

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π -MOSV)

2SK3131

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- Fast Reverse Recovery Time : $t_{rr} = 105$ ns (Typ.)
- Built-in High-Speed Free-Wheeling Diode
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.085$ Ω (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 35$ S (Typ.)
- Low Leakage Current: $I_{DSS} = 100$ μ A (Max.) ($V_{DS} = 500$ V)
- Enhancement-Mode : $V_{th} = 2.4 \sim 3.4$ V ($V_{DS} = 10$ V, $I_D = 1$ mA)

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	500	V
Drain-Gate Voltage ($R_{GS} = 20$ k Ω)	V_{DGR}	500	V
Gate-Source Voltage	V_{GSS}	± 30	V
DC Drain Current	DC I_D	50	A
	Pulse I_{DP}	200	A
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)	P_D	250	W
Single Pulse Avalanche Energy**	E_{AS}	525	mJ
Avalanche Current	I_{AR}	50	A
Repetitive Avalanche Energy*	E_{AR}	25	mJ
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55~150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	0.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	35.7	$^\circ\text{C}/\text{W}$

Note :

* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD} = 90$ V, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 357$ μ H, $R_G = 25$ Ω , $I_{AR} = 50$ A

This transistor is an electrostatic sensitive device.

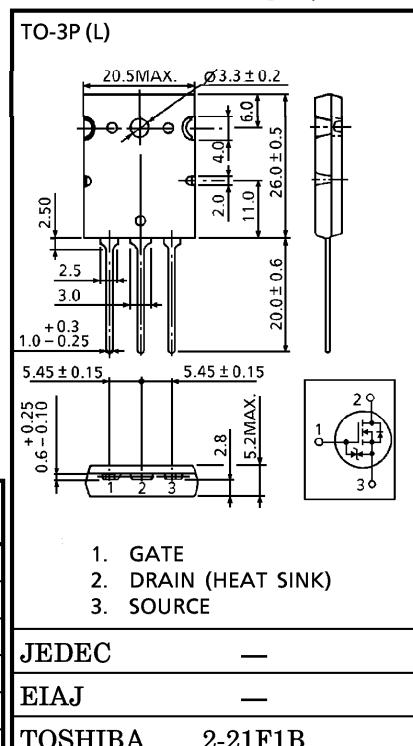
Please handle with caution.

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INDUSTRIAL APPLICATIONS

Unit in mm



JEDEC —

EIAJ —

TOSHIBA 2-21F1B

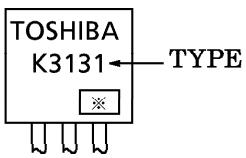
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 25 \text{ V}$, $V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Gate-Source Breakdown Voltage	$V_{(\text{BR})\text{GSS}}$	$I_G = \pm 100 \mu\text{A}$, $V_{DS} = 0 \text{ V}$	± 30	—	—	V
Drain Cut-off Current	I_{DSS}	$V_{DS} = 500 \text{ V}$, $V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10 \text{ mA}$, $V_{GS} = 0 \text{ V}$	500	—	—	V
Gate Threshold Voltage	V_{th}	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$	2.4	—	3.4	V
Drain-Source ON Resistance	$R_{DS(\text{ON})}$	$V_{GS} = 10 \text{ V}$, $I_D = 25 \text{ A}$	—	0.085	0.11	Ω
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}$, $I_D = 25 \text{ A}$	15	35	—	S
Input Capacitance	C_{iss}	$V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	—	11000	—	pF
Reverse Transfer Capacitance	C_{rss}		—	2100	—	
Output Capacitance	C_{oss}		—	4200	—	
Switching Time	Rise Time	t_r		—	105	—
	Turn-on Time	t_{on}		—	160	—
	Fall Time	t_f		—	65	—
	Turn-off Time	t_{off}		—	245	—
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	$V_{DD} = 400 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 50 \text{ A}$	—	280	—	nC
Gate-Source Charge	Q_{gs}		—	150	—	
Gate-Drain ("Miller") Charge	Q_{gd}		—	130	—	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	50	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	200	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 25 \text{ A}$, $V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 50 \text{ A}$, $V_{GS} = 0 \text{ V}$	—	105	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	380	—	nC

