



2SK3864

PDP Sustain Circuit Applications
Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 20\text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 75\text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100\text{ }\mu\text{A}$ (max) ($V_{DSS} = 120\text{ V}$)
- Enhancement mode: $V_{th} = 2.0\sim 4.0\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	120	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	120	V
Gate-source voltage	DC	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	45	A
	Pulse (Note 1)	I_{DP}	180	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	100	W
Single pulse avalanche energy (Note 2)		E_{AS}	84	mJ
Avalanche current		I_{AR}	45	A
Repetitive avalanche energy (Note 3)		E_{AR}	10	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	$-55\sim 150$	$^\circ\text{C}$

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

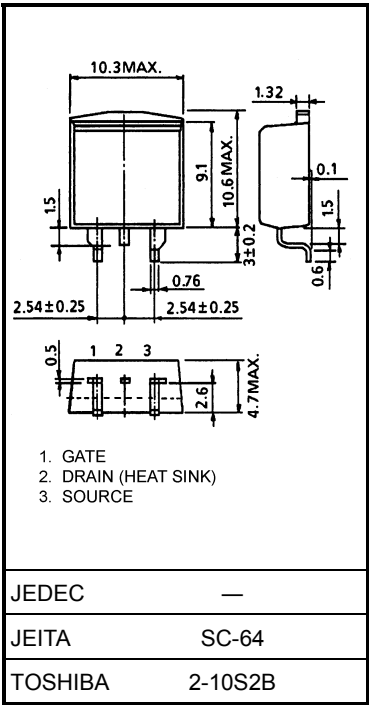
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.25	$^\circ\text{C/W}$

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

Note 2: $V_{DD} = 50\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 54\text{ }\mu\text{H}$, $R_G = 25\text{ }\Omega$, $I_{AR} = 45\text{ A}$

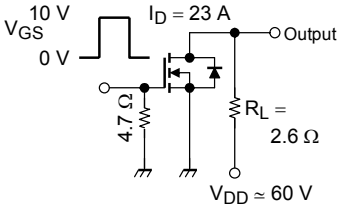
Note 3: Repetitive rating; pulse width limited by maximum channel temperature.

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



Weight: 1.5 g (typ.)

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 100	nA
Drain cut-off current		I_{DSS}	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	120	—	—	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		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 23\text{ A}$	—	20	25	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 23\text{ A}$	38	75	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	4900	—	pF
Reverse transfer capacitance		C_{rss}		—	210	—	
Output capacitance		C_{oss}		—	480	—	
Switching time	Rise time	t_r	 $V_{DD} \approx 60\text{ V}$ $\text{Duty} \leq 1\%, t_w = 10\text{ }\mu\text{s}$	—	7	—	ns
	Turn-on time	t_{on}		—	27	—	
	Fall time	t_f		—	9	—	
	Turn-off time	t_{off}		—	74	—	
Total gate charge		Q_g	$V_{DD} \approx 96\text{ V}, V_{GS} = 10\text{ V}, I_D = 45\text{ A}$	—	83	—	nC
Gate-source charge		Q_{gs}		—	23	—	
Gate-drain charge		Q_{gd}		—	60	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	45	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	180	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 45\text{ A}, V_{GS} = 0\text{ V},$ $dI_{DR}/dt = 50\text{ A}/\mu\text{s}$	—	75	—	ns
Reverse recovery charge	Q_{rr}		—	104	—	μC

Marking

