

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOS V)

# 2SK2229

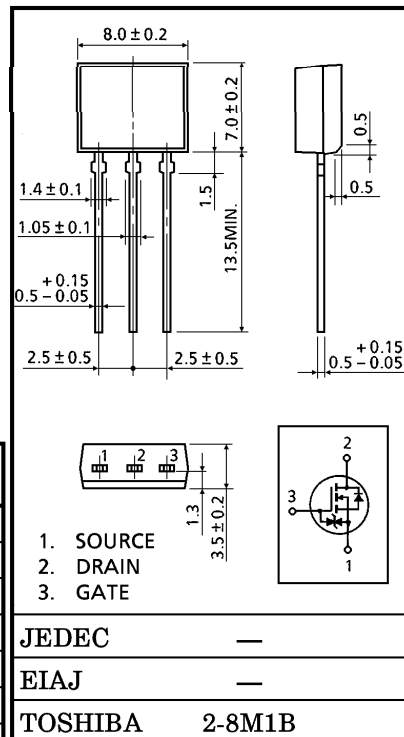
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS  
 CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

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	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	5 A
	Pulse	$I_{DP}$	20 A
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	1.3	W
Single Pulse Avalanche Energy**	$E_{AS}$	129	mJ
Avalanche Current	$I_{AR}$	5	A
Repetitive Avalanche Energy*	$E_{AR}$	0.13	mJ
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C



