

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π-MOSII<sup>5</sup>)

# 2SK1930

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

Unit: mm

- Low drain-source ON resistance :  $R_{DS(ON)} = 3.0 \Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 2.0 S$  (typ.)
- Low leakage current :  $I_{DSS} = 300 \mu A$  (max) ( $V_{DS} = 800 V$ )
- Enhancement mode :  $V_{th} = 1.5 \sim 3.5 V$  ( $V_{DS} = 10 V, I_D = 1 mA$ )

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	1000	V
Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )		$V_{DGR}$	1000	V
Gate-source voltage		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	4	A
	Pulse (Note 1)	$I_{DP}$	12	
Drain power dissipation ( $T_c = 25^\circ C$ )		$P_D$	100	W
Channel temperature		$T_{ch}$	150	°C
Storage temperature range		$T_{stg}$	-55~150	°C

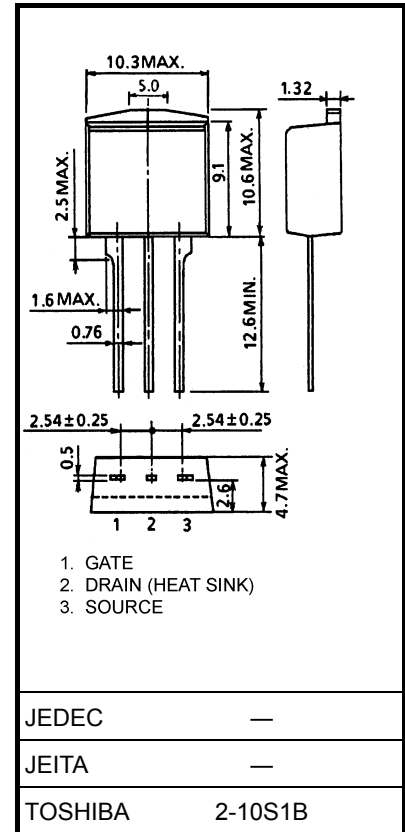
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Thermal Characteristics

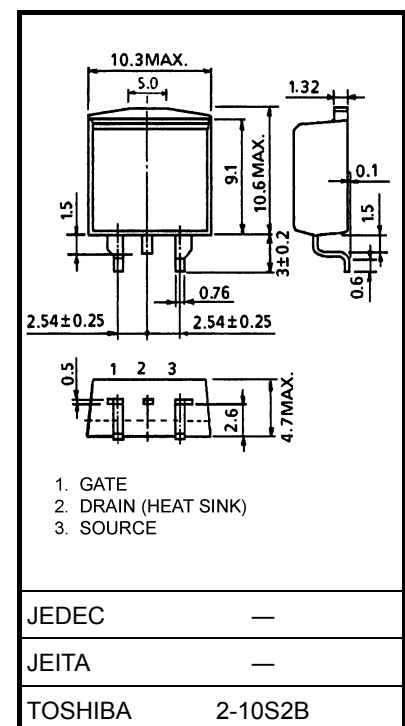
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.25	°C / W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	°C / W

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

This transistor is an electrostatic-sensitive device.  
Please handle with caution.



Weight: 1.5 g (typ.)



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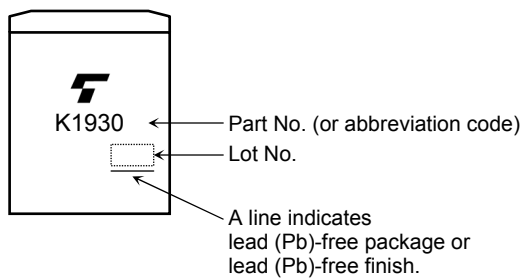
## Electrical Characteristics (Ta = 25°C)

