Unit: mm

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

2SK3742

Switching Regulator Applications

• Low drain-source ON resistance: $R_{DS (ON)} = 2.2 \Omega (typ.)$

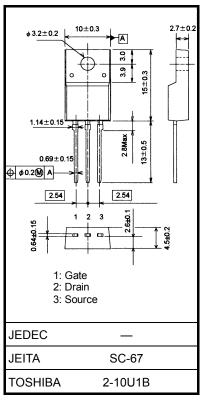
• High forward transfer admittance: |Yfs| = 3.5 S (typ.)

• Low leakage current: $I_{DSS} = 100 \mu A (V_{DS} = 720 V)$

• Enhancement model: V_{th} = 4.0 to 5.0 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 ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	900	V	
Gate-source voltage		V _{GSS}	±30	V	
Drain current	DC (Note 1)	ID	5		
	Pulse (t = 1 ms) (Note 1)	I _{DP}	15	Α	
Drain power dissipati	on (Tc = 25°C)	PD	45	W	
Single pulse avalanche energy (Note 2)		E _{AS}	595	mJ	
Avalanche current		I _{AR}	5	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

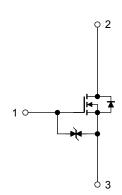
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	R _{th (ch-c)}	2.78	°C/W
Thermal resistance, channel to ambient	R _{th (ch-a)}	62.5	°C/W

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

Note 2: $V_{DD} = 90~V$, $T_{ch} = 25^{\circ}C$ (initial), L = 43.6~mH, $I_{AR} = 5.0~A$, $R_G = 25~\Omega$

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

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



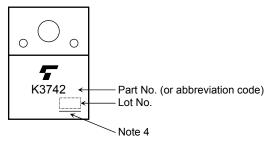
Electrical Characteristics (Ta = 25°C)

Char	acteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current		I _{GSS}	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±10	μА
Gate-source breakdown voltage		V (BR) GSS	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	±30	_	_	V
Drain cutoff current		I _{DSS}	V _{DS} = 720 V, V _{GS} = 0 V	_	_	100	μА
Drain-source breakdown voltage		V (BR) DSS	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	900	_	_	V
Gate threshold voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	4.0	_	5.0	V
Drain-source ON resistance		R _{DS} (ON)	V _{GS} = 10 V, I _D = 3 A	_	2.2	2.5	Ω
Forward transfer admittance		Yfs	V _{DS} = 20 V, I _D = 3 A	1.5	3.5	_	S
Input capacitance		C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	_	1150	_	pF
Reverse transfer capacitance		C _{rss}		_	20	_	
Output capacitance		C _{oss}		_	110	_	
Switching time	Rise time	t _r	$\begin{array}{c c} 10 \text{ V} & \text{I}_{D} = 3 \text{ A} & \text{V}_{OUT} \\ \hline \text{VGS} & \text{V} & \text{RL} = \\ 50 \Omega & \text{RC} & \text{RC} & \text{RC} \end{array}$	_	100	_	
	Turn-on time	t _{on}		_	140	_	
	Fall time	t _f		_	40	_	ns
	Turn-off time	t _{off}	Duty \leq 1%, $t_W = 10 \mu s$	_	130	_	
Total gate charge		Qg		_	25	_	
Gate-source charge		Q _{gs}	$V_{DD} \simeq 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	_	11	_	nC
Gate-drain charge		Q _{gd}			14		

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

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	_	_	_	5	Α
Pulse drain reverse current (Note 1)	I _{DRP}	_	_	_	15	Α
Forward voltage (diode)	V _{DSF}	I _{DR} = 5 A, V _{GS} = 0 V	_	_	-1.7	٧
Reverse recovery time	t _{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V},$	_	900	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} /dt = 100 A/μs		5.4	_	μС

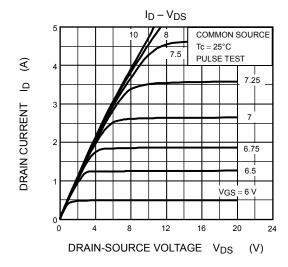
Marking

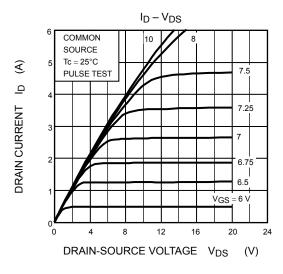


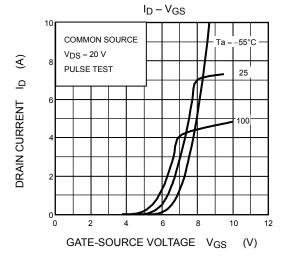
Note 4: A line under a Lot No. identifies the indication of product Labels.

