

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

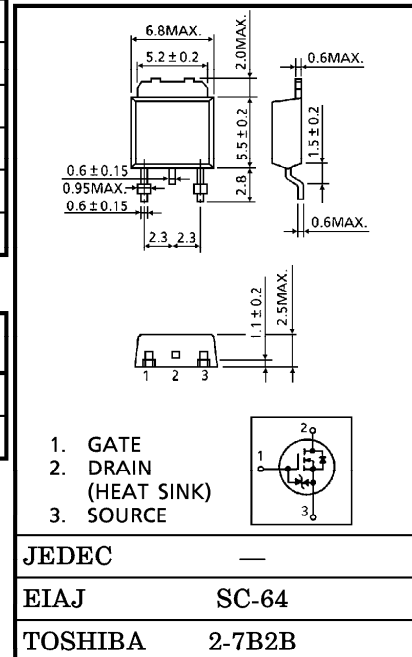
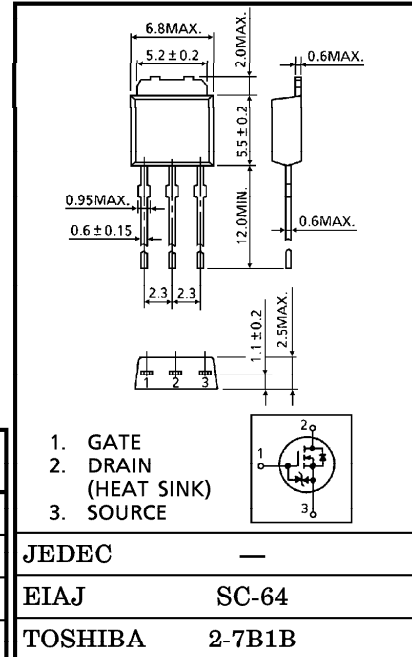
THERMAL CHARACTERISTICS

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

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



Weight : 0.36g

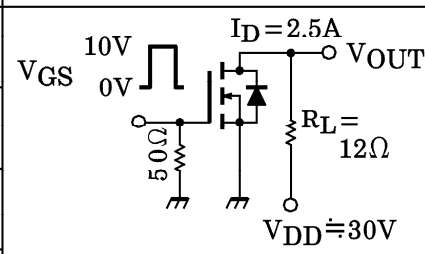
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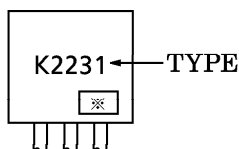
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	IGSS	VGS = ±16V, VDS = 0V	—	—	±10	μA	
Drain Cut-off Current	IDSS	VDS = 60V, VGS = 0V	—	—	100	μA	
Drain-Source Breakdown Voltage	V(BR)DSS	ID = 10mA, VGS = 0V	60	—	—	V	
Gate Threshold Voltage	Vth	VDS = 10V, ID = 1mA	0.8	—	2.0	V	
Drain-Source ON Resistance	RDS(ON)	VGS = 4V, ID = 1.3A	—	0.20	0.30	Ω	
		VGS = 10V, ID = 2.5A	—	0.12	0.16		
Forward Transfer Admittance	Yfs	VDS = 10V, ID = 2.5A	3.0	5.0	—	S	
Input Capacitance	Ciss	VDS = 10V, VGS = 0V f = 1MHz	—	370	—	pF	
Reverse Transfer Capacitance	Crss		—	60	—		
Output Capacitance	Coss		—	180	—		
Switching Time	Rise Time	tr		—	18	—	ns
	Turn-on Time	ton		—	25	—	
	Fall Time	tf		—	55	—	
	Turn-off Time	t _{off}		VIN : tr, tf < 5ns, Duty ≤ 1%, tw = 10μs	—	170	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Qg	VDD ≐ 48V, VGS = 10V ID = 5A	—	12	—	nC	
Gate-Source Charge	Qgs		—	8	—		
Gate-Drain ("Miller") Charge	Qgd		—	4	—		

