_{DS} = 500\ V$ )
- Enhancement mode:  $V_{th} = 2.0$  to  $4.0\ V$  ( $V_{DS} = 10\ V$ ,  $I_D = 1\ mA$ )

## 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 ( $t = 1\ ms$ ) (Note 1) $I_{DP}$	20	
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	$T_{stg}$	-55~150	$^\circ C$



Weight : 1.7 g (typ.)

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

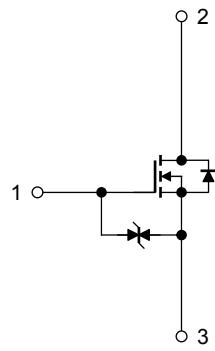
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	3.57	$^\circ C/W$
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	$^\circ C/W$

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

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

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

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



**Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$	
Gate-source breakdown voltage	$V_{(\text{BR})\text{GSS}}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	$\pm 30$	—	—	V	
Drain cut-off current	$I_{DSS}$	$V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	$\mu\text{A}$	
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	500	—	—	V	
Gate threshold voltage	$V_{th}$	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V	
Drain-source ON resistance	$R_{DS(\text{ON})}$	$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	1.35	1.50	$\Omega$	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	1.5	3.5	—	S	
Input capacitance	$C_{iss}$	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	550	—	pF	
Reverse transfer capacitance	$C_{rss}$		—	7	—		
Output capacitance	$C_{oss}$		—	70	—		
Switching time	Rise time	$t_r$	 $V_{GS}$ 10 V $V_{GS}$ 0 V $I_D = 2.5 \text{ A}$ $V_{OUT}$ $15 \Omega$ $R_L = 90 \Omega$ $V_{DD} \approx 225 \text{ V}$ Duty $\leq 1\%$ , $t_W = 10 \mu\text{s}$	—	10	—	ns
	Turn-on time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	10	—	
	Turn-off time	$t_{off}$		—	50	—	
Total gate charge	$Q_g$	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	16	—	nC	
Gate-source charge	$Q_{gs}$		—	10	—		
Gate-drain charge	$Q_{gd}$		—	6	—		

**Source-Drain Ratings and Characteristics ( $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	5	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	20	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V},$ $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	1400	—	ns
Reverse recovery charge	$Q_{rr}$		—	9	—	$\mu\text{C}$

**Marking**