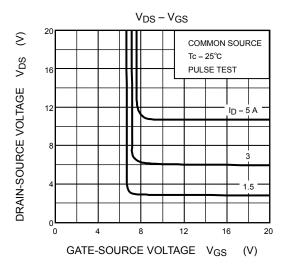
Not underlined: [[Pb]]/INCLUDES > MCV Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

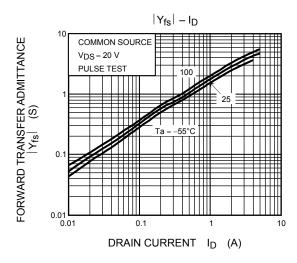
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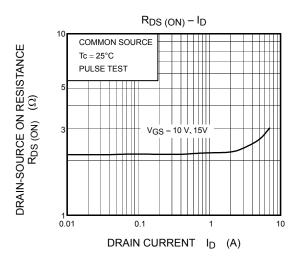




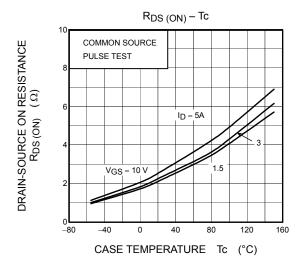


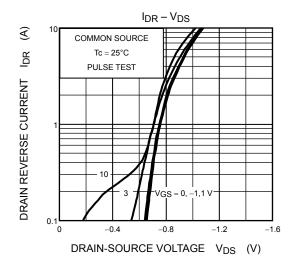


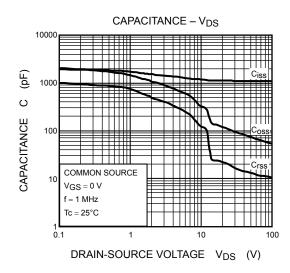


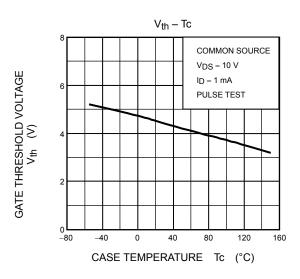


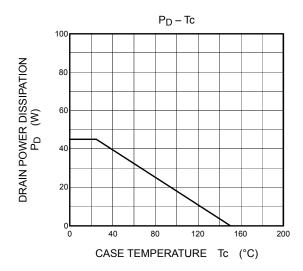
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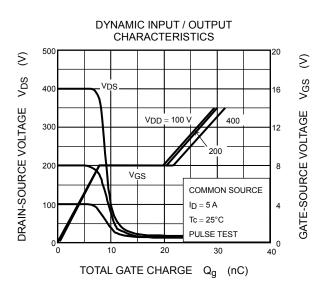




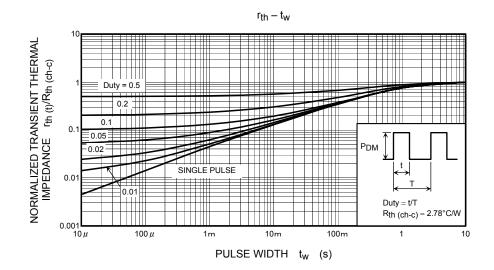


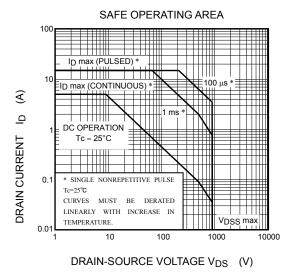


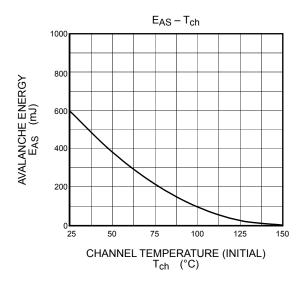


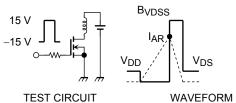


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$$R_{G} = 25 \Omega$$

$$V_{DD} = 90 \text{ V, L} = 43.6 \text{mH}$$

$$E_{AS} = \frac{1}{2} \cdot \text{L} \cdot \text{I}^{2} \cdot \left(\frac{\text{BVDSS}}{\text{BVDSS} - \text{VDD}}\right)$$

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