

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L²-π-MOSV)

2SK2231

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

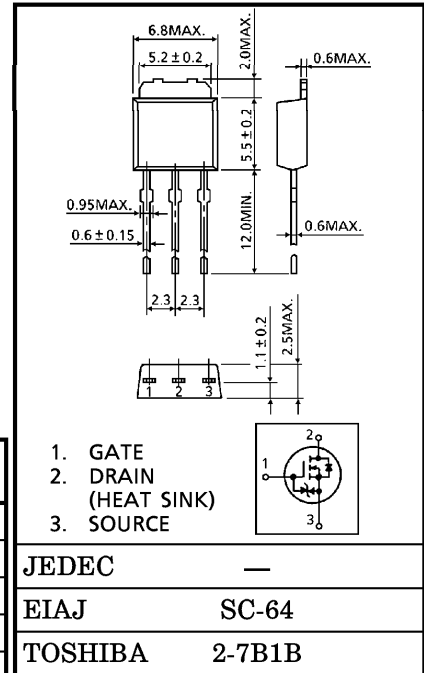
INDUSTRIAL APPLICATIONS

Unit in mm

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

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	60	V
Gate-Source Voltage	V_{GSS}	± 20	V
Drain Current	DC	I_D	5 A
	Pulse	I_{DP}	20 A
Drain Power Dissipation ($T_c = 25^\circ C$)	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	°C
Storage Temperature Range	T_{stg}	-55~150	°C



THERMAL CHARACTERISTICS

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

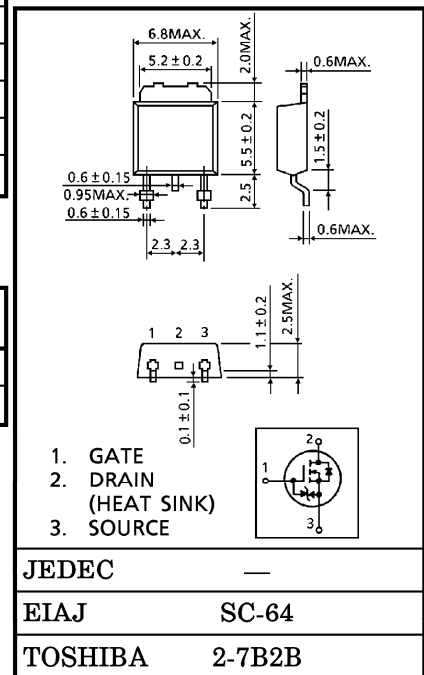
Note ;

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

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

This transistor is an electrostatic sensitive device.

Please handle with caution.

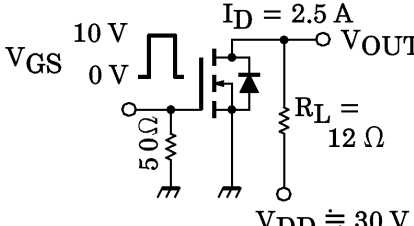


Weight : 0.36 g

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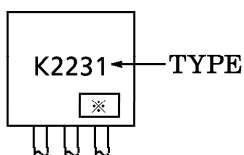
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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}		V _{IN} : t _r , t _f < 5 ns, Duty ≤ 1%, t _w = 10 μs	—	170	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q _g	V _{DD} ≐ 48 V, V _{GS} = 10 V	—	12	—	nC	
Gate-Source Charge	Q _{gs}	I _D = 5 A	—	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 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse Recovery Time	t _{rr}	I _{DR} = 5 A, V _{GS} = 0 V	—	70	—	ns
Reverse Recovery Charge	Q _{rr}	dI _{DR} /dt = 50 A/μs	—	0.1	—	μC

