

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L^2 - π -MOSV)

2SK2231

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.12 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 5.0 \text{ S}$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu\text{A}$ (Max.) ($V_{DS} = 60 \text{ V}$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	5
	Pulse	I_{DP}	20
Drain Power Dissipation ($T_c = 25^\circ\text{C}$)	P_D	20	W
Single Pulse Avalanche Energy**	E_{AS}	129	mJ
Avalanche Current	I_{AR}	5	A
Repetitive Avalanche Energy*	E_{AR}	2	mJ
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Case	$R_{th(ch-c)}$	6.25	$^\circ\text{C/W}$
Thermal Resistance, Channel To Ambient	$R_{th(ch-a)}$	125	$^\circ\text{C/W}$

Note ;

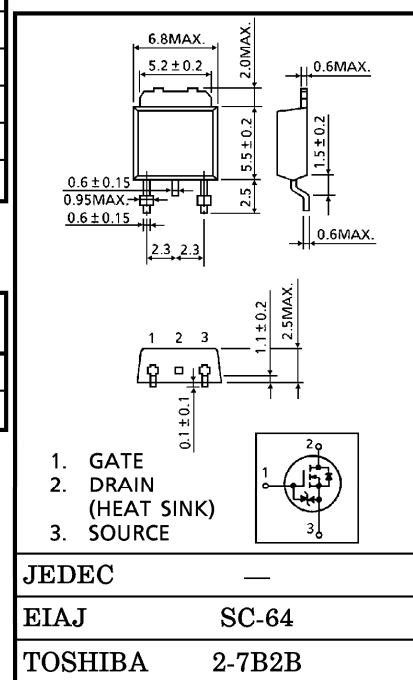
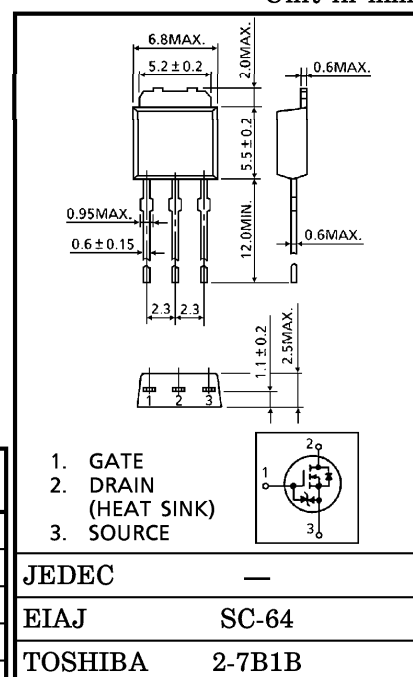
* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 7 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 5 \text{ A}$

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

INDUSTRIAL APPLICATIONS

Unit in mm

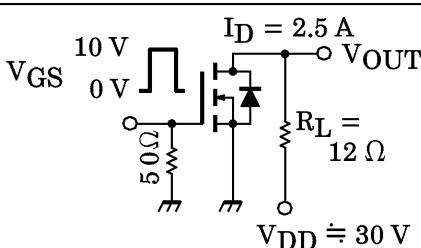


Weight : 0.36 g

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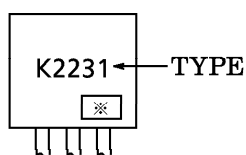
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain Cut-off Current		I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V	—	—	100	μA
Drain-Source Breakdown Voltage		V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	60	—	—	V
Gate Threshold Voltage		V _{th}	V _{DS} = 10 V, I _D = 1 mA	0.8	—	2.0	V
Drain-Source ON Resistance		R _{DS (ON)}	V _{GS} = 4 V, I _D = 1.3 A	—	0.20	0.30	Ω
			V _{GS} = 10 V, I _D = 2.5 A	—	0.12	0.16	
Forward Transfer Admittance		Y _{fs}	V _{DS} = 10 V, I _D = 2.5 A	3.0	5.0	—	S
Input Capacitance		C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V f = 1 MHz	—	370	—	pF
Reverse Transfer Capacitance		C _{rss}		—	60	—	
Output Capacitance		C _{oss}		—	180	—	
Switching Time	Rise Time	t _r		—	18	—	ns
	Turn-on Time	t _{on}		—	25	—	
	Fall Time	t _f		—	55	—	
	Turn-off Time	t _{off}		—	170	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q _g	V _{DD} ≈ 48 V, V _{GS} = 10 V I _D = 5 A	—	12	—	nC
Gate-Source Charge		Q _{gs}		—	8	—	
Gate-Drain (“Miller”) Charge		Q _{gd}		—	4	—	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	5	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	20	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	—1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	70	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$	—	0.1	—	μC

