

Switching Regulator Applications

- ### Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	600	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)		V_{DGR}	600	V
Gate-source voltage		V_{GSS}	± 30	V
Drain current	DC (Note 1)	I_D	6	A
	Pulse ($t = 1\text{ ms}$) (Note 1)	I_{DP}	24	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	40	W
Single pulse avalanche energy (Note 2)		E_{AS}	345	mJ
Avalanche current		I_{AR}	6	A
Repetitive avalanche energy (Note 3)		E_{AR}	4	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 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	$R_{th(ch-c)}$	3.125	°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: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}(\text{initial})$, $L = 16.8 \text{ mH}$, $I_{AB} = 6 \text{ A}$, $R_G = 25 \Omega$

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

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

10 ± 0.3

φ 3.2 ± 0.2

3.0

3.9

15 ± 0.3

5.6 MAX.

1.1

1.1

13.0 MIN.

0.75 ± 0.15

2.54 ± 0.25

2.54 ± 0.25

2.7 ± 0.2

0.75 ± 0.15

2.6

4.5 ± 0.2

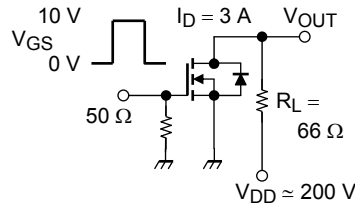
1 2 3

1. GATE
2. DRAIN
3. SOURCE

1 2 3

Weight: 1.9 g (typ.)

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 25\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Gate-source breakdown voltage		$V_{(BR)GSS}$	$I_G = \pm 10\text{ }\mu\text{A}, V_{DS} = 0\text{ V}$	± 30	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	600	—	—	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		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 3\text{ A}$	—	0.9	1.25	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3\text{ A}$	1.2	5.0	—	S
Input capacitance		C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1050	—	pF
Reverse transfer capacitance		C_{rss}		—	10	—	
Output capacitance		C_{oss}		—	110	—	
Switching time	Rise time	t_r	 Duty $\leq 1\%$, $t_W = 10\text{ }\mu\text{s}$	—	20	—	ns
	Turn-on time	t_{on}		—	40	—	
	Fall time	t_f		—	35	—	
	Turn-off time	t_{off}		—	130	—	
Total gate charge		Q_g	$V_{DD} \approx 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 6\text{ A}$	—	28	—	nC
Gate-source charge		Q_{gs}		—	16	—	
Gate-drain charge		Q_{gd}		—	12	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	6	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	24	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 6\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 6\text{ A}, V_{GS} = 0\text{ V},$	—	1000	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	7.0	—	μC

Marking

