

TK100A10N1

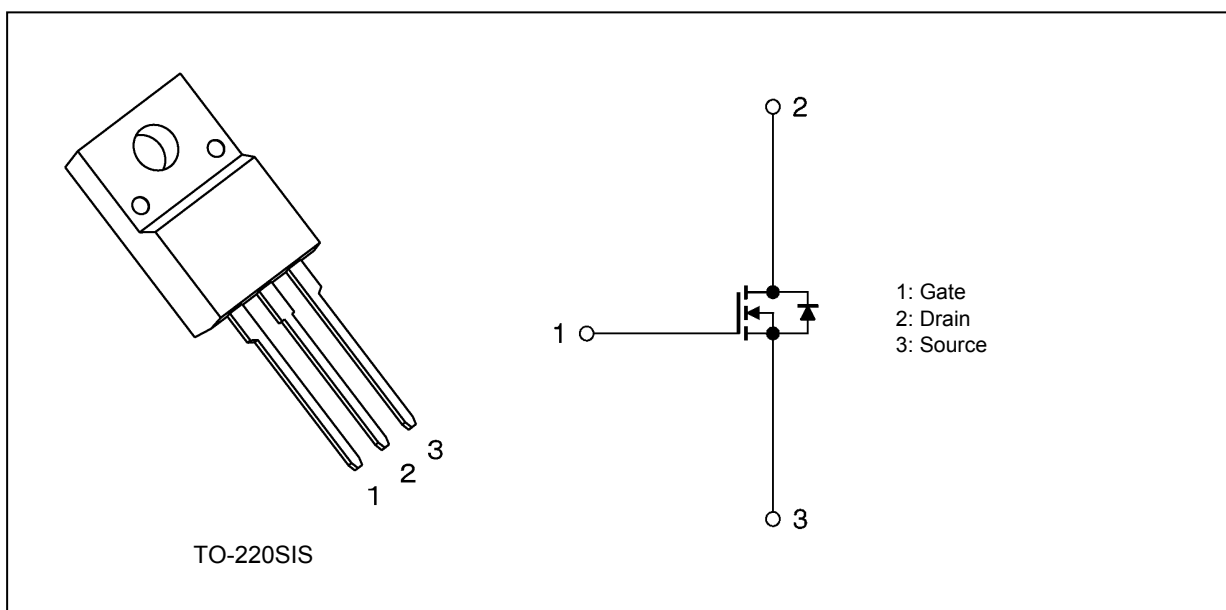
1. Applications

- Switching Voltage Regulators

2. Features

- (1) Low drain-source on-resistance: $R_{DS(ON)} = 3.1 \text{ m}\Omega$ (typ.) ($V_{GS} = 10 \text{ V}$)
- (2) Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- (3) Enhancement mode: $V_{th} = 2.0 \text{ to } 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1.0 \text{ mA}$)

3. Packaging and Internal Circuit



4. Absolute Maximum Ratings (Note) ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	100	V
Gate-source voltage	V_{GSS}	± 20	
Drain current (DC) (Silicon limit) (Note 1,2)	I_D	207	A
Drain current (DC) ($T_c = 25^\circ\text{C}$) (Note 1)	I_D	100	
Drain current (pulsed) ($t = 1 \text{ ms}$) (Note 1)	I_{DP}	362	
Power dissipation ($T_c = 25^\circ\text{C}$)	P_D	45	W
Single-pulse avalanche energy (Note 3)	E_{AS}	222	mJ
Avalanche current	I_{AR}	100	A
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to 150	

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.).

6. Electrical Characteristics

6.1. Static Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 0.1	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	100	—	—	V
Drain-source breakdown voltage (Note 4)	$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	65	—	—	
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}, I_D = 1.0\text{ mA}$	2.0	—	4.0	
Drain-source on-resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 50\text{ A}$	—	3.1	3.8	$\text{m}\Omega$

Note 4: If a reverse bias is applied between gate and source, this device enters $V_{(BR)DSX}$ mode. Note that the drain-source breakdown voltage is lowered in this mode.

6.2. Dynamic Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input capacitance	C_{iss}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	8800	—	pF
Reverse transfer capacitance	C_{rss}		—	63	—	
Output capacitance	C_{oss}		—	1500	—	
Gate resistance	r_g	—	—	2.6	—	Ω
Switching time (rise time)	t_r	See Figure 6.2.1	—	32	—	ns
Switching time (turn-on time)	t_{on}		—	59	—	
Switching time (fall time)	t_f		—	45	—	
Switching time (turn-off time)	t_{off}		—	140	—	

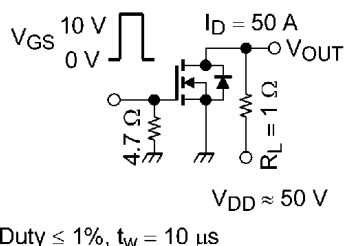


Fig. 6.2.1 Switching Time Test Circuit

6.3. Gate Charge Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 80\text{ V}, V_{GS} = 10\text{ V}, I_D = 100\text{ A}$	—	140	—	nC
Gate-source charge 1	Q_{gs1}		—	46	—	
Gate-drain charge	Q_{gd}		—	34	—	
Gate switch charge	Q_{SW}		—	55	—	

6.4. Source-Drain Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Reverse drain current (DC) (Note 5)	I_{DR}	—	—	—	100	A
Reverse drain current (pulsed) (Note 5)	I_{DRP}	—	—	—	362	
Diode forward voltage	V_{DSF}	$I_{DR} = 100\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V
Reverse recovery time (Note 6)	t_{rr}	$I_{DR} = 100\text{ A}, V_{GS} = 0\text{ V}$ $-di_{DR}/dt = 100\text{ A}/\mu\text{s}$	—	93	—	ns
Reverse recovery charge (Note 6)	Q_{rr}		—	220	—	nC

Note 5: Ensure that the channel temperature does not exceed 150°C .

Note 6: Ensure that V_{DS} peak does not exceed V_{DSS} .

7. Marking (Note)

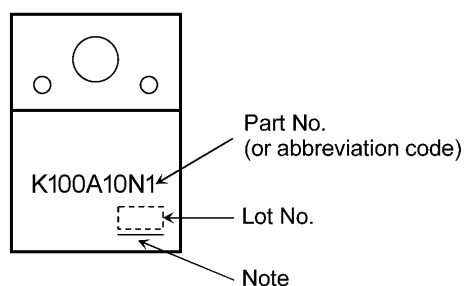


Fig. 7.1 Marking

Note: A line under a Lot No. identifies the indication of product Labels.

Not underlined: $[[Pb]]/INCLUDES > MCV$

Underlined: $[[G]]/RoHS\ COMPATIBLE$ or $[[G]]/RoHS\ [[Pb]]$

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.