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

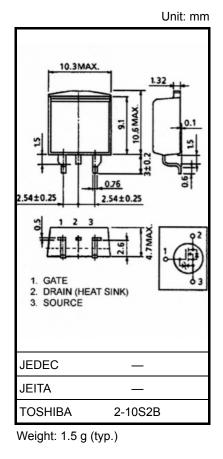
2SK3879

Switching Regulator Applications

- Low drain-source ON resistance: $RDS(ON) = 1.35 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 5.2 \text{ S (typ.)}$
- Low leakage current: $I_{DSS} = 100 \ \mu A \ (max) \ (V_{DS} = 640 \ V)$
- Enhancement model: $V_{th} = 2.0 \sim 4.0 \text{ V} (V_{DS} = 10 \text{ V}, \text{ID} = 1 \text{ mA})$

		_		
Characteristic		Symbol	Rating	Unit
Drain-source voltage		V _{DSS}	800	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V _{DGR}	800	V
Gate-source voltage		V _{GSS}	±30	V
Drain current	DC (Note	I) I _D	6.5	А
	Pulse (Note	I) I _{DP}	19.5	A
Drain power dissipation (Tc = 25° C)		PD	80	W
Single pulse avalanche energy (Note 2)		2) E _{AR}	375	mJ
Avalanche current		I _{AR}	6.5	А
Repetitive avalanche	e energy (Note	B) E _{AR}	8	mJ
Channel temperature	9	T _{ch}	150	°C
Storage temperature	range	T _{stg}	-55~150	°C

Absolute Maximum Ratings (Ta = 25°C)



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

Thermal Characteristics

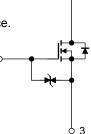
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	R _{th (ch-c)}	1.56	°C/W
Note 1: Ensure that the channel temp	erature does r	not exceed 15	0°C dur

Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 2: $V_{DD} = 90 \text{ V}, \text{ T}_{ch} = 25^{\circ}\text{C}$ (initial), L = 16.1 mH, R_G = 25 Ω , I_{AR} = 6.5 A

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

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



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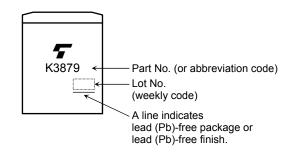
Electrical Characteristics (Ta = 25°C)

Char	acteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cur	rent	I _{GSS}	$V_{GS}=\pm 25~V,~V_{DS}=0~V$		_	±10	μA
Drain-source brea	akdown voltage	V (BR) GSS	$I_G=\pm 10~\mu A,~V_{DS}=0~V$		_	_	V
Drain cutoff curre	ent	I _{DSS}	$V_{DS} = 640 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$		_	100	μA
Drain-source brea	akdown voltage	V (BR) DSS	$I_D = 10$ mA, $V_{GS} = 0$ V	800	_	_	V
Gate threshold vo	oltage	V _{th}	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ mA}$	2.0	_	4.0	V
Drain-source ON	resistance	R _{DS (ON)}	$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$	_	1.35	1.7	Ω
Forward transfer	admittance	Y _{fs}	$V_{DS} = 20 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$	2.5	5.2	_	S
Input capacitance	e	C _{iss}		_	1500	_	pF
Reverse transfer	capacitance	C _{rss}	$V_{DS} = 25 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$	_	25	_	
Output capacitan	put capacitance C _{oss}		_	140	_		
Rise time Turn-on time Fall time Turn-off time	Rise time	tr	$U_{GS} = 3.5 \text{ A } V_{OUT}$	_	35		
	Turn-on time	ton			80		20
	Fall time	t _f			50		- ns
	Turn-off time	t _{off}		_	220		
Total gate charge (gate-source plus gate-drain) Gate-source charge Gate-drain ("Miller") charge		Qg			35		
		Q _{gs}	$V_{DD} \simeq 400 \text{ V}, \text{ V}_{GS} = 10 \text{ V}, \text{ I}_{D} = 6.5 \text{ A}$		22		nC
		Q _{gd}			13		

