

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L^2 - π -MOSV)

2SK2201

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- 4 V gate drive
- Low drain-source ON resistance : $R_{DS(ON)} = 0.28 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 3.5 S$ (typ.)
- Low leakage current : $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 100 V$)
- Enhancement-mode : $V_{th} = 0.8 \sim 2.0 V$ ($V_{DS} = 10 V$, $I_D = 1 mA$)

Maximum Ratings ($T_a = 25^\circ C$)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	100	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	3 A
	Pulse (Note 1)	I_{DP}	12 A
Drain power dissipation ($T_c = 25^\circ C$)	P_D	20	W
Single pulse avalanche energy (Note 2)	E_{AS}	140	mJ
Avalanche current	I_{AR}	3	A
Repetitive avalanche energy (Note 3)	E_{AR}	2	mJ
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	$-55 \sim 150$	$^\circ C$

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	6.25	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	125	$^\circ C / W$

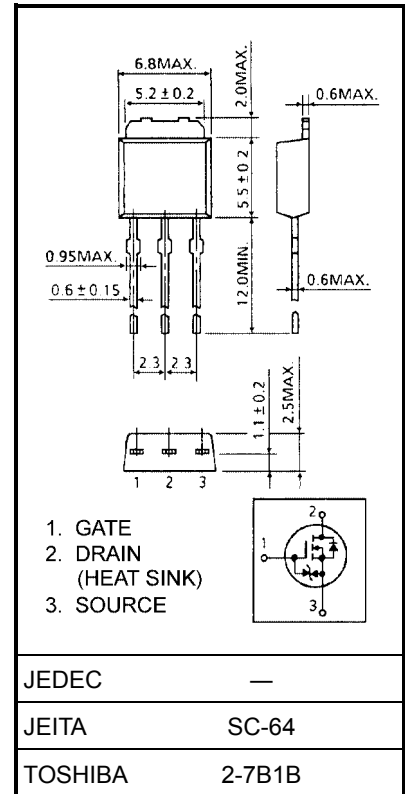
Note 1: Please use devices on condition that the channel temperature is below $150^\circ C$.

Note 2: $V_{DD} = 50 V$, $T_{ch} = 25^\circ C$ (initial), $L = 25 mH$, $R_G = 25 \Omega$, $I_{AR} = 3 A$

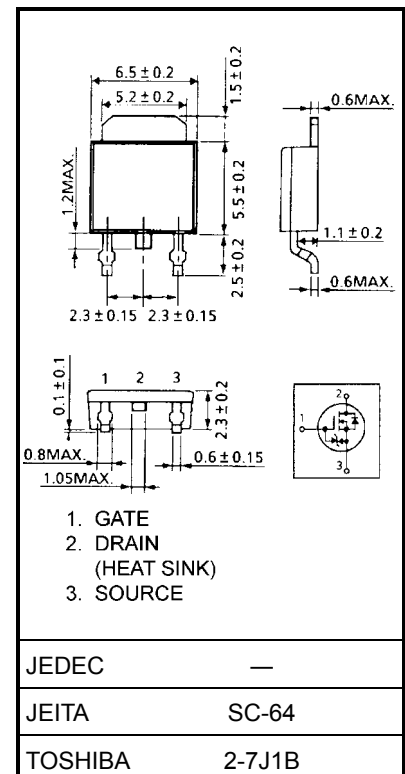
Note 3: Repetitive rating: Pulse width limited by maximum channel temperature

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

Unit: mm

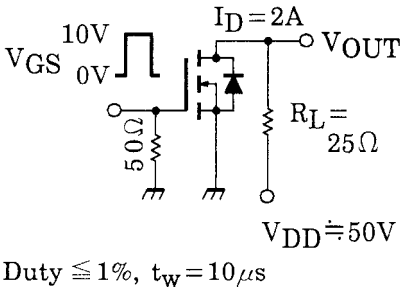


Weight: 0.36 g (typ.)