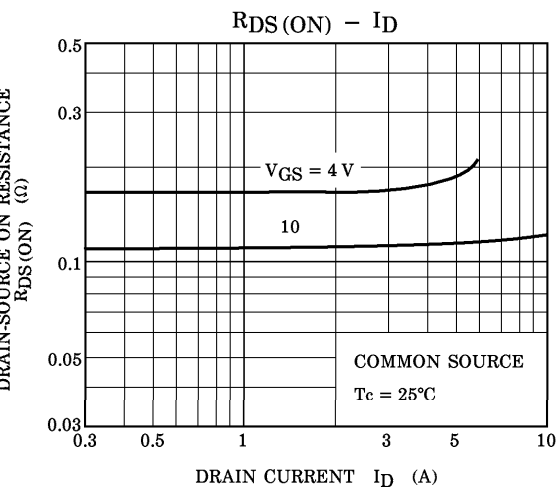
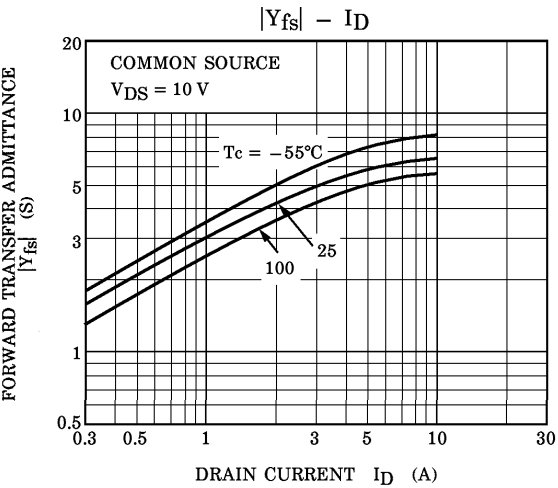
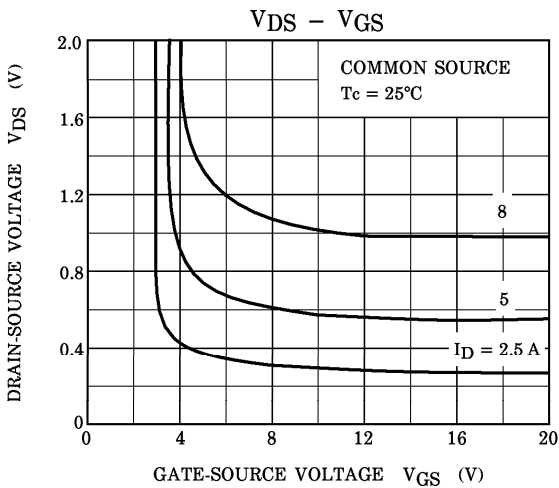
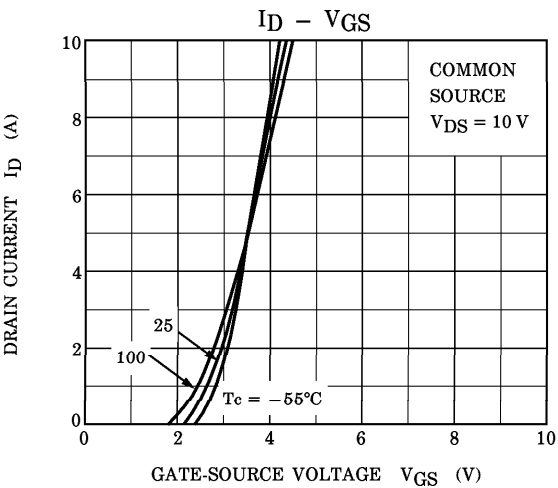
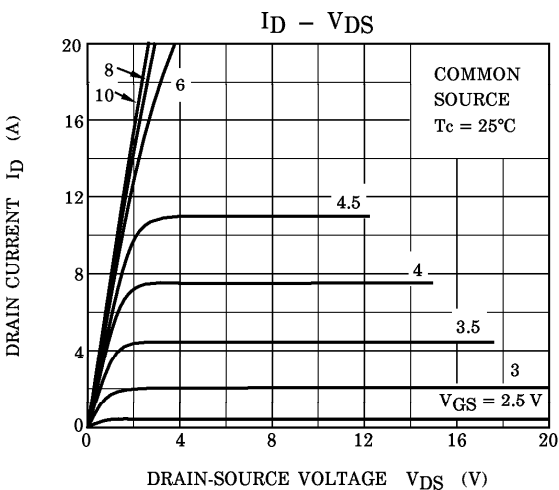
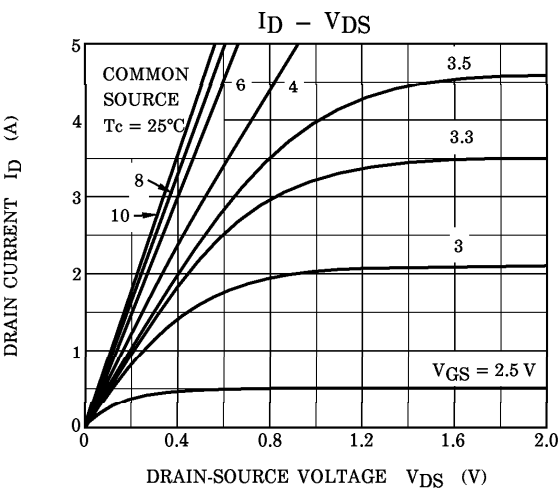
MARKING

