

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

2SK2231

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm

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

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$)	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

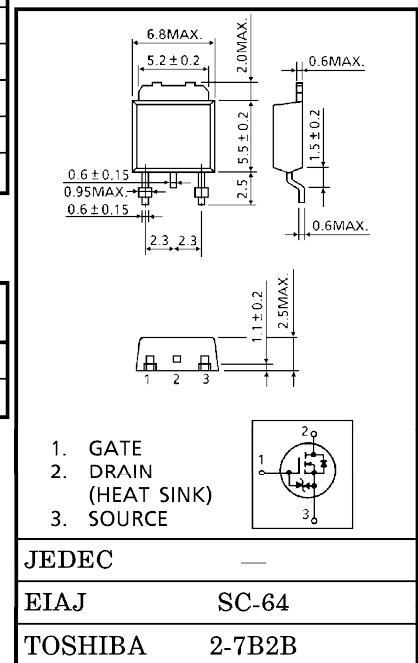
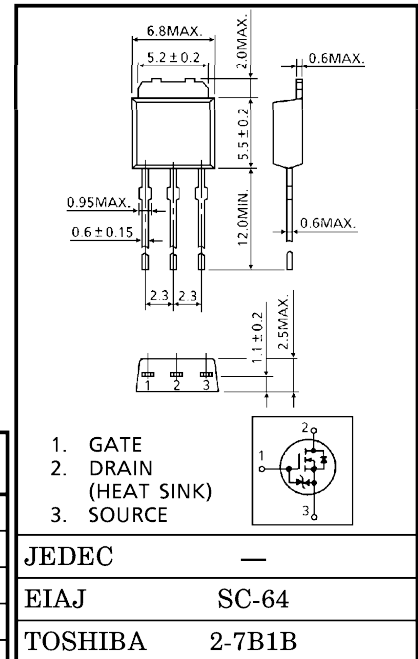
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Case	$R_{th(ch-c)}$	6.25	°C/W
Thermal Resistance, Channel To Ambient	$R_{th(ch-a)}$	125	°C/W

Note ;

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

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

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



Weight : 0.36g

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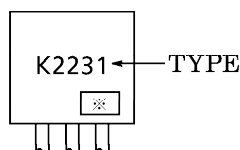
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	± 10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V(BR)_{DSS}$	$I_D = 10mA, V_{GS} = 0V$	60	—	—	V
Gate Threshold Voltage		V_{th}	$V_{DS} = 10V, I_D = 1mA$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4V, I_D = 1.3A$	—	0.20	0.30	Ω
			$V_{GS} = 10V, I_D = 2.5A$	—	0.12	0.16	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 2.5A$	3.0	5.0	—	S
Input Capacitance		C_{iss}	$V_{DS} = 10V, V_{GS} = 0V$ $f = 1MHz$	—	370	—	pF
Reverse Transfer Capacitance		C_{rss}		—	60	—	
Output Capacitance		C_{oss}		—	180	—	
Switching Time	Rise Time	t_r	<p>$I_D = 2.5A$ $V_{GS} = 10V, 0V$ 50Ω $R_L = 12\Omega$ $V_{DD} \doteq 30V$</p>	—	18	—	ns
	Turn-on Time	t_{on}		—	25	—	
	Fall Time	t_f		—	55	—	
	Turn-off Time	t_{off}		$V_{IN} : t_r, t_f < 5ns,$ $Duty \leq 1\%, t_w = 10\mu s$	—	170	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \doteq 48V, V_{GS} = 10V$ $I_D = 5A$	—	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}	$I_{DR} = 5A, V_{GS} = 0V$	—	—	-1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = 5A, V_{GS} = 0V$	—	70	—	ns
Reverse Recovery Charge	Q_{rr}	$dI_{DR} / dt = 50A / \mu s$	—	0.1	—	μC

