Unit: mm

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

2SK3131

Chopper Regulator DC-DC Converter and Motor Drive **Applications**

 $t_{rr} = 105 \text{ ns (typ.)}$ Fast reverse recovery time

Built-in high-speed free-wheeling diode

Enhancement mode

• Low drain-source ON resistance : R_{DS} (ON) = 0.085 Ω (typ.)

 $|Y_{fs}| = 35 \text{ S (typ.)}$ High forward transfer admittance $: I_{DSS} = 100 \,\mu A \,(max) \,(V_{DS} = 500 \,V)$ Low leakage current : $V_{th} = 2.4 \sim 3.4 \text{ V (V}_{DS} = 10 \text{ V, I}_{D} = 1 \text{ mA)}$

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Drain-source voltage		V_{DSS}	500	V	
Drain-gate voltage (R _{GS} = 20 kΩ)		V_{DGR}	500	V	
Gate-source voltage		V_{GSS}	±30	V	
DC Drain current	DC (Note 1)	ΙD	50	Α	
	Pulse (Note 1)	I_{DP}	200	Α	
Drain power dissipation	n (Tc = 25°C)	P_{D}	250	W	
Single pulse avalanche energy (Note 2)		E _{AS}	525	mJ	
Avalanche current		I _{AR}	50	Α	
Repetitive avalanche energy (Note 3)		E _{AR}	25	mJ	
Channel temperature		T _{ch}	150	°C	
Storage temperature range		T _{stg}	-55~150	°C	

ه 3.3 ± 0.2 5.45 ± 0.15 5.45 ± 0.15

Weight: 9.75 g (typ.)

1.GATE

JEDEC JEITA **TOSHIBA**

2.DRAIN (heat sink) 3.SOURCE

2-21F1B

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)}	0.5	°C / W
Thermal resistance, channel to ambient	R _{th (ch-a)}	35.7	°C / W

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

Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^{\circ}\text{C}$ (initial), $L = 357 \mu\text{H}$, $R_G = 25 \Omega$, $I_{AR} = 50 \text{ A}$

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

This transistor is an electrostatic-sensitive device.

Please handle with caution.

2SK3131



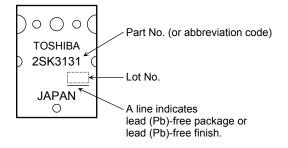
Electrical Characteristics (Ta = 25°C)

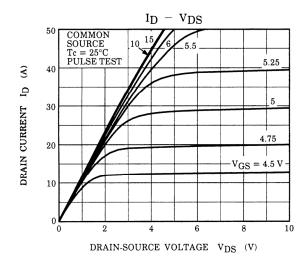
Charac	cteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Gate leakage cu	ırrent	I _{GSS}	V _{GS} = ±25 V, V _{DS} = 0 V	_	_	±10	μΑ
Gate-source bre	eakdown voltage	V (BR) GSS	I _G = ±100 μA, V _{DS} = 0 V	±30	_	_	V
Drain cut-off cu	rrent	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	_	_	100	μA
Drain-source br	eakdown voltage	V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	500	_	_	V
Gate threshold v	oltage/	V_{th}	V _{DS} = 10 V, I _D = 1 mA	2.4	_	3.4	V
Drain-source O	N resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 25 A	_	0.085	0.11	Ω
Forward transfer	r admittance	Y _{fs}	V _{DS} = 10 V, I _D = 25 A	15	35	_	S
Input capacitano	e	C _{iss}			11000	_	
Reverse transfe	r capacitance	C _{rss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	_	2100	_	pF
Output capacitance		C _{oss}			4200		
Switching time	Rise time	tr	V_{GS} V_{GS} V_{OV} V_{DD} V_{DD} V_{DD}	_	105	_	
	Turn-on time	t _{on}		_	160	_	ne
	Fall time	t _f		l	65	I	ns
	Turn-off time	t _{off}	Duty $\leq 1\%$, $t_{\rm w} = 10 \mu \rm s$	_	245	_	
Total gate charge (Gate-source plus gate-drain)		Qg			280		
Gate-source charge		Q _{gs}	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 50 \text{ A}$		150	_	nC
Gate-drain ("miller") charge		Q _{gd}			130	_	

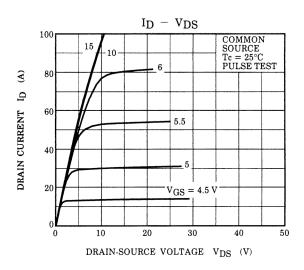
Source-Drain Ratings and Characteristics (Ta = 25°C)

