TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type(π -MOS IV)

TK09H90A

Switching Regulator Applications

- Low drain-source ON resistance $: RDS (ON) = 1.0\Omega (typ.)$
- High forward transfer admittance $|Y_{fs}| = 6S$ (typ.)
- Low leakage current $: I_{DSS} = 100 \ \mu A \ (max) \ (V_{DS} = 720V)$
- Enhancement mode : $V_{th} = 2.0 \sim 4.0 V (V_{DS} = 10 V, I_D = 1 mA)$

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V _{DSS}	900	V
Drain-gate voltage (R	_{GS} = 20 kΩ)	V _{DGR}	900	V
Gate-source voltage	_	V _{GSS}	±30	V
Drain current	DC (Note 1)	Ι _D	9	А
	Pulse (Note 1)	I _{DP}	27	А
Drain power dissipation	n (Tc = 25°C)	PD	150	W
Single-pulse avalanche energy (Note 2)		E _{AS}	778	mJ
Avalanche current		I _{AR}	9	А
Repetitive avalanche e	energy (Note 3)	E _{AR}	15	mJ
Channel temperature		T _{ch}	150	°C
Storage temperature range		T _{stg}	-55~150	°C



Weight: 3.8 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

Characteristic	Symbol	Мах	Unit
Thermal resistance, channel to case	R _{th (ch−c)}	0.833	°C / W
Thermal resistance, channel to ambient	R _{th (ch−a)}	50	°C / W

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

Note 2: V_{DD} = 90 V, T_{ch} = 25°C (initial), L = 17.6 mH, R_G = 25 Ω , I_{AR} = 9 A

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

This transistor is an electrostatic-sensitive device. Handle with care.



Unit: mm

Electrical Characteristics (Ta = 25°C)

Chara	cteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cu	ırrent	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V		_	±10	μA
Gate-source br	eakdown voltage	V _(BR) GSS	I _G = ±10 μA, V _{DS} = 0 V	±30		_	V
Drain cutoff curr	ent	I _{DSS}	V _{DS} = 720 V, V _{GS} = 0 V	—	_	100	μA
Drain-source br	eakdown voltage	V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	900		_	V
Gate threshold	voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0		4.0	V
Drain-source O	N resistance	R _{DS (ON)}	V _{GS} = 10 V, I _D = 4.0 A	_	1.0	1.3	Ω
Forward transfe	r admittance	Y _{fs}	V _{DS} = 10 V, I _D = 4.0 A	3.5	6.0		S
Input capacitance	ce	C _{iss}			2200		pF
Reverse transfer capacitance		C _{rss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	_	45		
Output capacitance		C _{oss}			190		
Switching time	Rise time	tr	$V_{GS} \stackrel{10V}{}_{0V} \prod_{\substack{\bullet \\ 4.7\Omega}} I_{D} \stackrel{I_{D}=4A}{}_{RL} \circ V_{out}$	_	25	_	
	Turn on time	t _{on}		_	65	_	20
	Fall time	t _f		_	20	_	- ns
	Turn off time	t _{off}	$V_{DD}=400V$ Duty $\leq 1\%$, t _w =10µs	_	120	_	
Total gate charge (gate-source plus gate-drain)		Qg		_	60	_	
Gate-source charge		Q _{gs}	V _{DD} ≈ 400 V, V _{GS} = 10 V, I _D = 9 A		34	_	nC
Gate-drain ("Miller") charge		Q _{gd}			26	_	

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

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	_	_	9	А
Pulse drain reverse current (Note 1)	I _{DRP}	—	_	_	27	А
Forward voltage (diode)	V _{DSF}	I _{DR} = 9 A, V _{GS} = 0 V	_	_	-1.9	V
Reverse recovery time	t _{rr}	I _{DR} = 9 A, V _{GS} = 0 V	_	1450	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} / dt = 100 A / μs	_	17	_	μC

Marking



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Safe operating area





 $\begin{array}{l} \mathsf{R}_{G} = 25 \ \Omega \\ \mathsf{V}_{DD} = 90 \ \mathsf{V}, \ \mathsf{L} = 17.6 \ \mathsf{mH} \end{array} \qquad \mathsf{E}_{AS} = \frac{1}{2} \cdot \mathsf{L} \cdot \mathsf{I}^{2} \cdot \left(\frac{\mathsf{B}_{VDSS}}{\mathsf{B}_{VDSS} - \mathsf{V}_{DD}} \right) \end{array}$

Wave form

Test circuit

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20070701-EN

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