Weight : 0.54g

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Ambient	$R_{th(ch-a)}$	96.1	°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.**

961001EAA2

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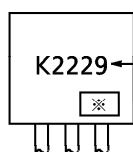
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

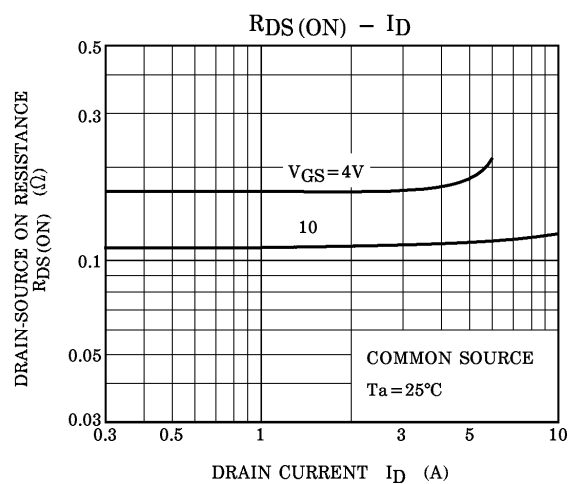
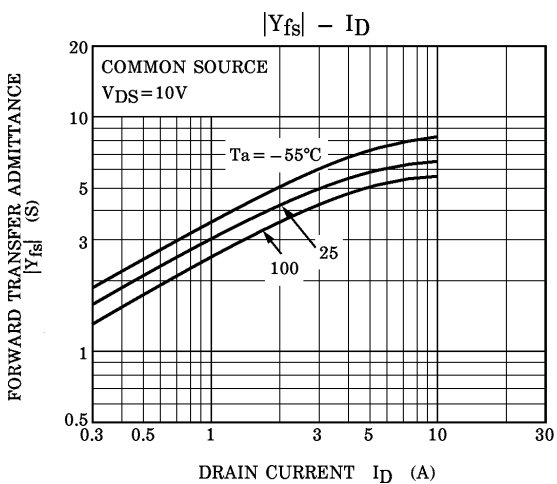
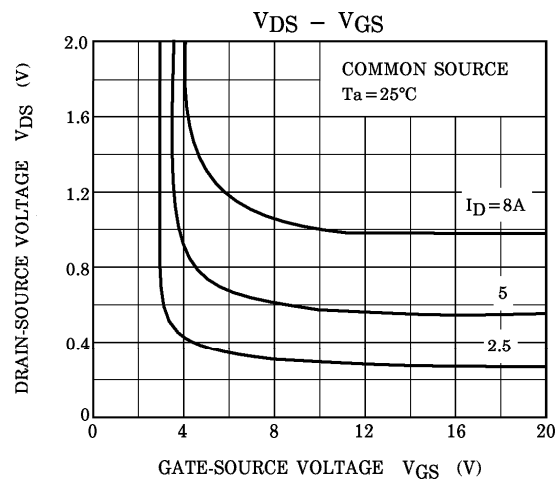
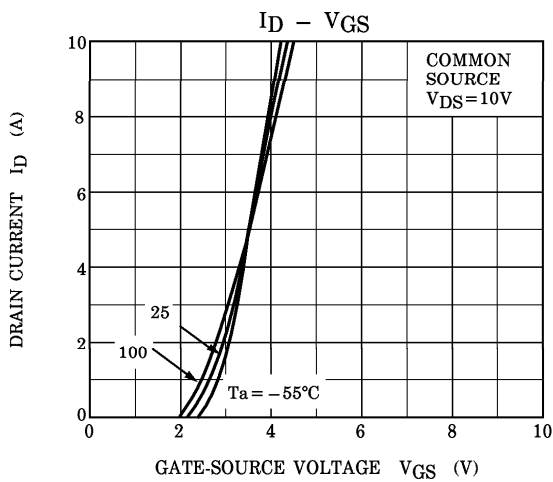
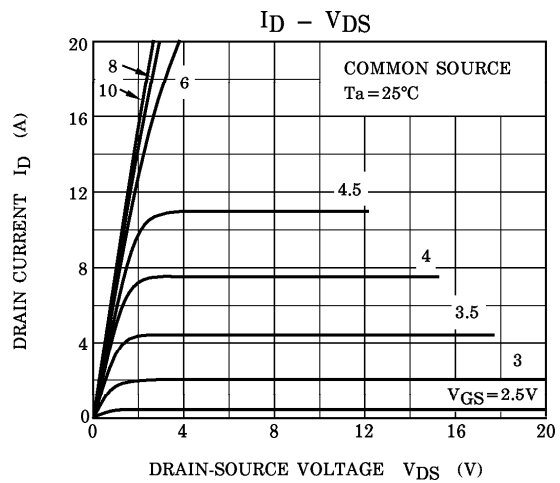
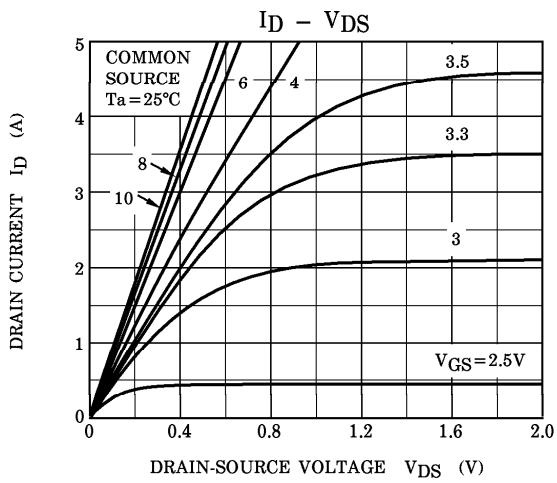
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