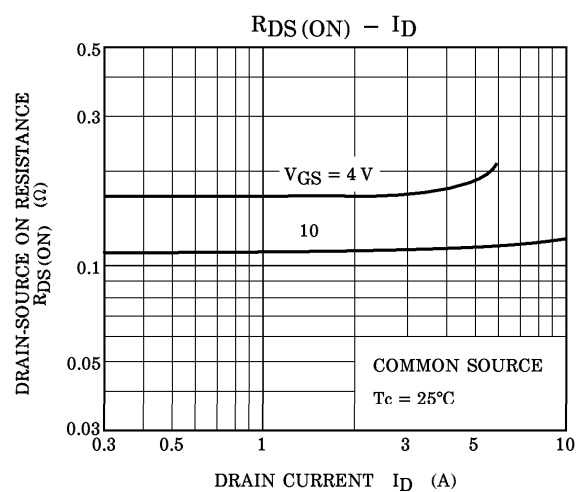
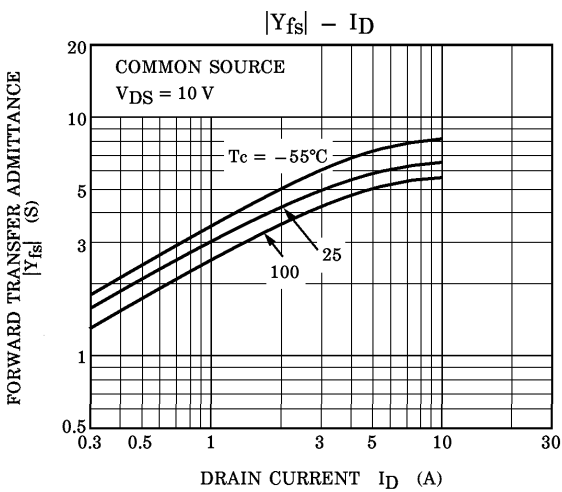
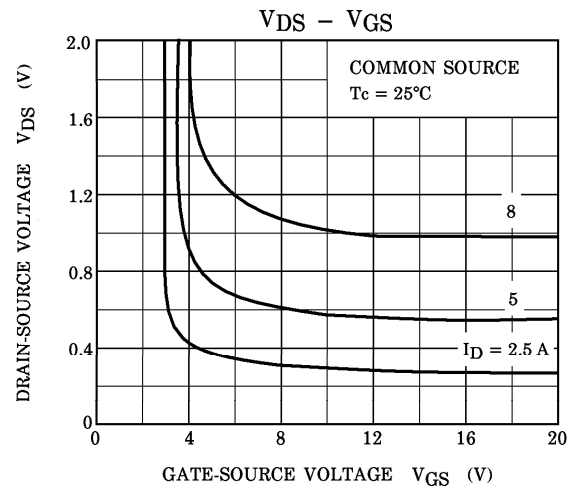
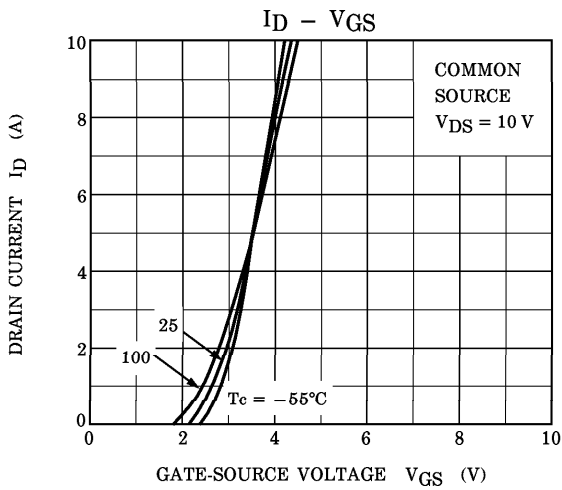
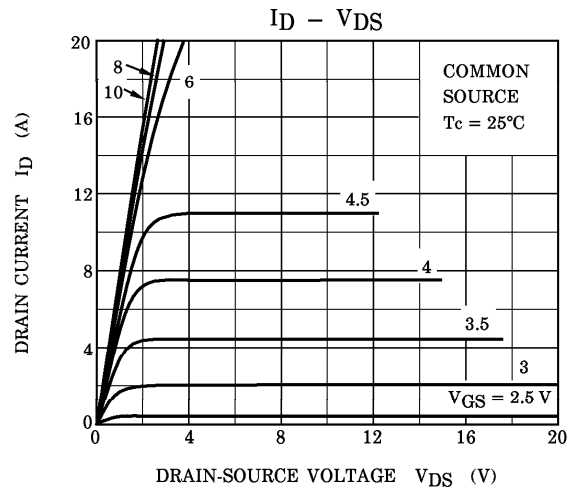
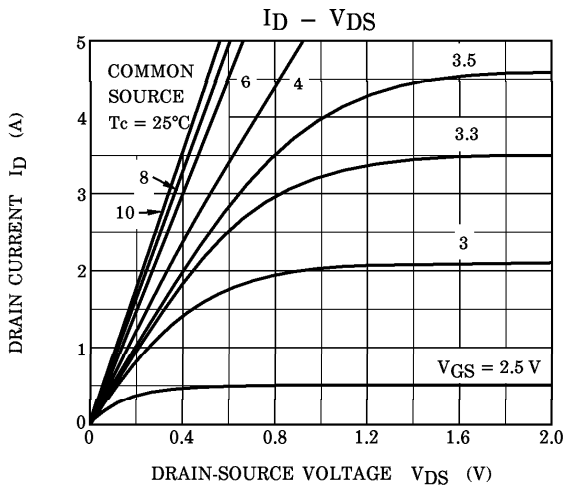
MARKING