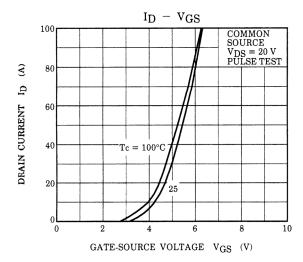
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	_	_	_	50	Α
Pulse drain reverse current (Note 1)	I _{DRP}	_	_	_	200	Α
Forward voltage (diode)	V _{DSF}	V _{DR} = 25 A, V _{GS} = 0 V	_	_	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 50 A, V _{GS} = 0 V		105		ns
Reverse recovery charge	Q _{rr}	dI _{DR} / dt = 100 A / μs		380	_	nC

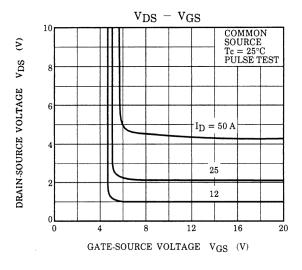
Marking

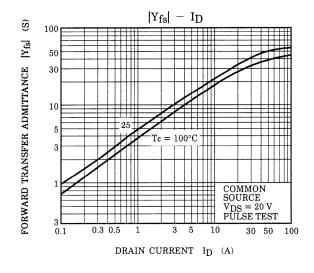


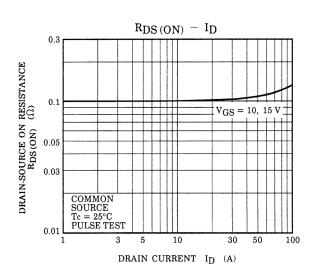


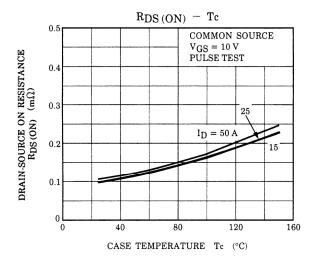


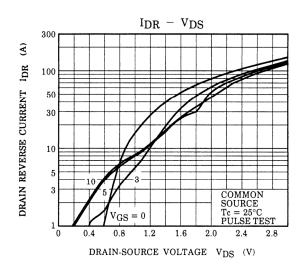


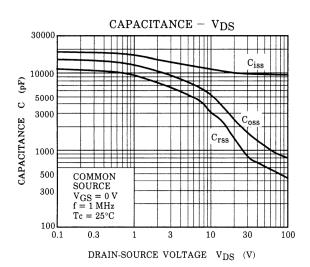


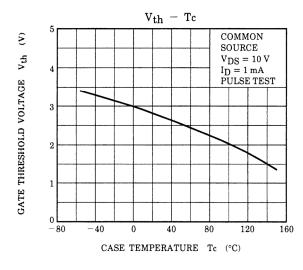


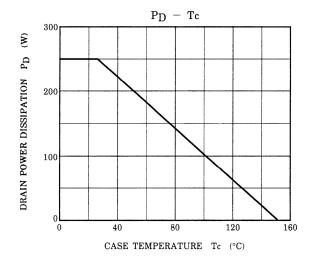


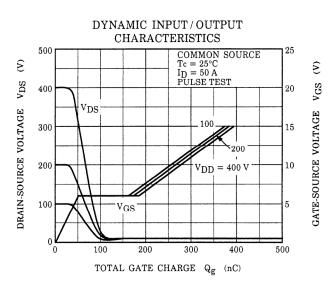


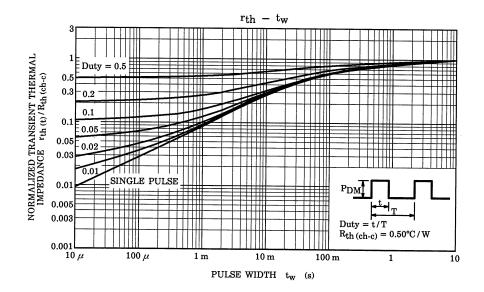


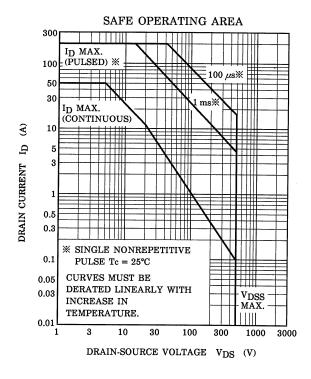


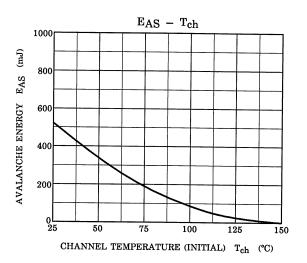


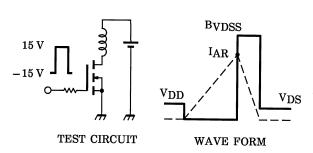












$$R_G$$
 = 25 Ω
 V_{DD} = 90 V, L = 357 μ H

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

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20070701-EN

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