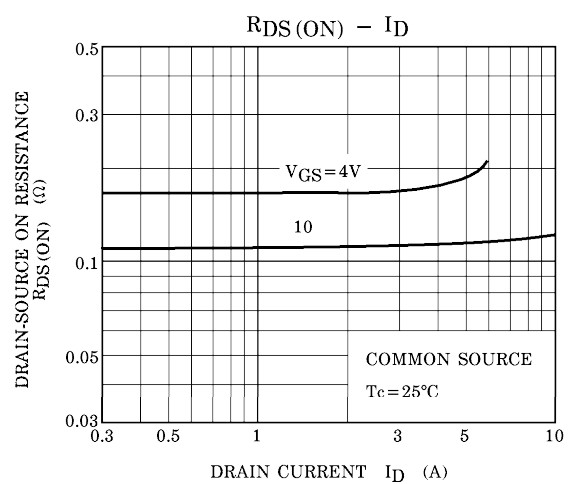
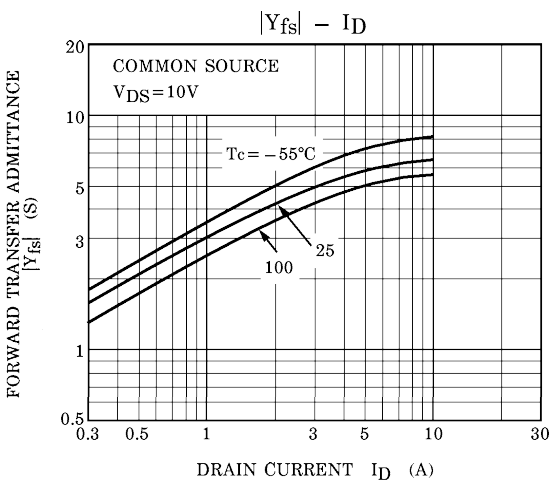
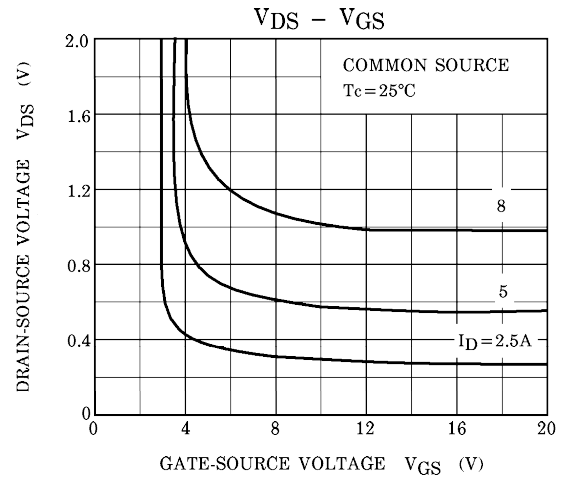
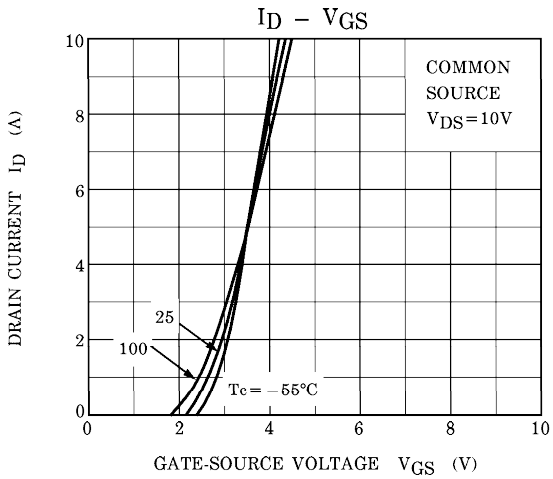
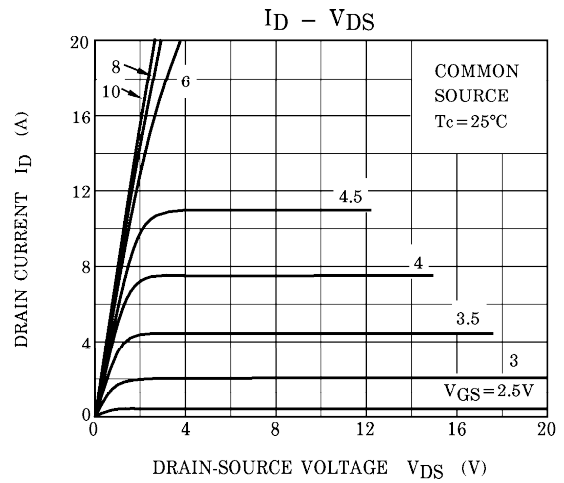
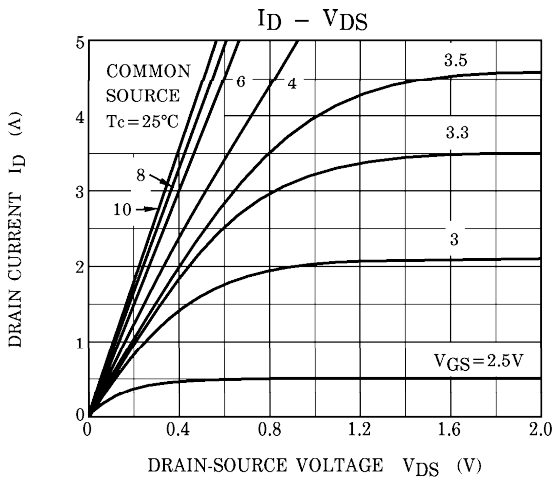
MARKING