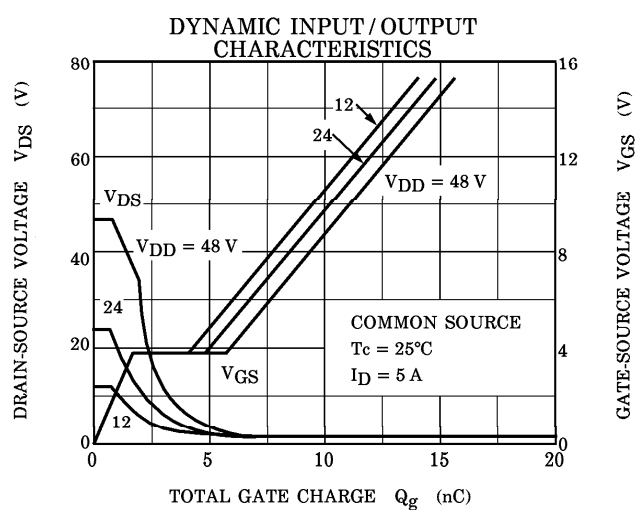
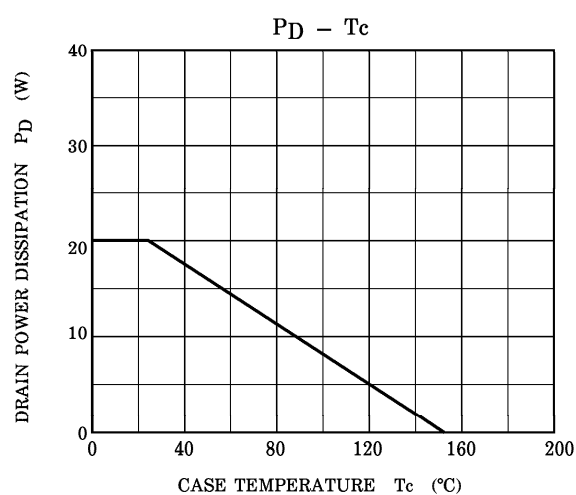
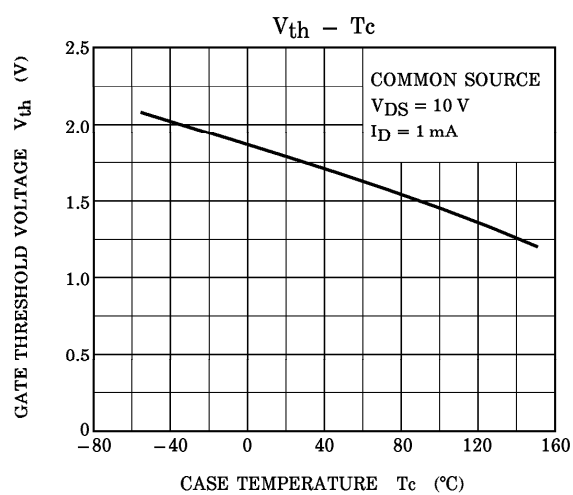