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	IDR	—	—	—	5	A
Pulse Drain Reverse Current	IDRP	—	—	—	20	A
Diode Forward Voltage	VDSF	IDR = 5A, VGS = 0V	—	—	-1.7	V
Reverse Recovery Time	t _{rr}	IDR = 5A, VGS = 0V	—	70	—	ns
Reverse Recovery Charge	Q _{rr}	dIDR / dt = 50A / μs	—	0.1	—	μC

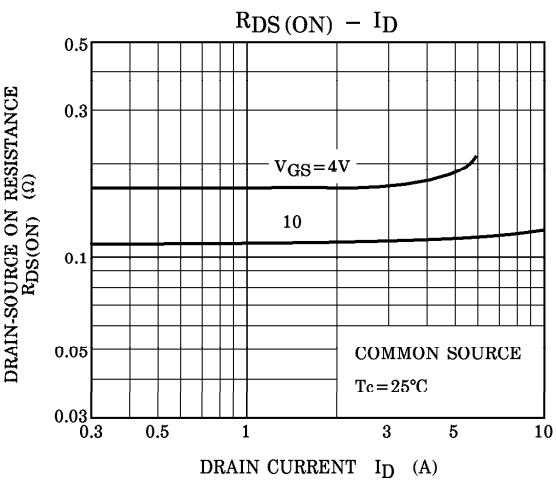
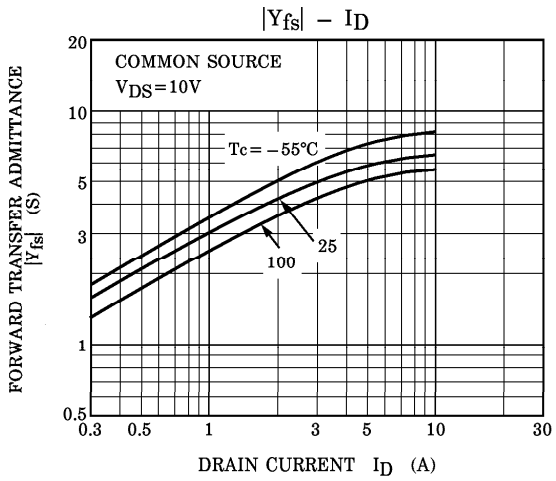
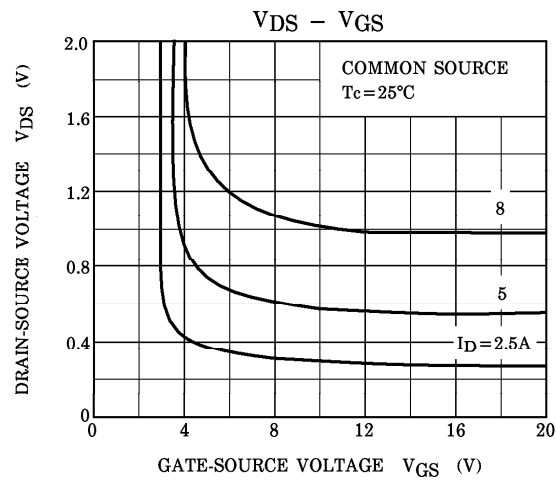
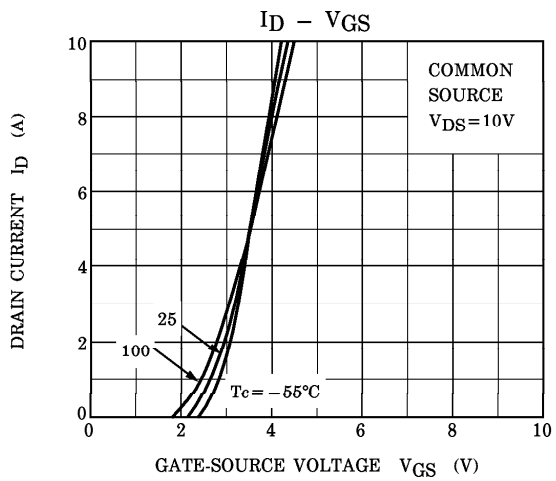
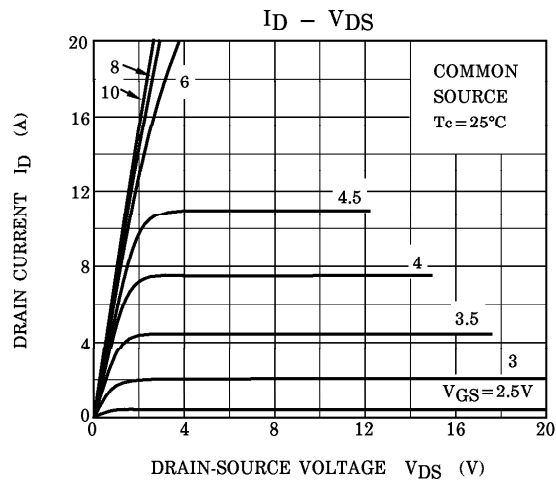
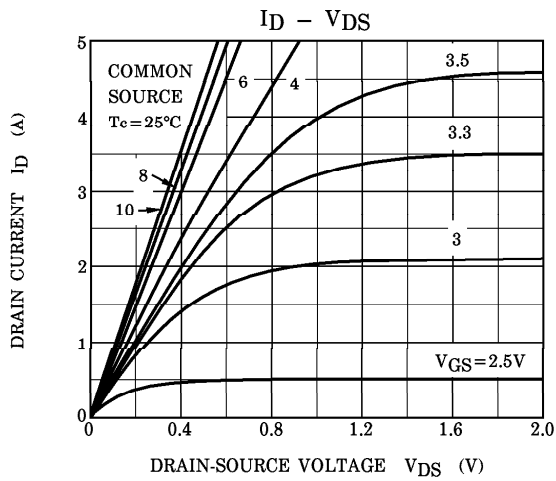