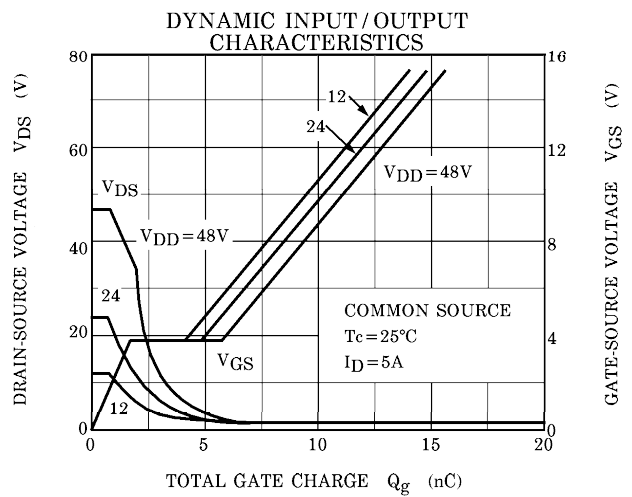
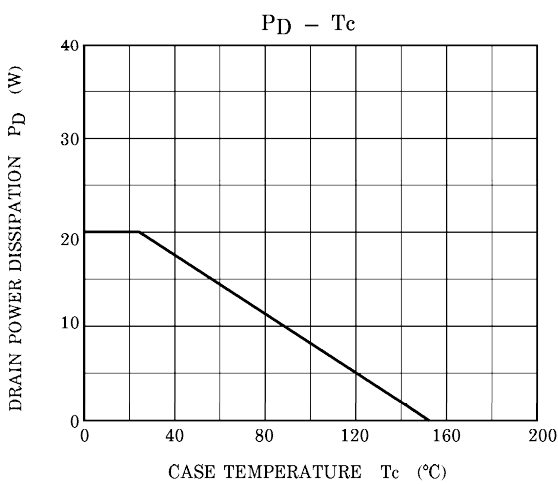
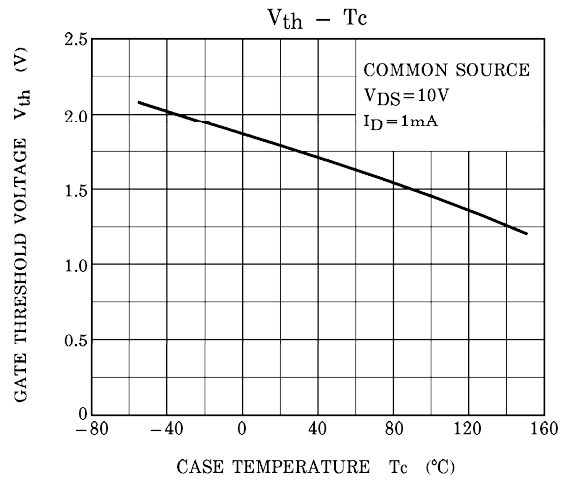
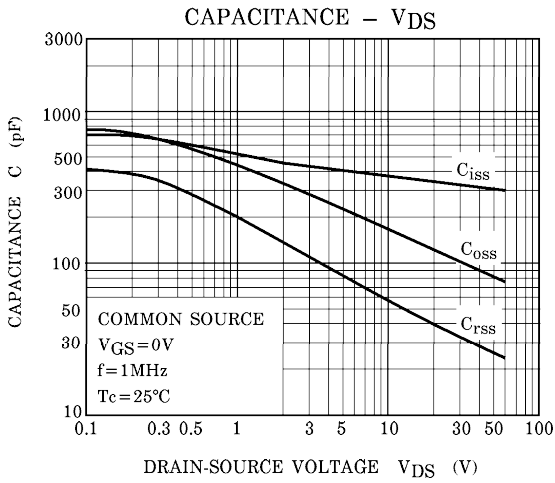
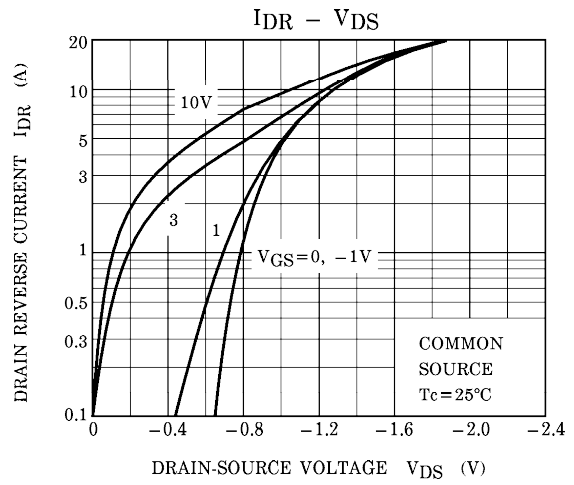
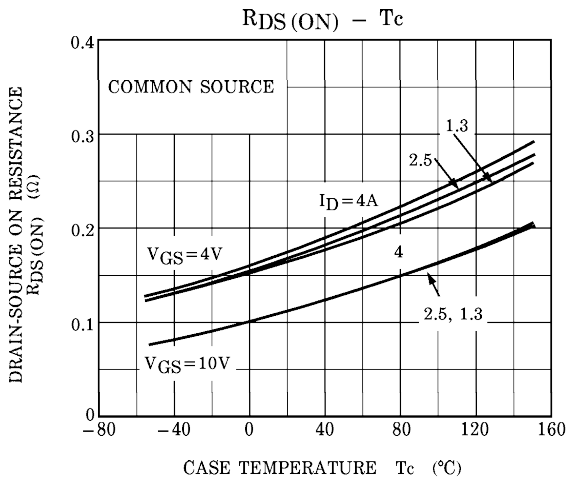