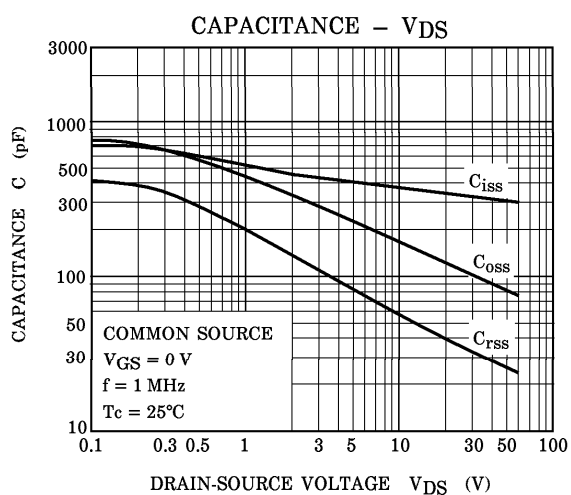
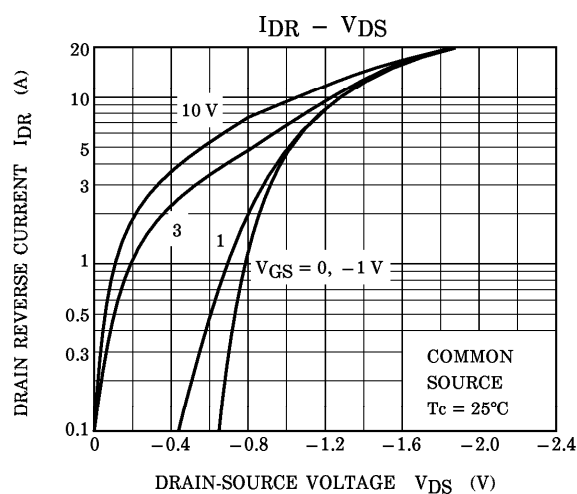
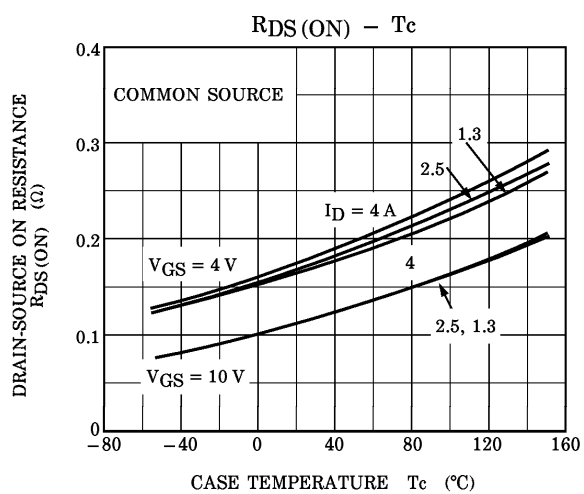