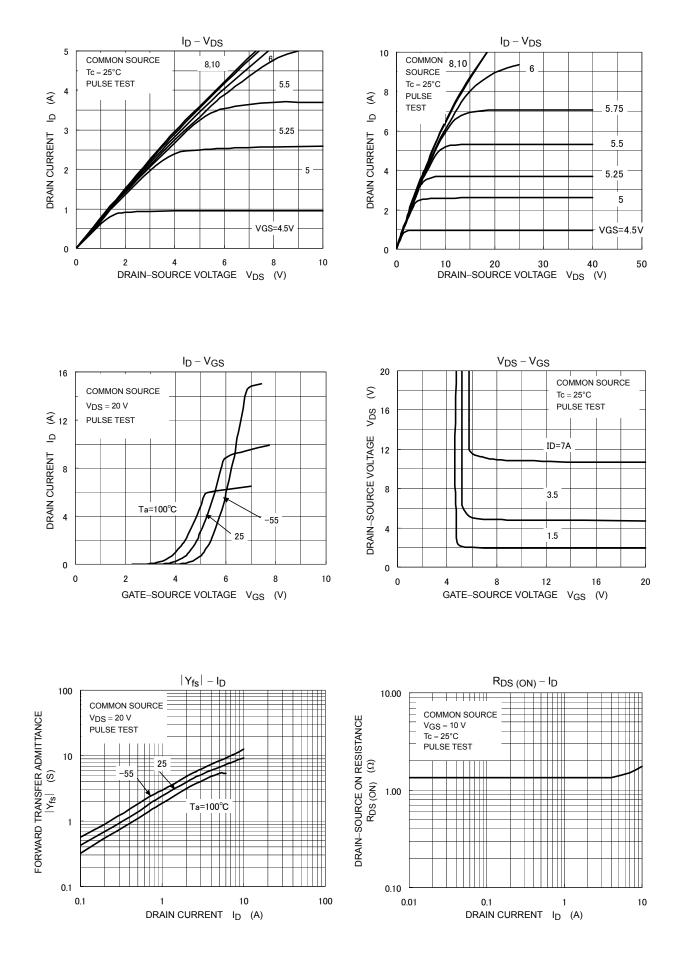
Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	_	_	6.5	А
Pulse drain reverse current (Note 1)	I _{DRP}	—		_	19.5	А
Forward voltage (diode)	V _{DSF}	I _{DR} = 6.5 A, V _{GS} = 0 V	_	_	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 6.5 A, V _{GS} = 0 V,	_	1200	_	ns
Reverse recovery charge	Q _{rr}	dI _{DR} /dt = 100 A/μs	_	11.5	_	μC

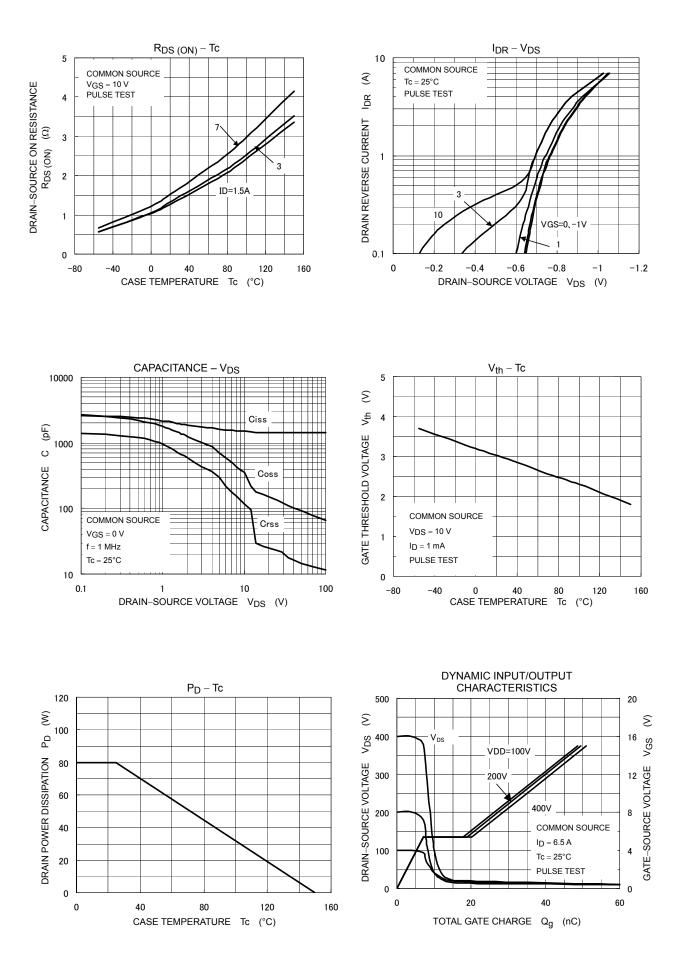
Marking

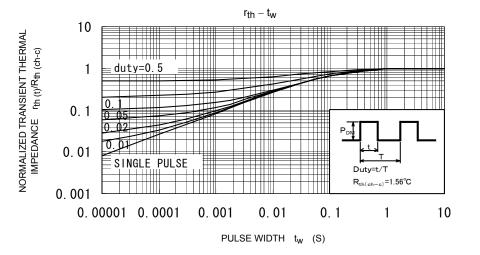


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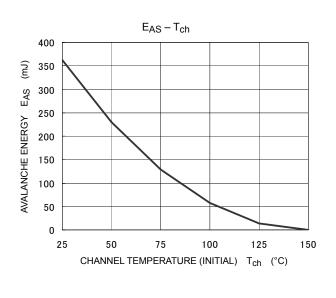


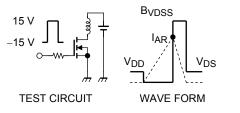
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SAFE OPERATING AREA 100 MAX (PULSED) * 100 μs 10 MAX (CONTINUOUS) € DRAIN CURRENT ID 1 ms 1 Ŧ DC OPERATION Tc = 25° 0.1 * SINGLE NONREPETITIVE PULSE Tc = 25°C Curves must be derated linearly with increase in temperature V_{DSS} MAX 0.01 10 100 DRAIN-SOURCE VOLTAGE V_{DS} (V) 1 1000





$R_G = 25 \Omega$	$EAS = \frac{1}{2} \cdot L \cdot l^2 \cdot ($	
V _{DD} = 90 V, L = 16.1 mH		(BVDSS-VDD)

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20070701-EN

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