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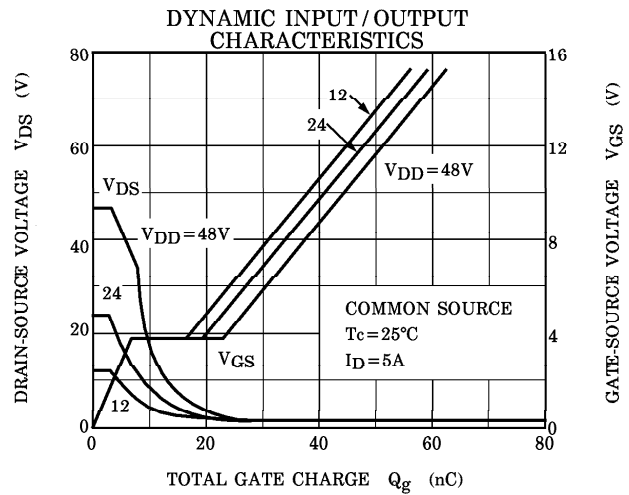
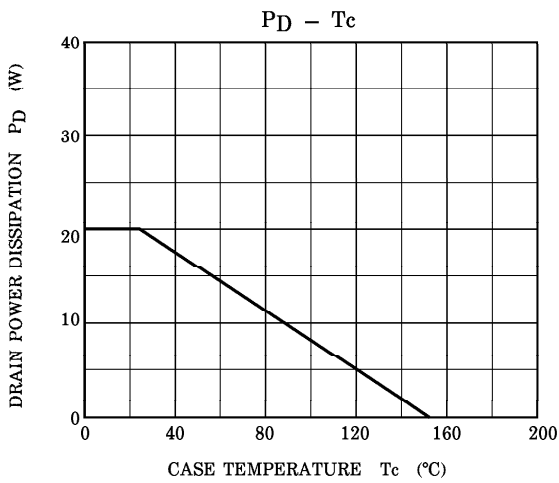
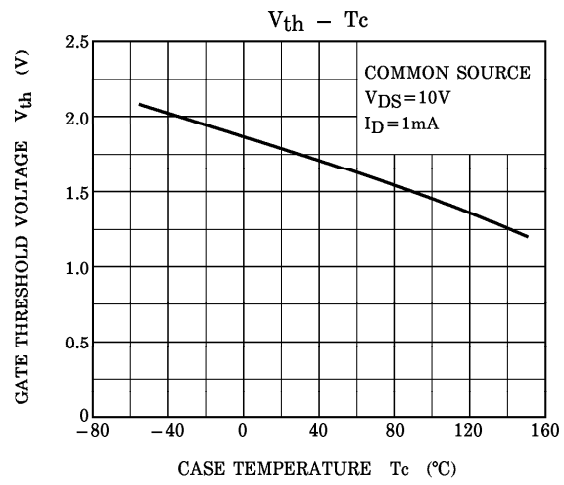
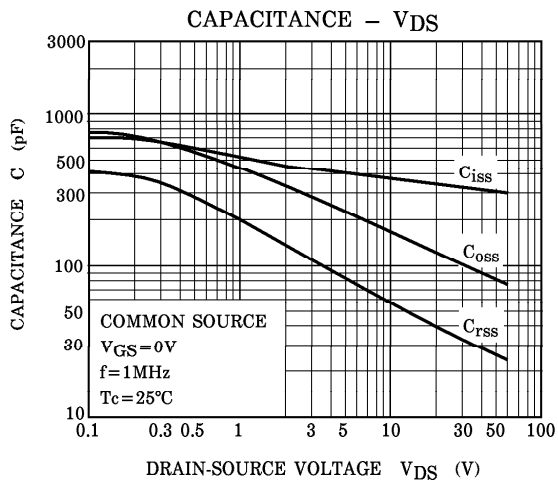
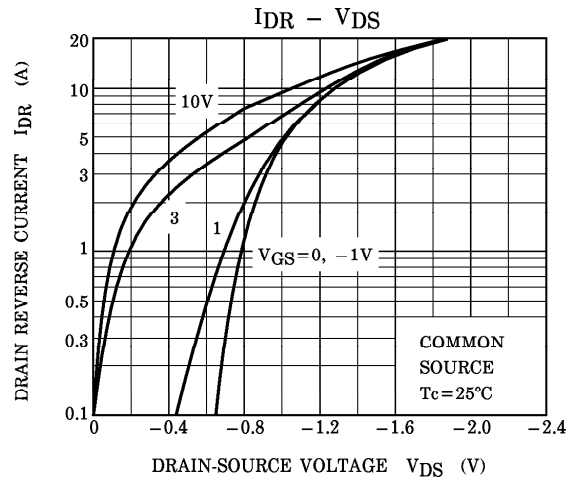
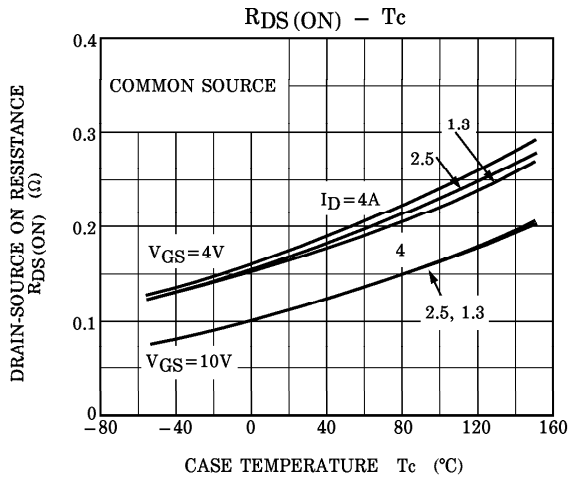