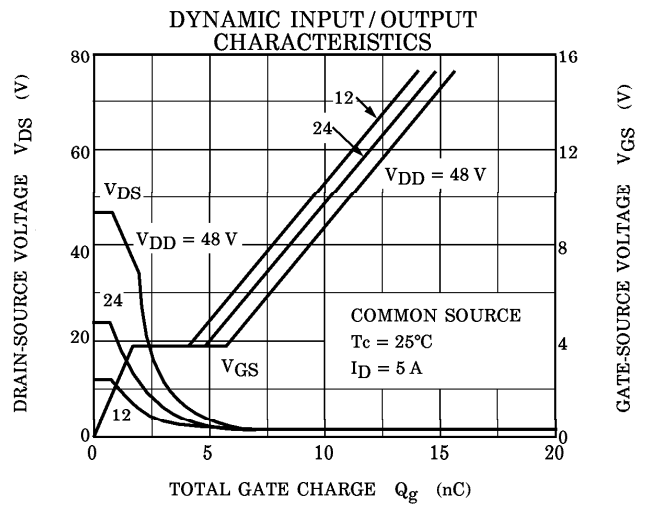
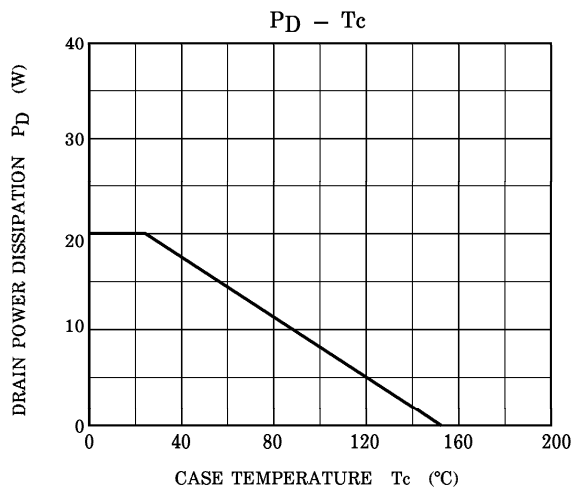
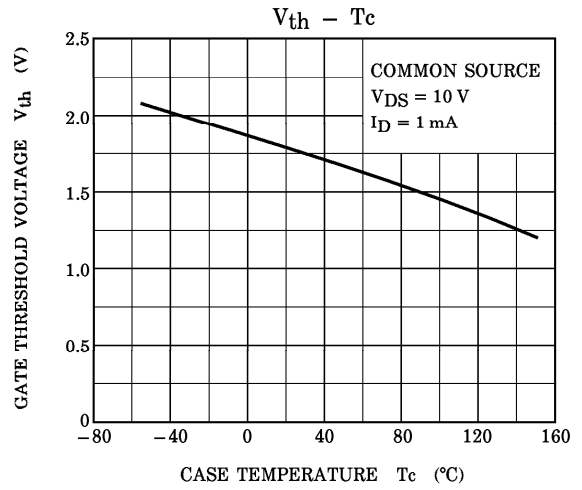