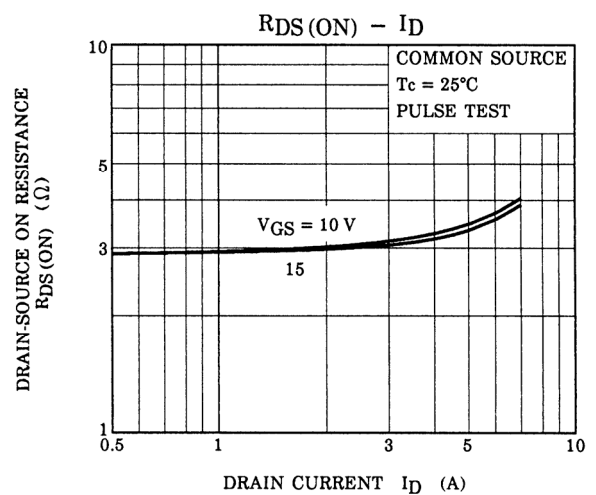
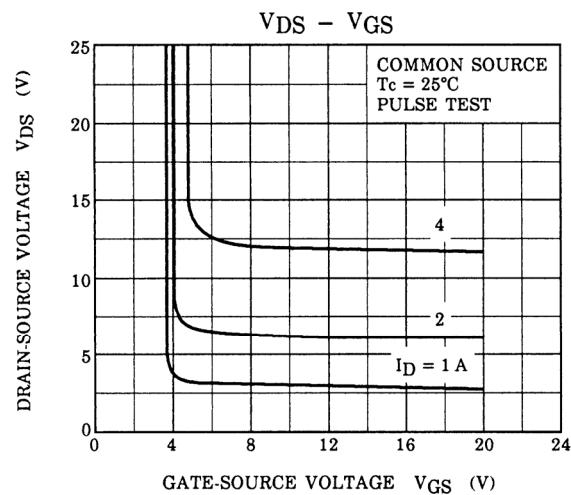
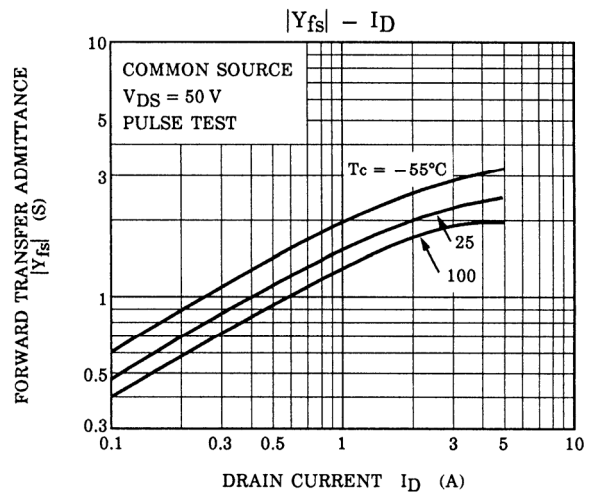
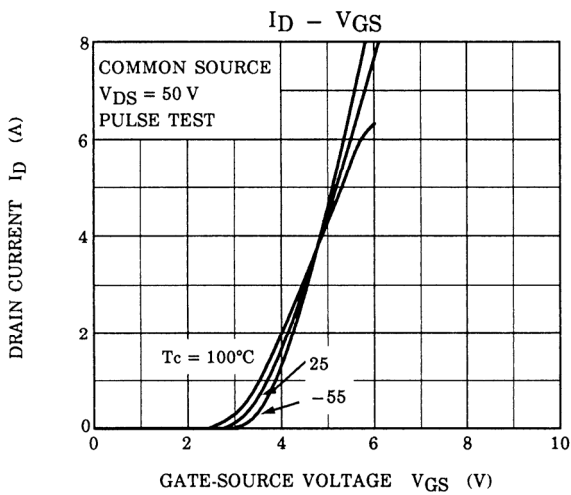
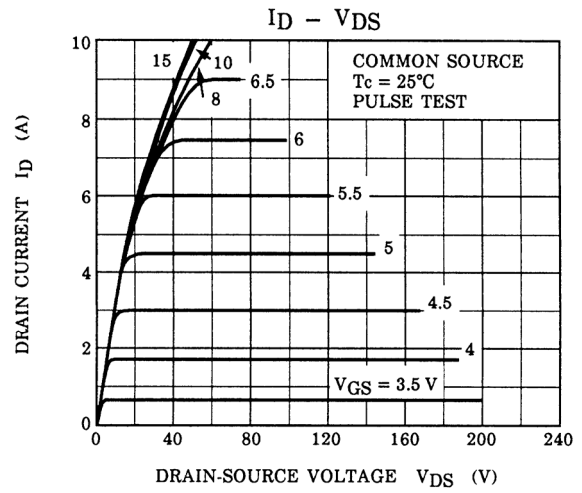
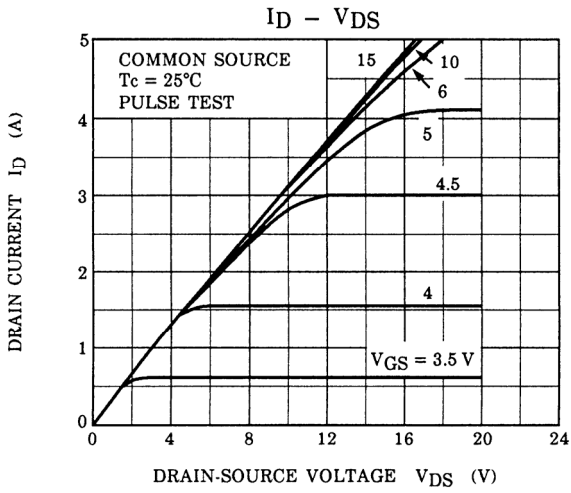
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 100$	nA
Drain cut-off current		$I_{DSS}$	$V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	—	—	300	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	1000	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	—	3.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 2\text{ A}$	—	3.0	3.8	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 20\text{ V}, I_D = 2\text{ A}$	1.0	2.0	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	700	—	pF
Reverse transfer capacitance		$C_{rss}$		—	55	—	
Output capacitance		$C_{oss}$		—	100	—	
Switching time	Rise time	$t_r$	<p><math>I_D = 2\text{ A}</math> <math>V_{GS} = 10\text{ V}, 0\text{ V}</math> <math>R_L = 200\ \Omega</math> <math>V_{DD} \approx 400\text{ V}</math> Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	18	—	ns
	Turn-on time	$t_{on}$		—	30	—	
	Fall time	$t_f$		—	12	—	
	Turn-off time	$t_{off}$		—	70	—	
Total gate charge (Gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 4\text{ A}$	—	60	—	nC
Gate-source charge		$Q_{gs}$		—	35	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	25	—	