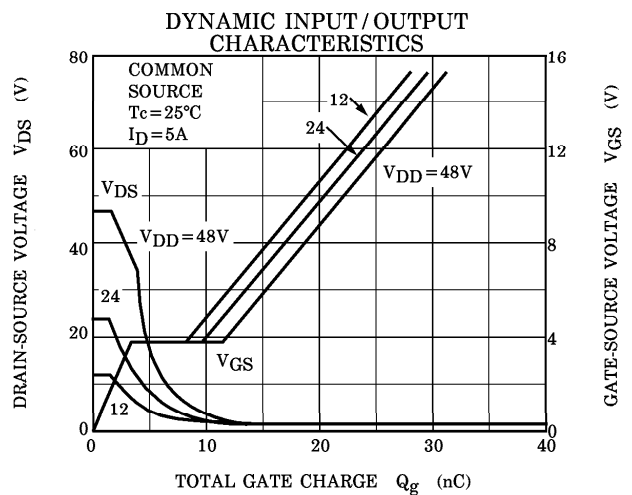
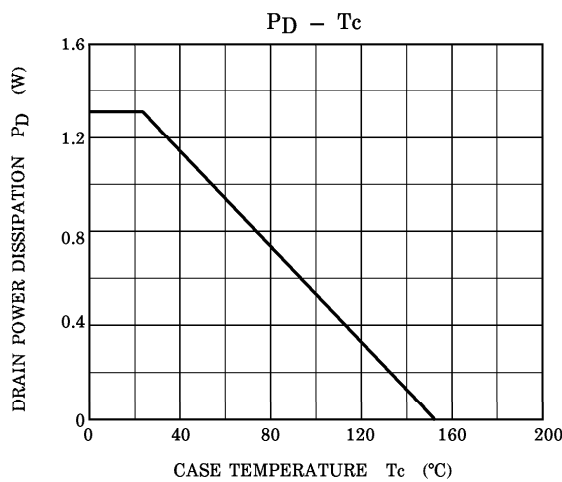
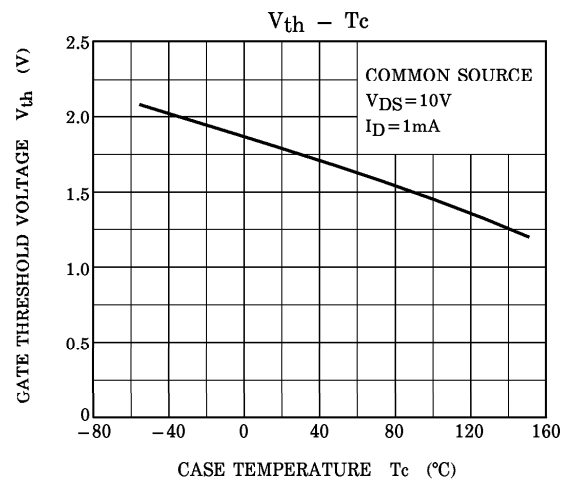
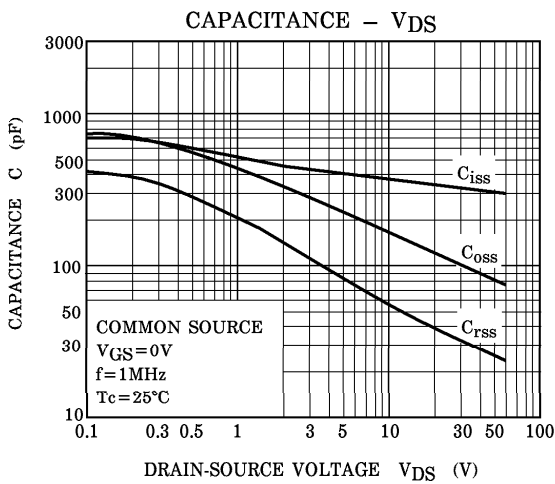
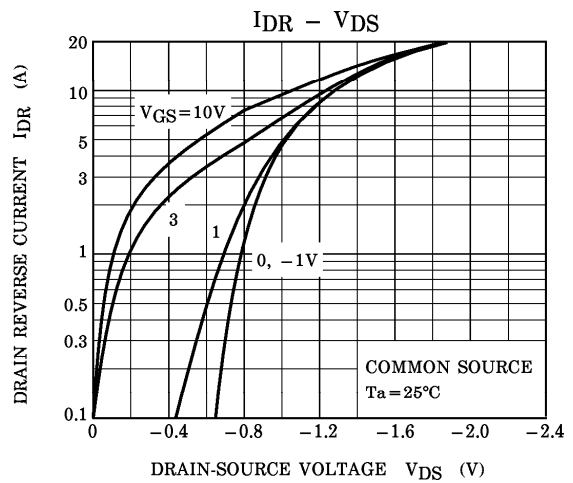
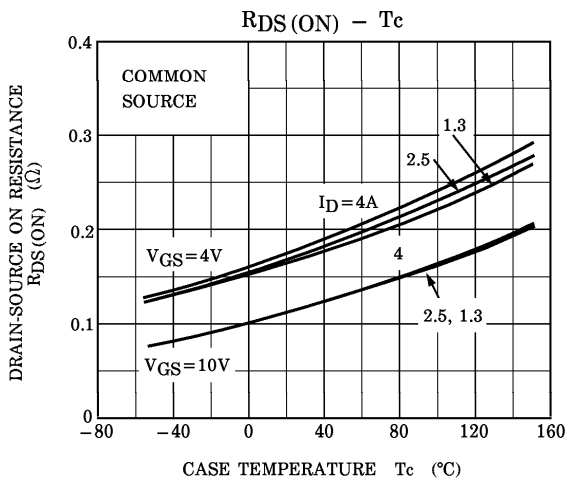
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	5	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	20	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 5A, V <sub>GS</sub> = 0V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 5A, V <sub>GS</sub> = 0V, dI <sub>DR</sub> / dt = 50A / μs	—	70	—	ns
Reverse Recovery Charge	Q <sub>rr</sub>		—	0.1	—	μC