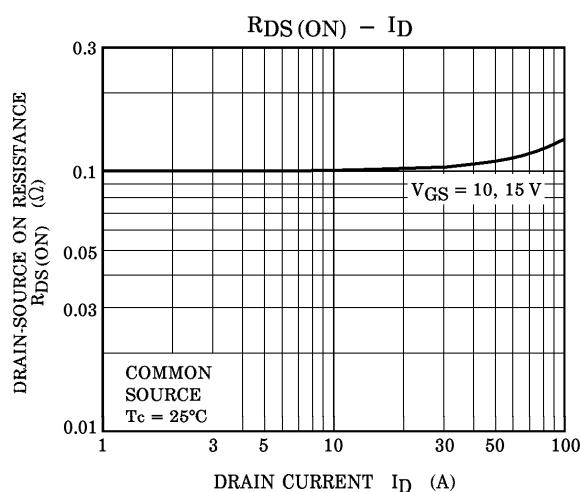
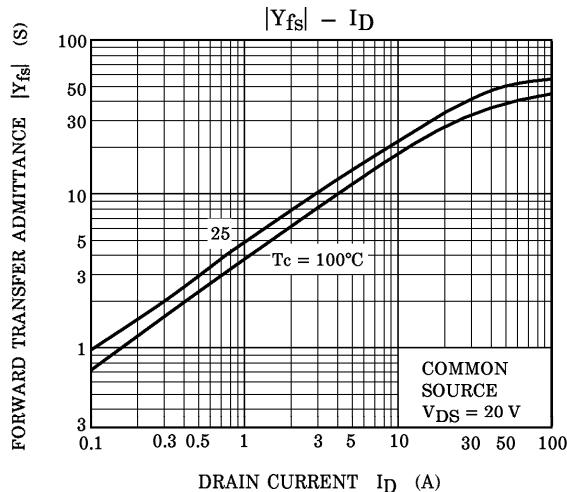
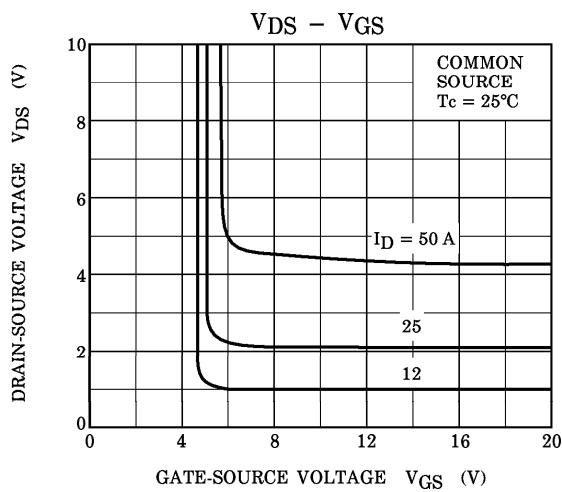
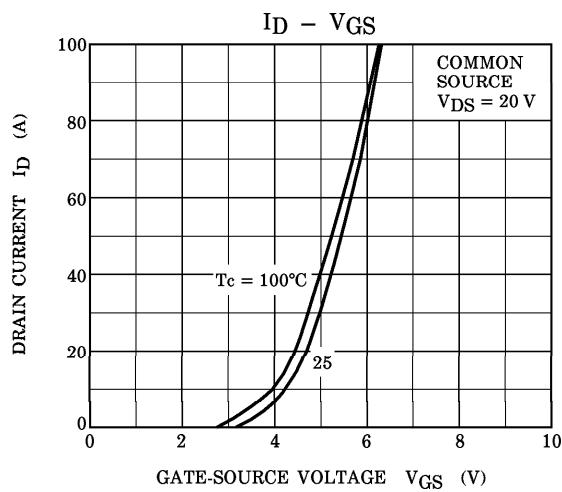