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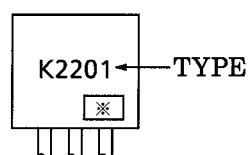
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	100	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.0	V
Drain-source ON resistance	$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 2 \text{ A}$	—	0.36	0.45	Ω
		$V_{GS} = 10 \text{ V}, I_D = 2 \text{ A}$	—	0.28	0.35	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2 \text{ A}$	1.5	3.5	—	S
Input capacitance	C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	280	—	pF
Reverse transfer capacitance	C_{rss}		—	50	—	
Output capacitance	C_{oss}		—	105	—	
Switching time	Rise time		—	20	—	ns
	Turn-on time		—	50	—	
	Fall time		—	40	—	
	Turn-off time		—	170	—	
Total gate charge (Gate-source plus gate-drain)	Q_g	$V_{DD} \approx 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 3 \text{ A}$	—	13.5	—	nC
Gate-source charge	Q_{gs}		—	8.5	—	
Gate-drain ("miller") charge	Q_{gd}		—	5	—	

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	3	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	12	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 3 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = 3 \text{ A}, V_{GS} = 0 \text{ V}, dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	100	—	ns
Reverse recovery charge	Q_{rr}		—	0.2	—	μC

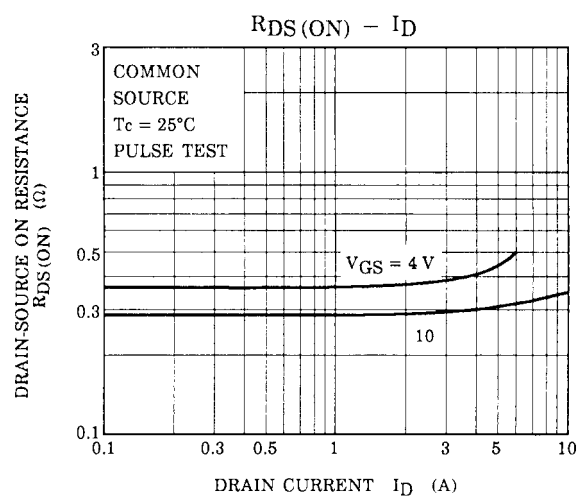
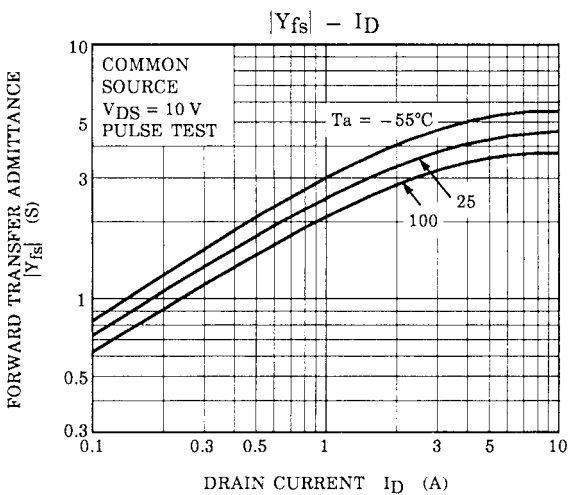
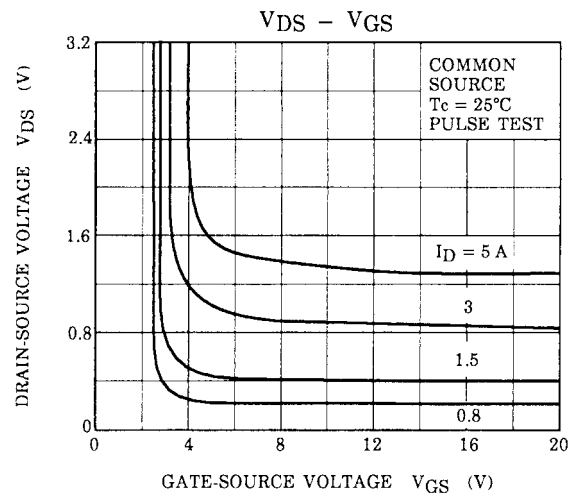
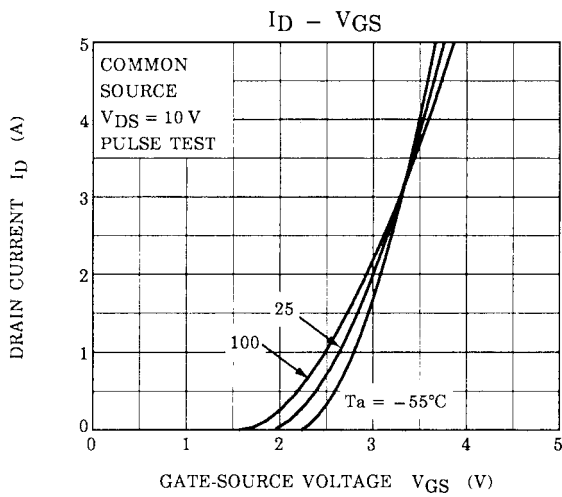
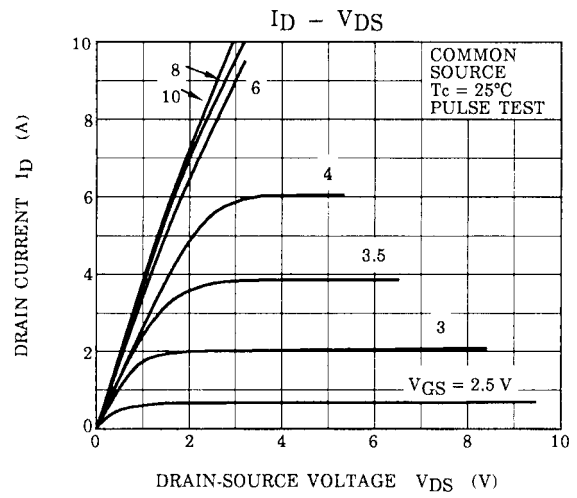
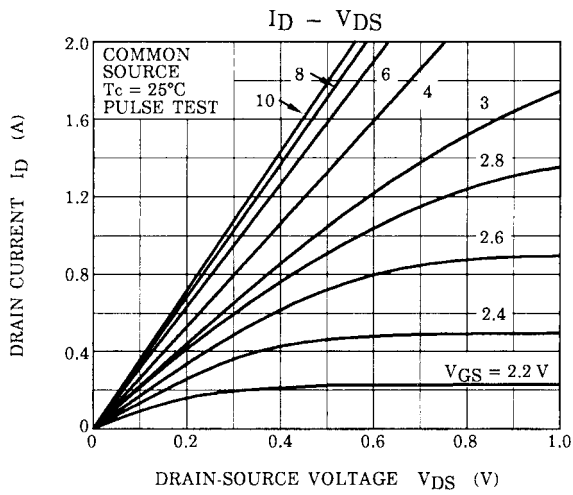
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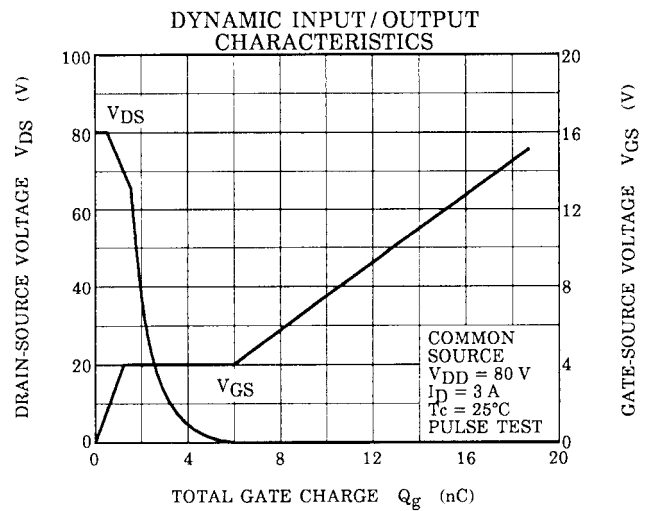
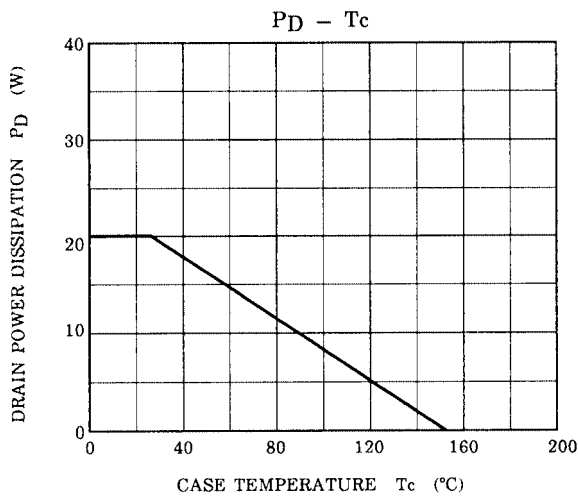
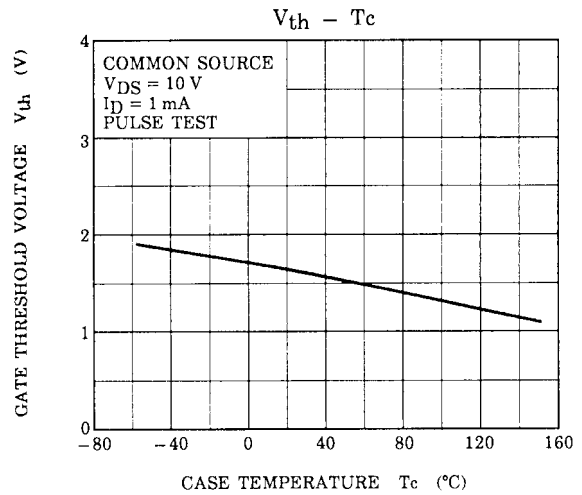
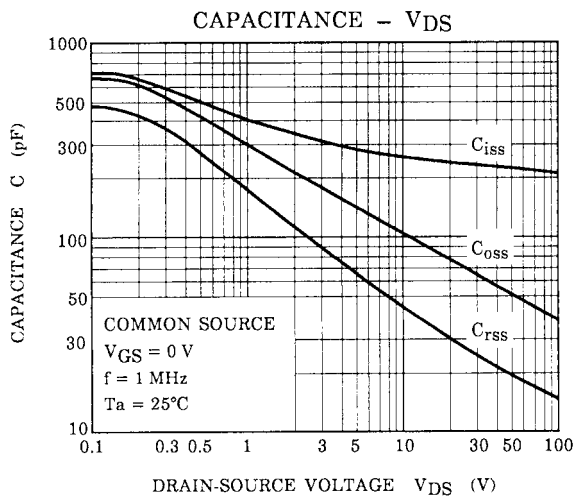
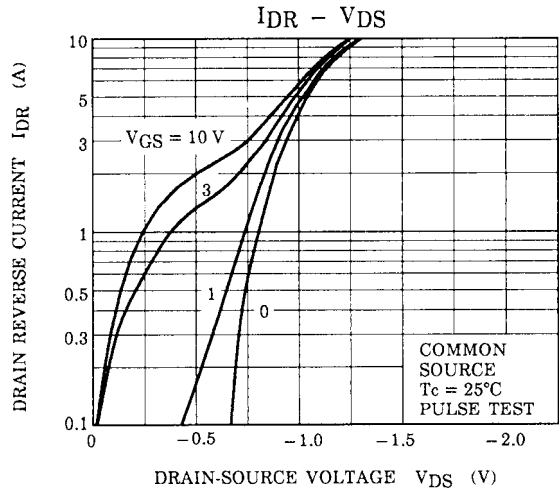
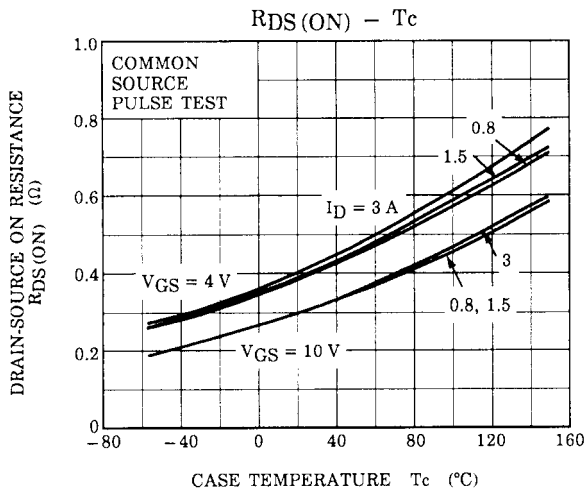