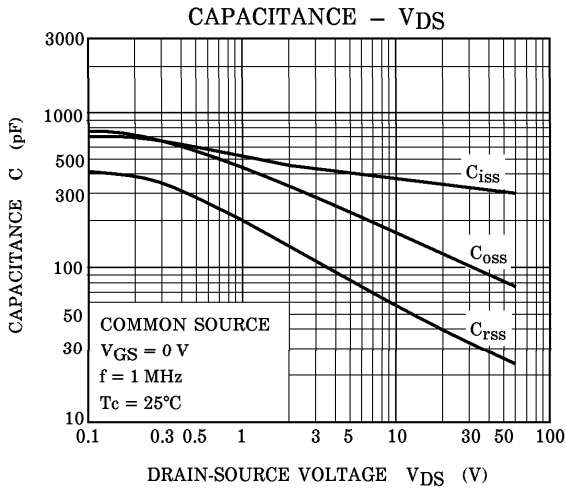
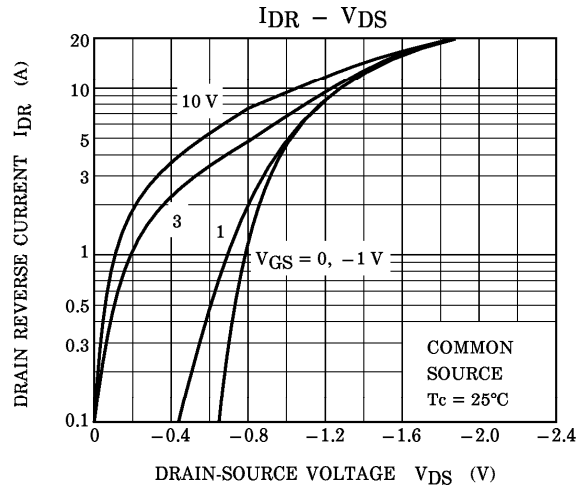
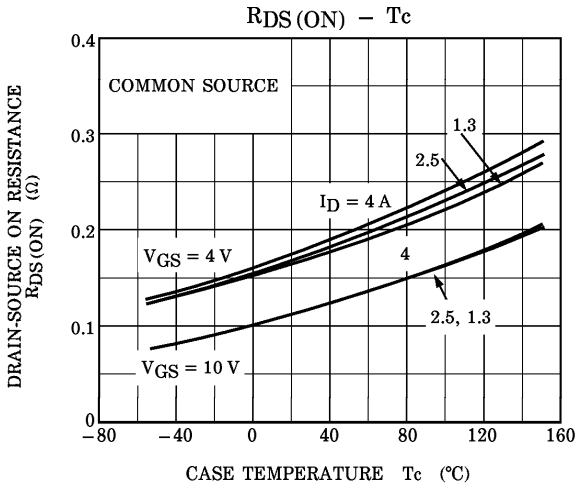