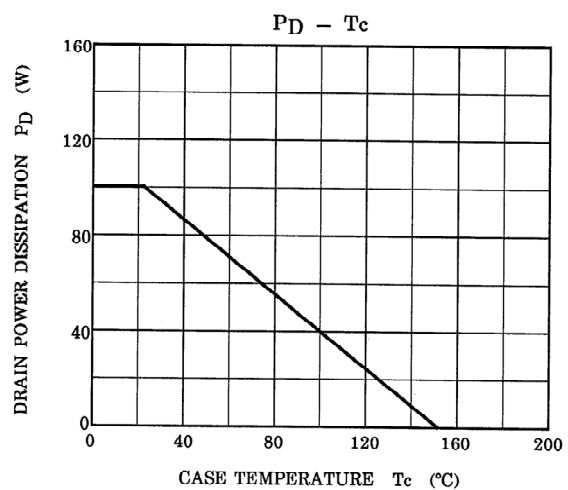
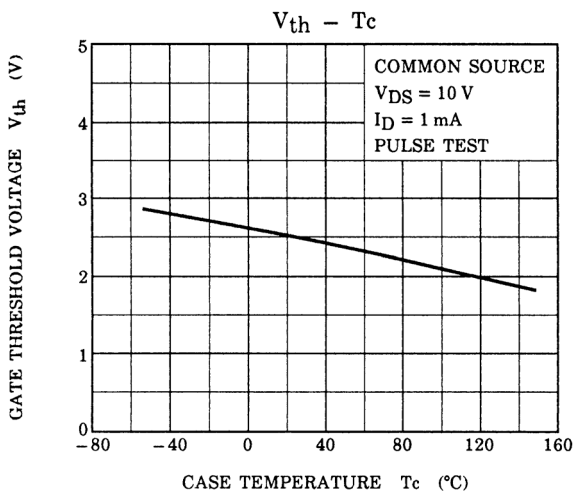
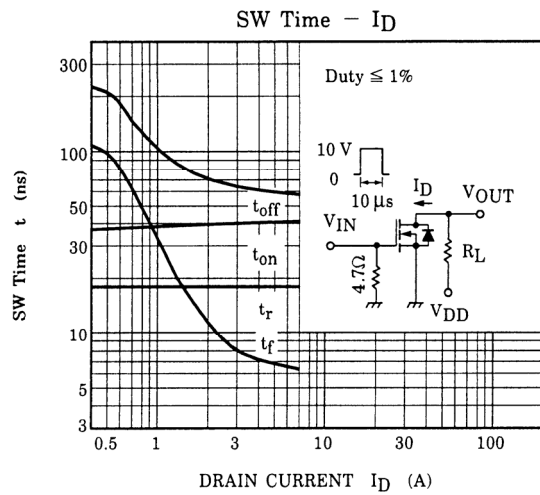
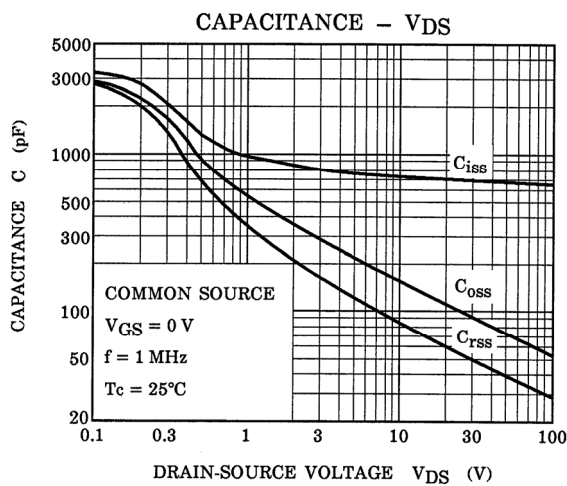
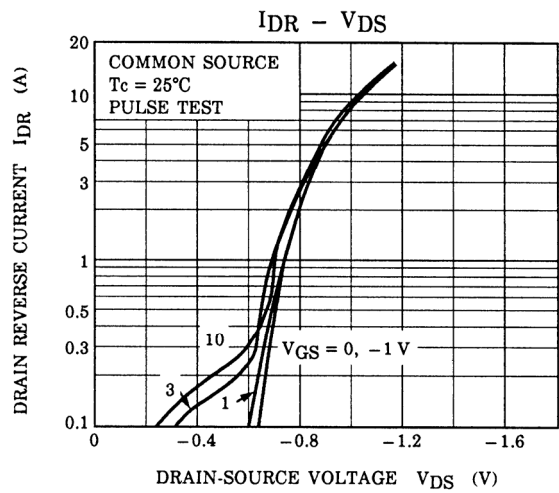
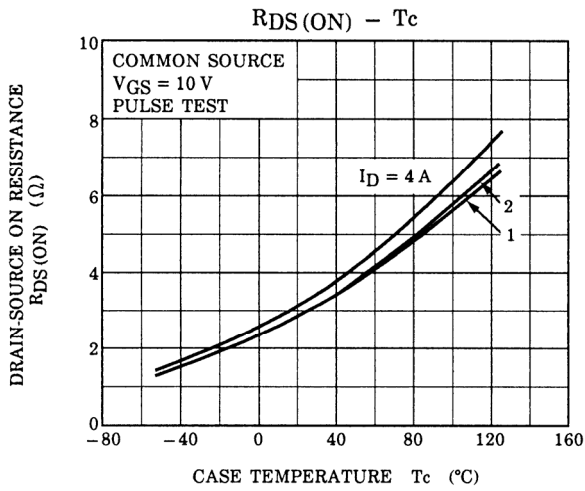
## Source-Drain Ratings and Characteristics (Ta = 25°C)