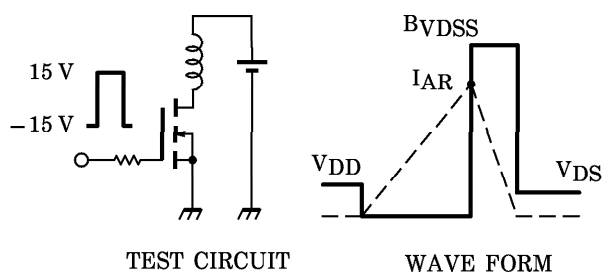
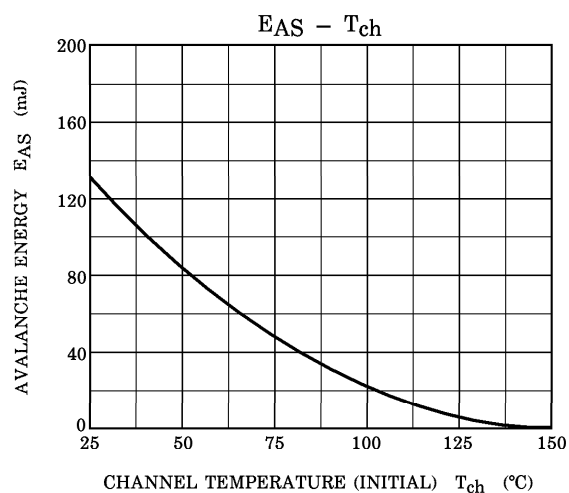
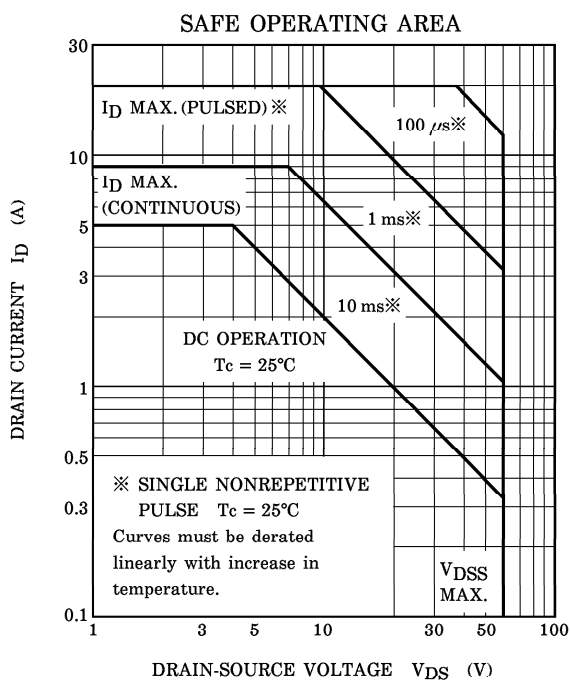
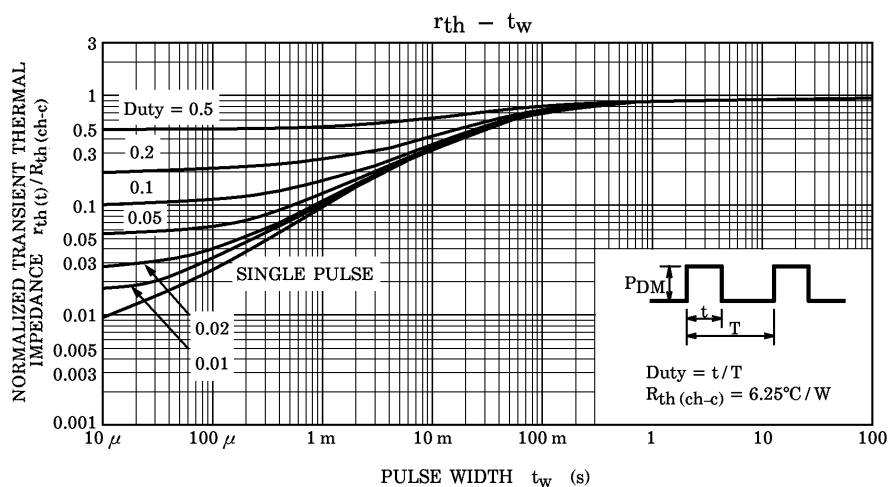
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak $I_{AR} = 5 \text{ A}$, $R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}$, $L = 7 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$