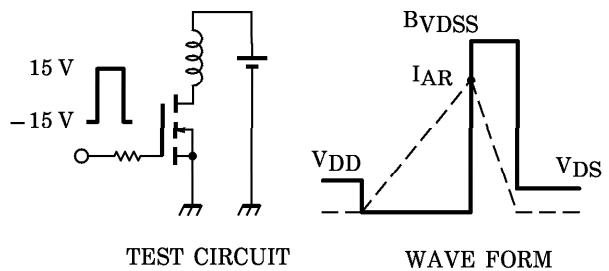
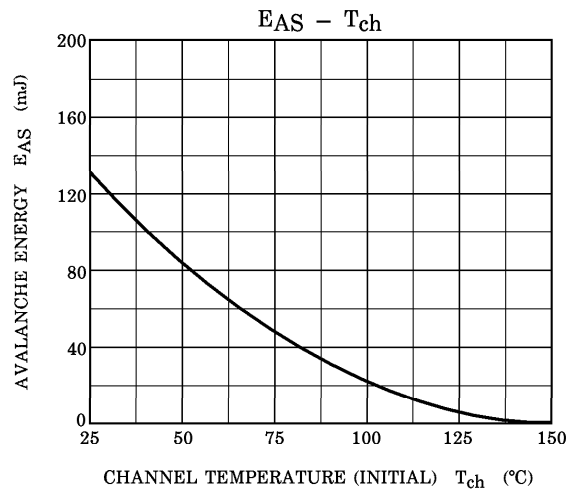
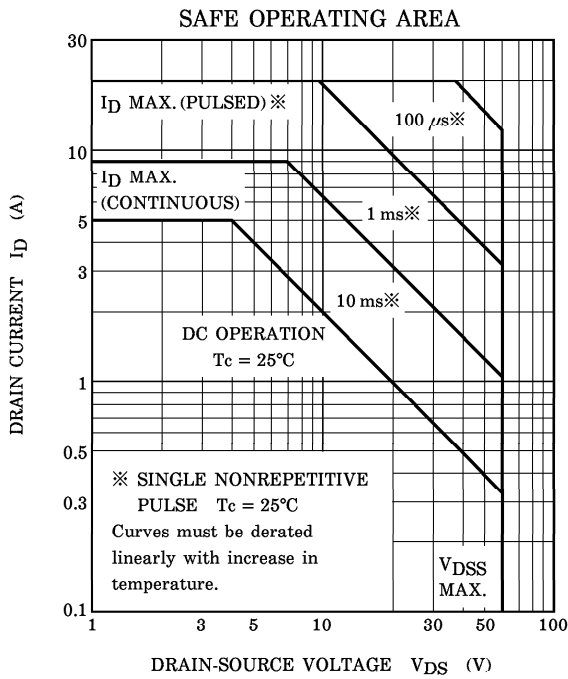
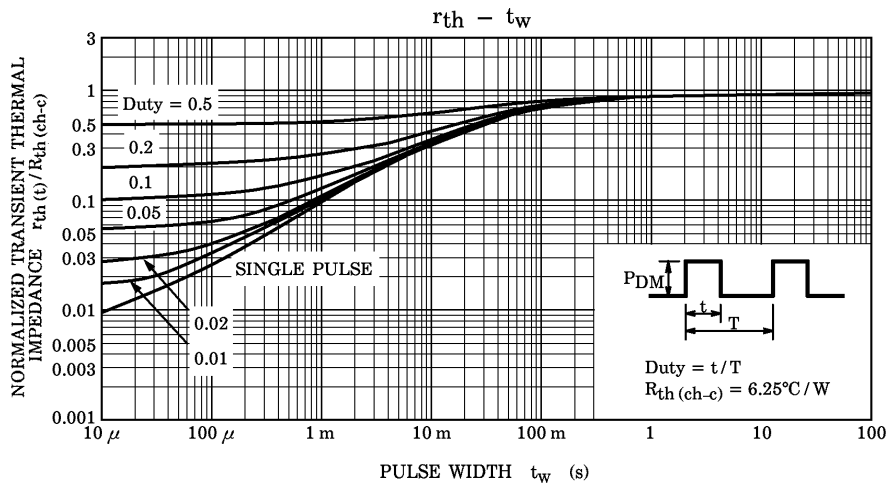
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

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