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

2SK3903

Switching Regulator Applications

• Low drain-source ON resistance: $R_{DS (ON)} = 0.32 \Omega (typ.)$

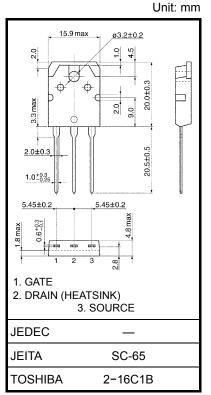
• High forward transfer admittance: $|Y_{fS}| = 7.5 \text{ S (typ.)}$

Low leakage current: I_{DSS} = 100 μA (max) (V_{DS} = 600 V)

• Enhancement model: V_{th} = 2.0 to 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}	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	14	Α	
	Pulse	(Note 1)	I _{DP}	56	A 	
Drain power dissipation (Tc = 25°C)			PD	150	W	
Single pulse avalanche energy (Note 2)			E _{AS}	806	mJ	
Avalanche current			I _{AR}	14	Α	
Repetitive avalanche energy (Note 3)			E _{AR}	15	mJ	
Channel temperature			T _{ch}	150	°C	
Storage temperature range			T _{stg}	-55 to 150	°C	



Weight: 4.6 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)}	0.833	°C/W
Thermal resistance, channel to ambient	R _{th (ch-a)}	50	°C/W

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Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^{\circ}\text{C}$, L = 7.2 mH, $R_G = 25 \Omega$, $I_{AR} = 14 \text{ A}$

Note 3: Repetitive rating: pulse width limited by max junction temperature

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

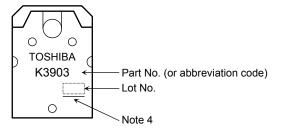
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage current		I _{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	_	_	±10	μА
Gate-source breakdown voltage		V (BR) GSS	$I_G = \pm 10 \ \mu A, \ V_{DS} = 0 \ V$	±30	_	_	V
Drain cut-off current		I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V	_	_	100	μА
Drain-source breakdown voltage		V (BR) DSS	$I_D = 10$ mA, $V_{GS} = 0$ V	600	_	_	V
Gate threshold voltage		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 = 7 A	_	0.32	0.44	Ω
Forward transfer admittance		Y _{fS}	V _{DS} = 10 V, I _D = 7 A	2.1	7.5	_	S
Input capacitance		C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	_	3100	_	pF
Reverse transfer capacitance		C _{rss}		_	20	_	
Output capacitance		Coss		_	270	_	
Switching time	Rise time	t _r	$V_{GS}^{10 \text{ V}} V_{GS}^{10 \text{ V}} = 7 \text{ A}$ $V_{GS}^{10 \text{ V}} V_{GS}^{10 \text{ V}} = 29 \Omega$	_	70	_	ns
	Turn-on time	t _{on}		_	130	_	
	Fall time	t _f			70		
	Turn-off time	t _{off}	Duty \leq 1%, t_W = 10 μs $V_{DD} \approx$ 200 V	_	280	_	
Total gate charge (gate-source plus gate-drain)		Qg		_	62	_	nC
Gate-source charge		Q _{gs}	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 14 \text{ A}$	_	40	_	
Gate-drain ("Miller") charge		Q _{gd}		_	22	_	

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

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	_	_	_	14	Α
Pulse drain reverse current (Note 1)	I _{DRP}	_	_	_	56	Α
Forward voltage (diode)	V _{DSF}	I _{DR} = 14 A, V _{GS} = 0 V	_	_	-1.7	٧
Reverse recovery time	t _{rr}	I _{DR} = 14 A, V _{GS} = 0 V,	_	1300	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} /dt = 100 A/μs		18		μС

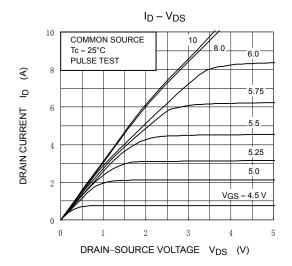
Marking

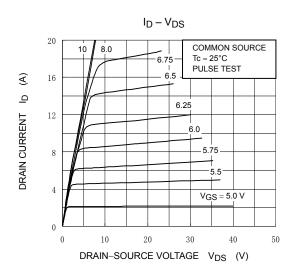


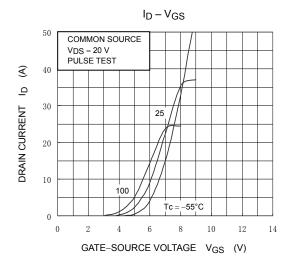
Note 4: A line under a Lot No. identifies the indication of product Labels.