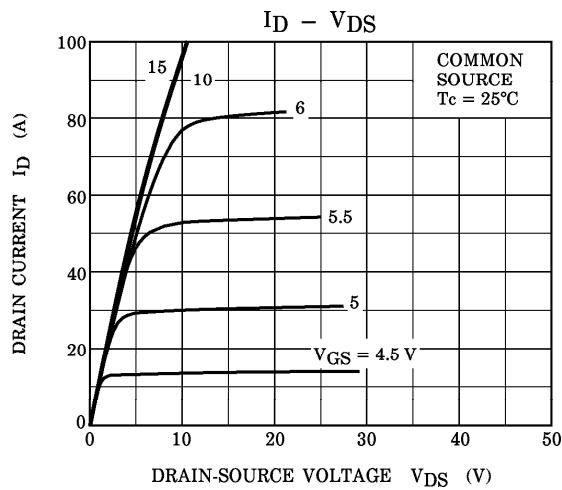
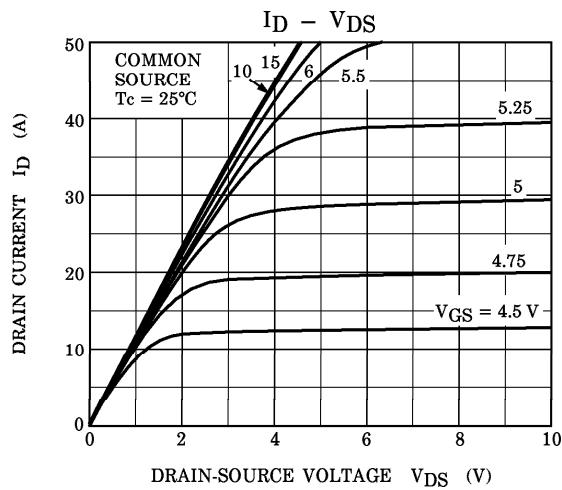
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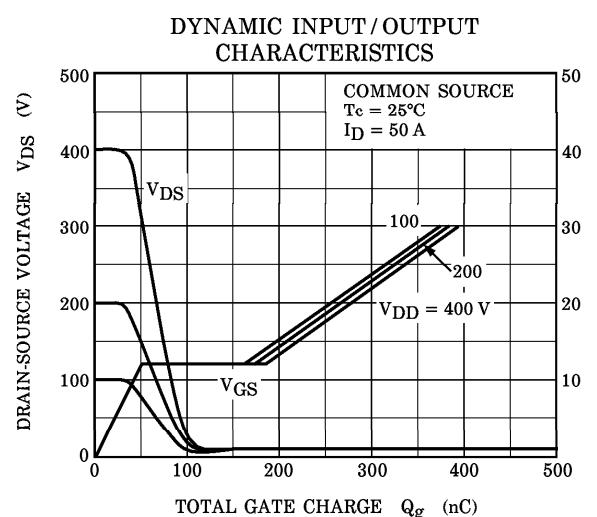
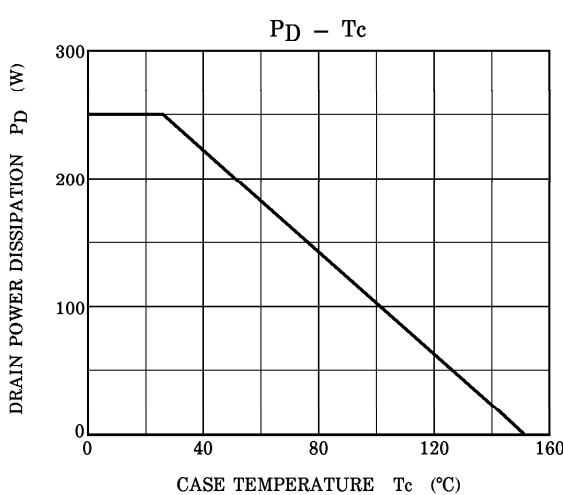
