Unit: mm

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

TK11A50D

Switching Regulator Applications

Low drain-source ON-resistance: R_{DS} (ON) = 0.45 Ω (typ.)

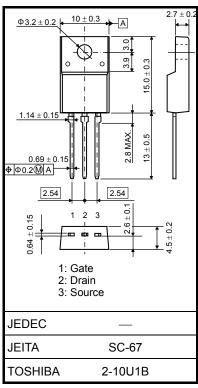
High forward transfer admittance: |Y_{fS}| = 5.5 S (typ.)

• Low leakage current: $I_{DSS} = 10 \mu A \text{ (max) (V}_{DS} = 500 \text{ V)}$

• Enhancement mode: V_{th} = 2.0 to 4.0 V (V_{DS} = 10 V, I_D = 1 mA)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Drain-source voltage		V_{DSS}	500	V	
Gate-source voltage		V _{GSS}	±30	V	
Drain current	DC (Note 1)	I _D	11		
	Pulse (t = 1 ms) (Note 1)	I _{DP}	44	Α	
Drain power dissipati	on (Tc = 25°C)	P _D	45	W	
Single pulse avalance	ne energy (Note 2)	E _{AS}	264	mJ	
Avalanche current		I _{AR}	11	Α	
Repetitive avalanche	energy (Note 3)	E _{AR}	4.5	mJ	
Channel temperature	!	T _{ch}	150	°C	
Storage temperature range		T _{stg}	-55 to 150	°C	

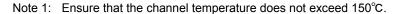


Weight: 1.7 g (typ.)

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

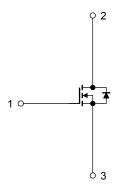
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R _{th (ch-c)}	2.78	°C/W
Thermal resistance, channel to ambient	R _{th (ch-a)}	62.5	°C/W



Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^{\circ}\text{C}(\text{initial})$, L = 3.7 mH, $R_G = 25 \Omega$, $I_{AR} = 11 \text{ A}$

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

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



Start of commercial production 2009-05

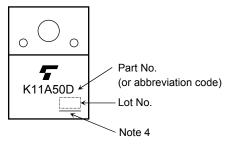
Electrical Characteristics (Ta = 25°C)

Chara	acteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current		I _{GSS}	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±1	μΑ
Drain cut-off current		I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	_	_	10	μΑ
Drain-source breakdown voltage		V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	500	_	_	V
Gate threshold vo	oltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	_	4.0	V
Drain-source ON	-resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 5.5 A	_	0.45	0.6	Ω
Forward transfer	admittance	Y _{fs}	V _{DS} = 10 V, I _D = 5.5 A	1.4	5.5	_	S
Input capacitance		C _{iss}		_	1200	_	pF
Reverse transfer capacitance		C _{rss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	_	6	_	
Output capacitance		Coss			120	_	
Switching time	Rise time	t _r	V_{GS} V_{OV} V_{OV} V_{OV} V_{OV} $V_{DD} \approx 200 \text{ V}$ $V_{DD} \approx 200 \text{ V}$	_	25	_	
	Turn-on time	t _{on}		_	60	_	
	Fall time	t _f		_	12	_	ns
	Turn-off time	t _{off}		_	100	_	
Total gate charge		Qg		_	24	_	
Gate-source charge		Q _{gs}	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 11 \text{ A}$	_	16	_	nC
Gate-drain charge		Q _{gd}		_	8	_	

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

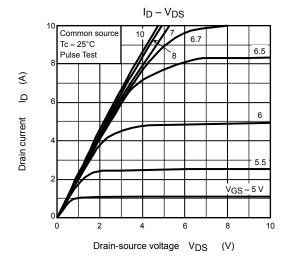
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	_	_	_	11	Α
Pulse drain reverse current (Note 1)	I _{DRP}	_	_	_	44	Α
Forward voltage (diode)	V_{DSF}	I _{DR} = 11 A, V _{GS} = 0 V	_	_	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 11 A, V _{GS} = 0 V,	_	1300	_	ns
Reverse recovery charge	Qrr	dI _{DR} /dt = 100 A/μs		12	_	μС