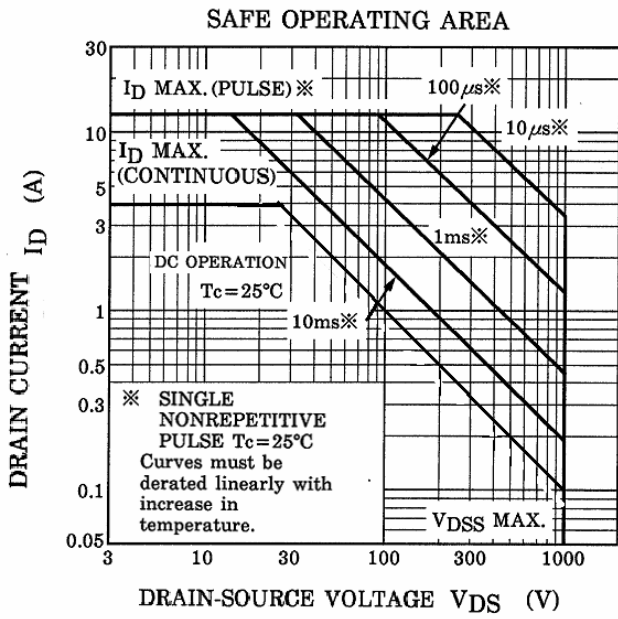
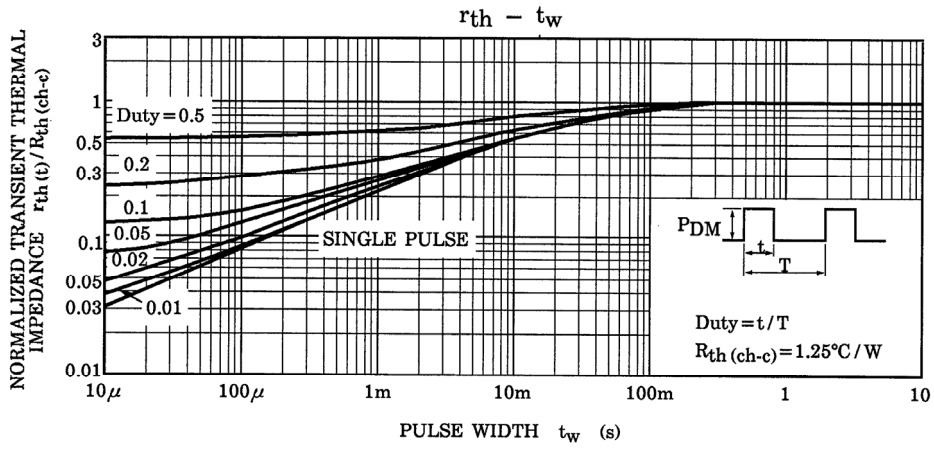
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	4	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	12	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 4\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.9	V

## Marking









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