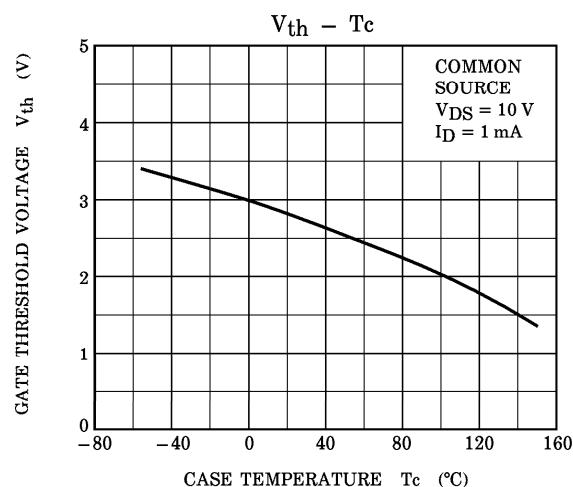
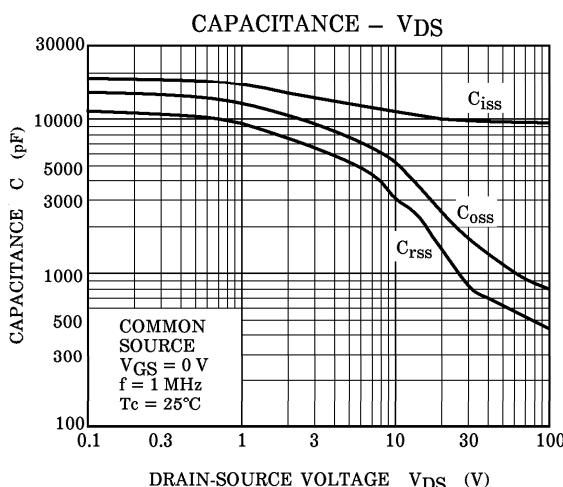
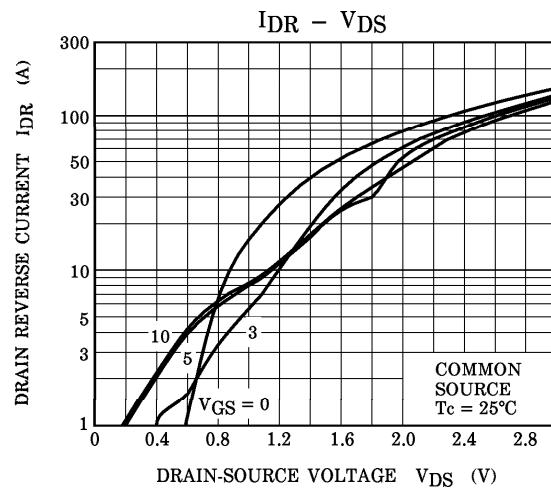
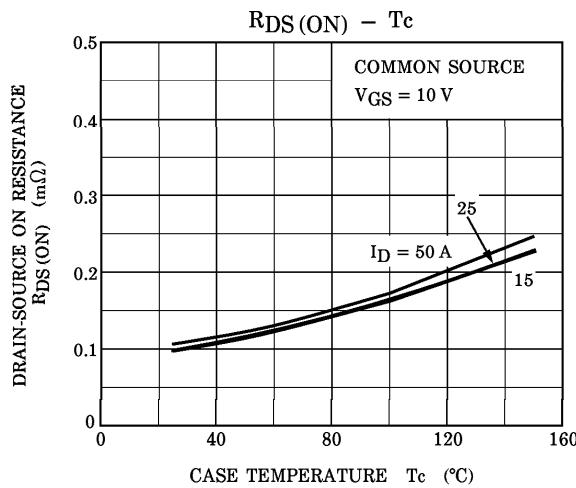