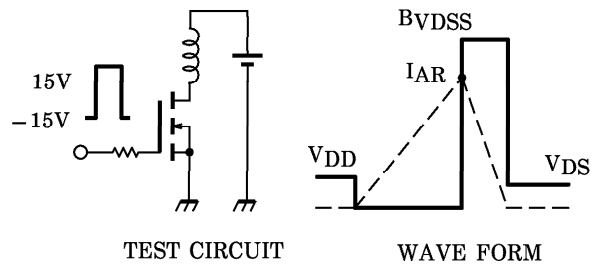
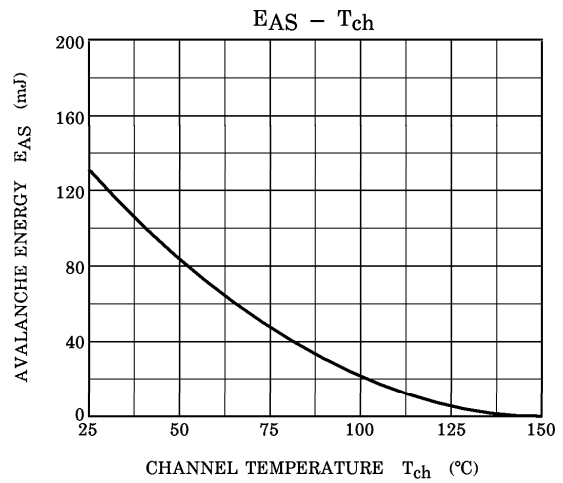
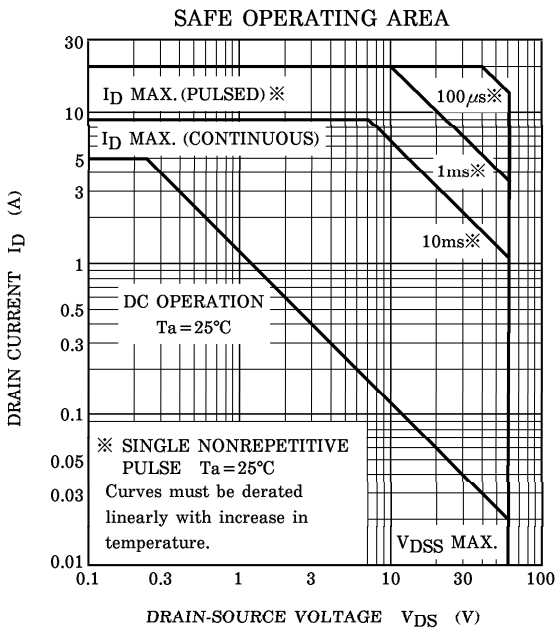
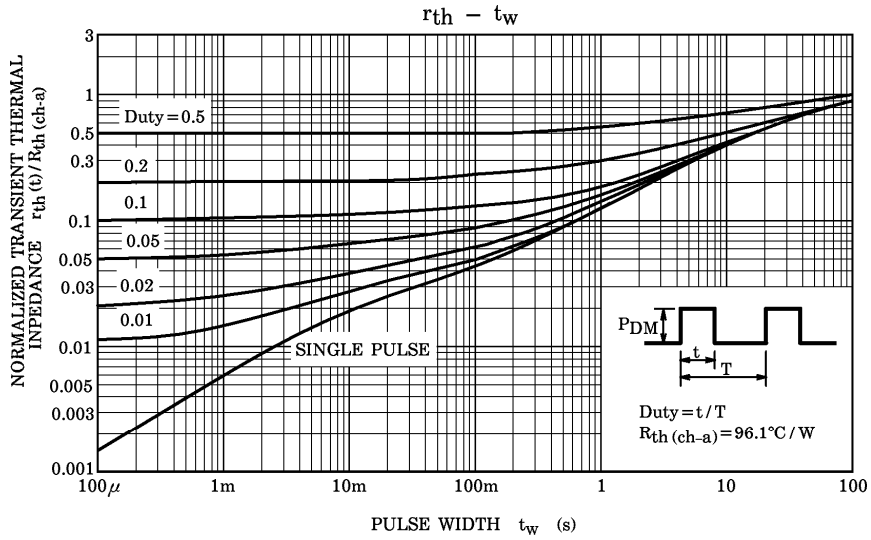
MARKING



K2229 ← TYPE  
 ※ Lot Number  
 □ □ ← Month (Starting from Alphabet A)  
 ———— Year (Last Number of the Christian Era)







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

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