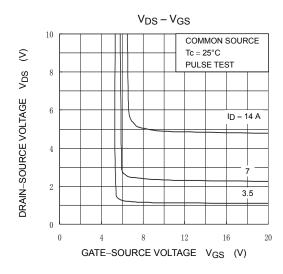
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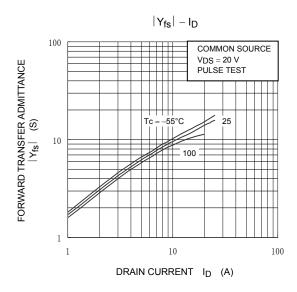
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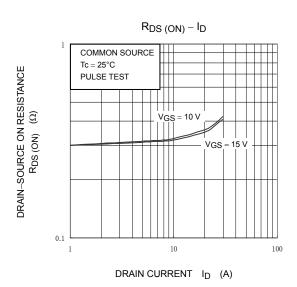


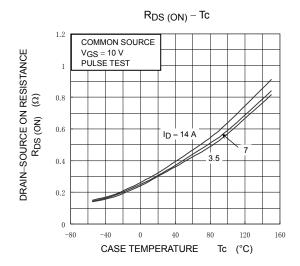


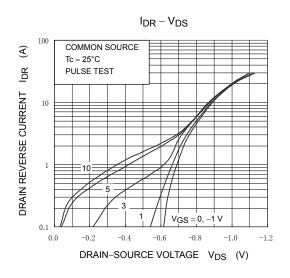


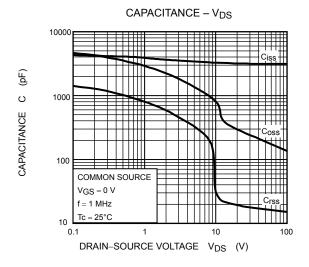


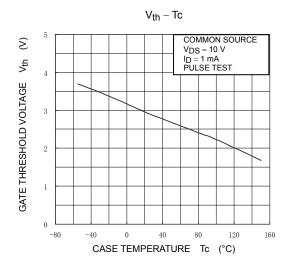


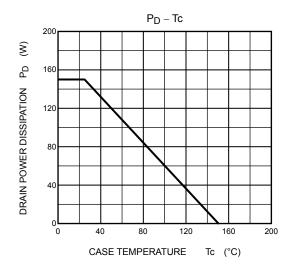


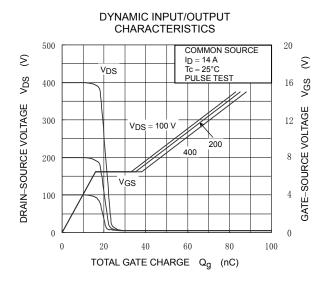


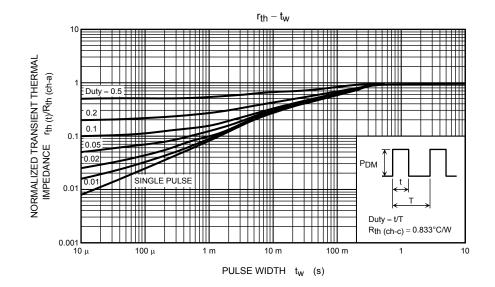


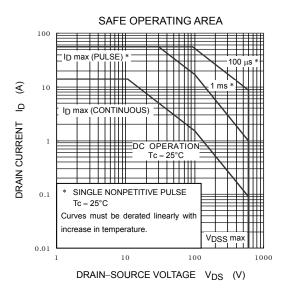


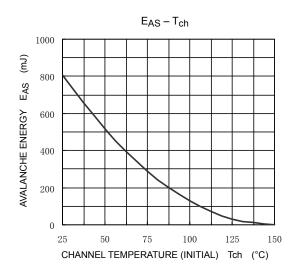


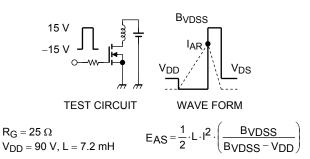












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