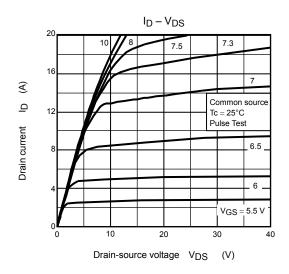
Marking

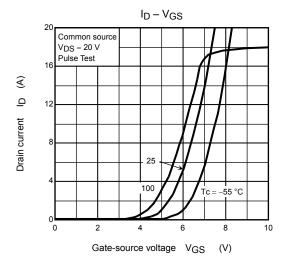


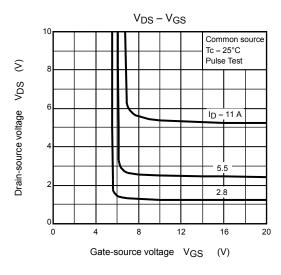
Note 4 : A line under a Lot No. identifies the indication of product Labels [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

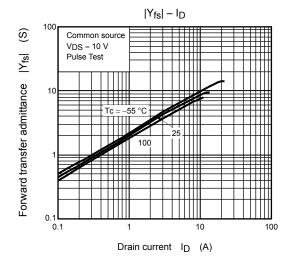
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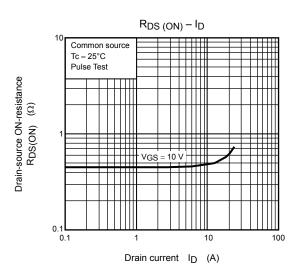




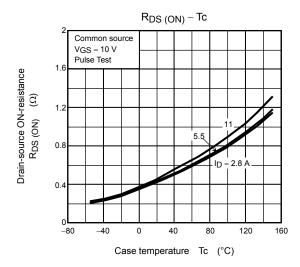


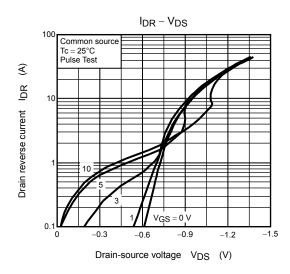


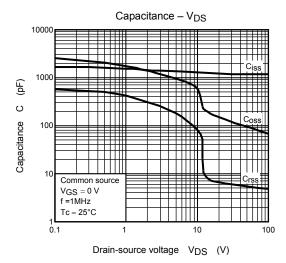


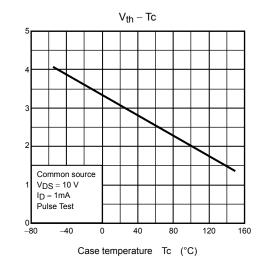


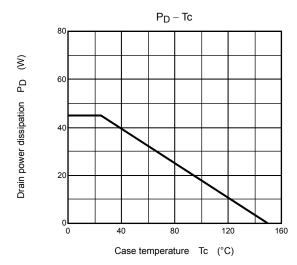
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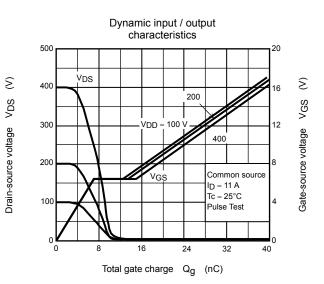








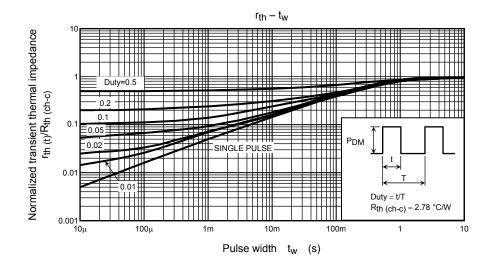


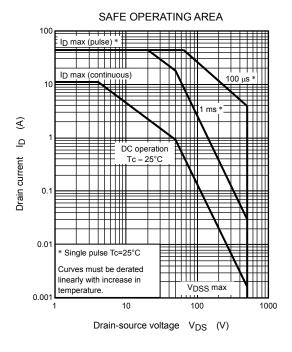


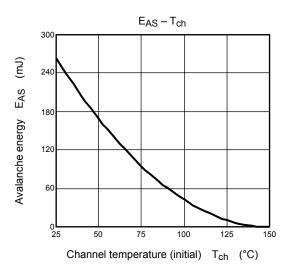
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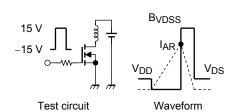
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Gate threshold voltage









$$R_G = 25~\Omega$$

$$V_{DD} = 90~V,~L = 3.7~mH$$

$$\mathsf{EAS} = \frac{1}{2} \cdot L \cdot l^2 \cdot \left(\frac{\mathsf{BVDSS}}{\mathsf{BVDSS} - \mathsf{VDD}} \right)$$

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