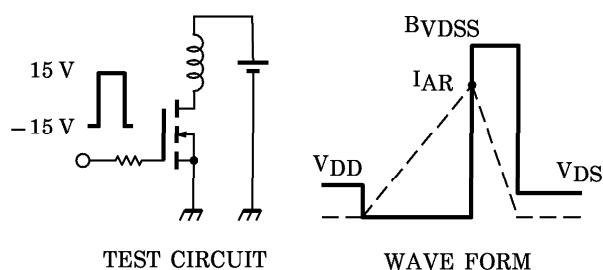
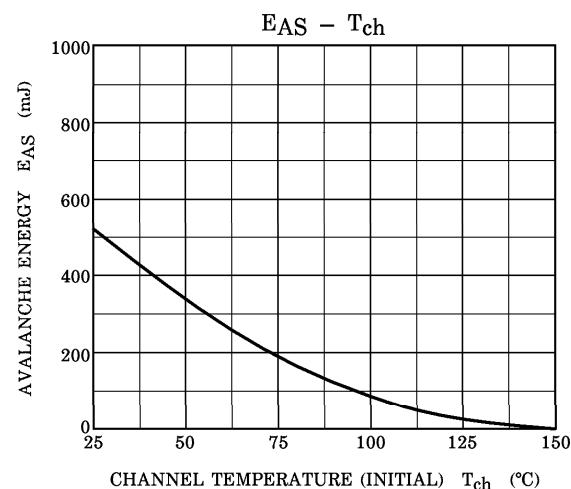
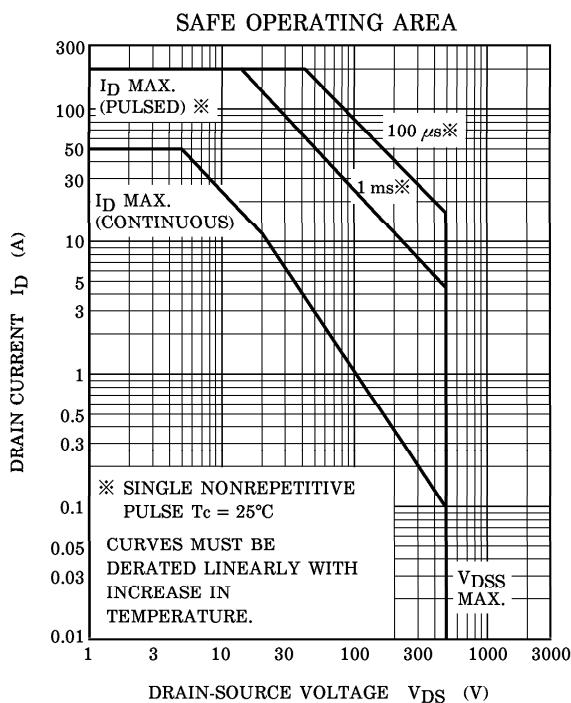
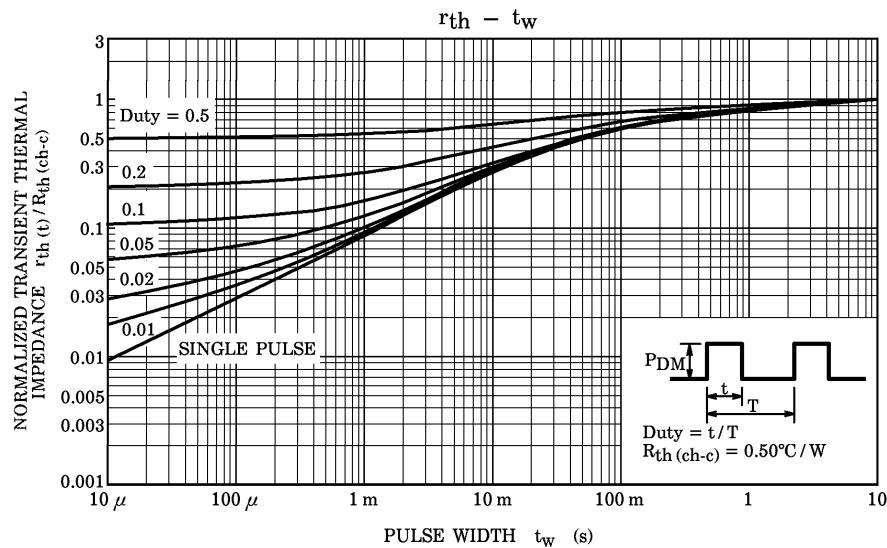
※ Lot Number

 Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)







Peak $I_{AR} = 50 \text{ A}$, $R_G = 25 \Omega$ $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$

$V_{DD} = 90 \text{ V}$, $L = 357 \mu\text{H}$