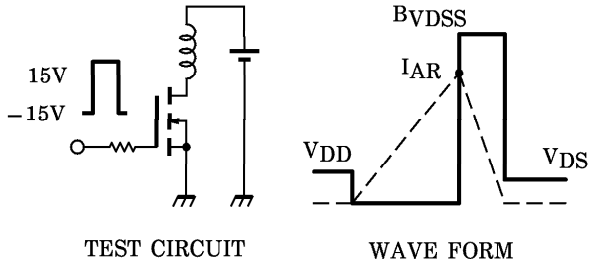
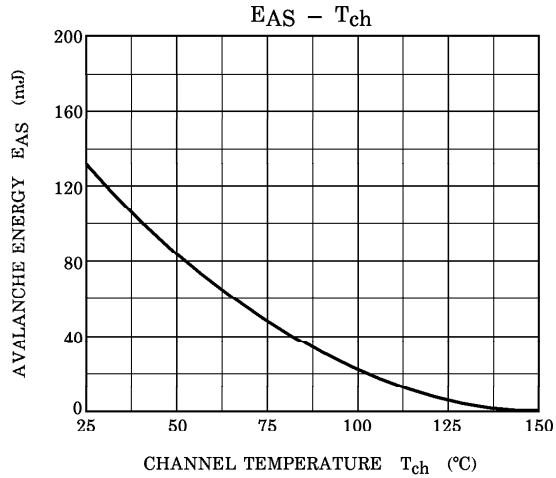
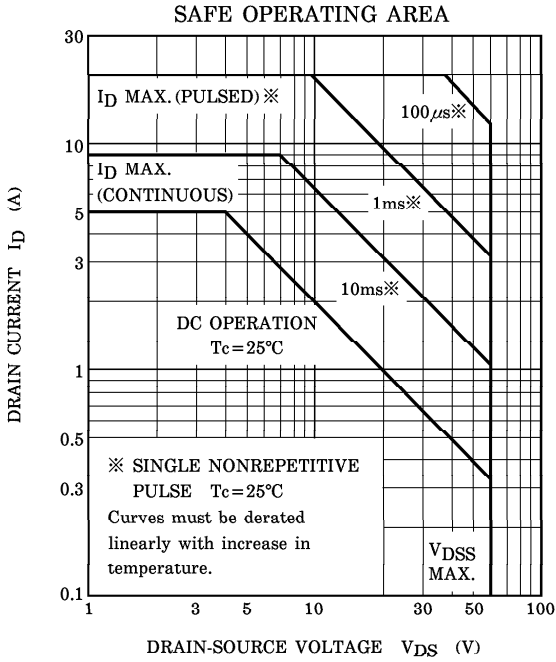
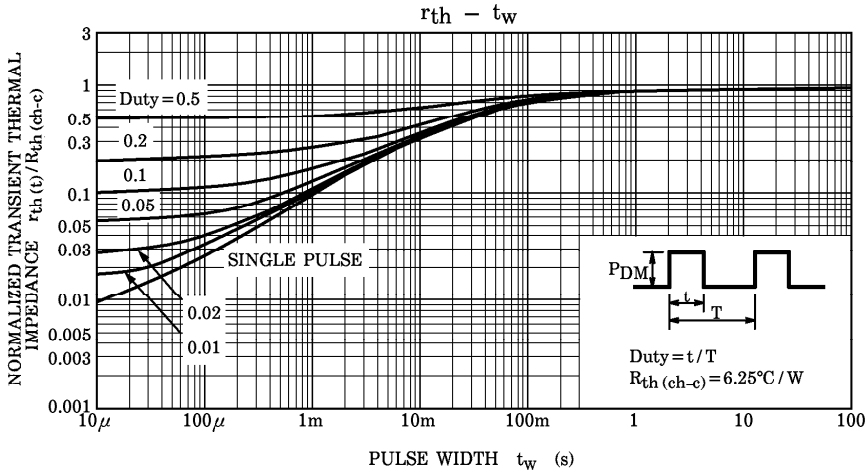
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







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

$$EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$