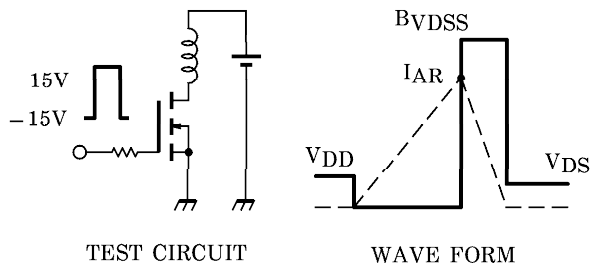
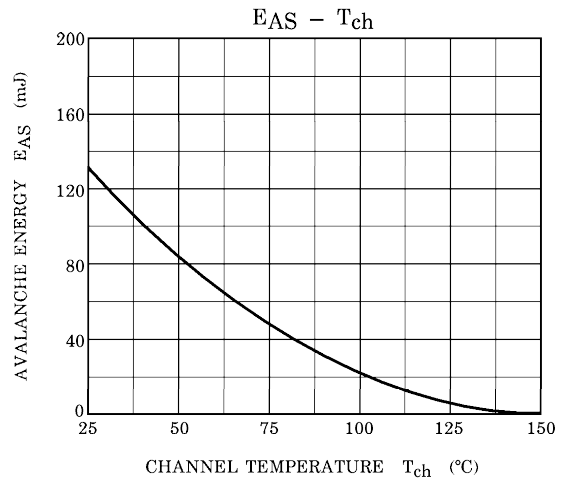
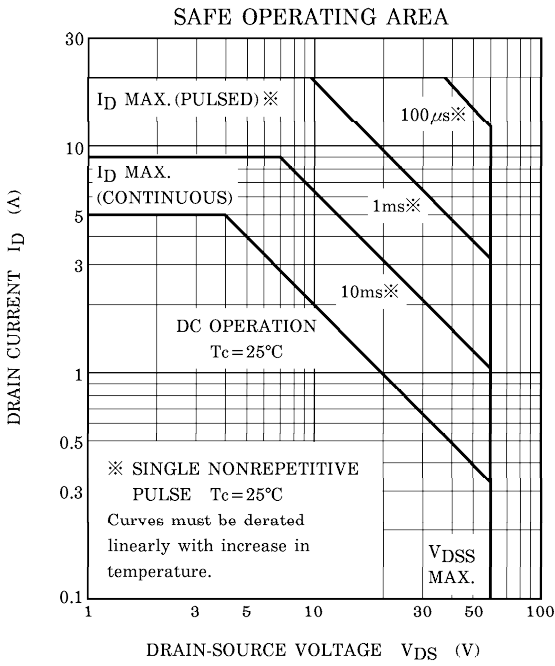
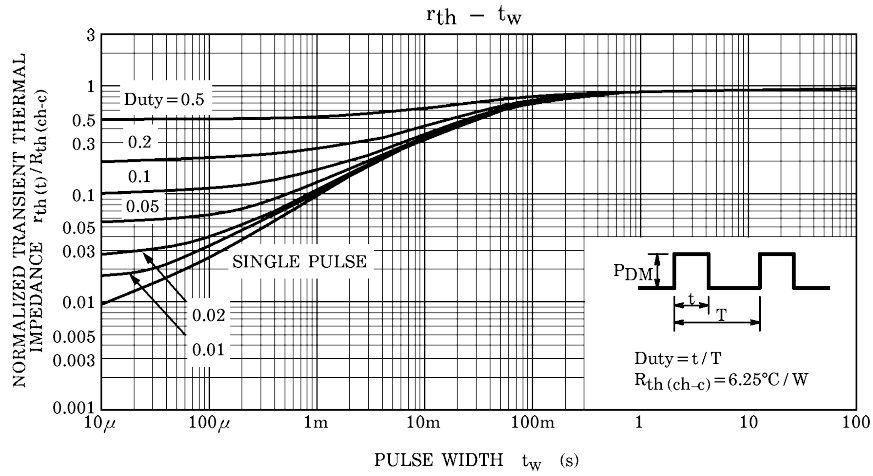
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

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