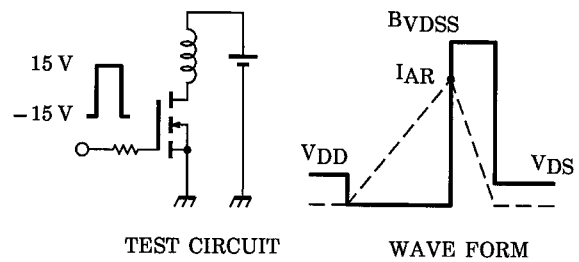
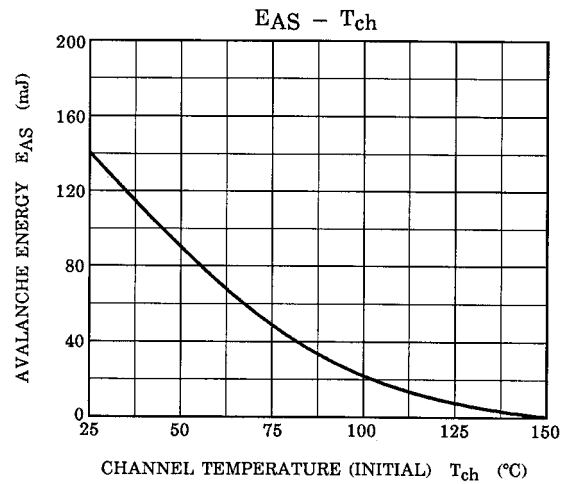
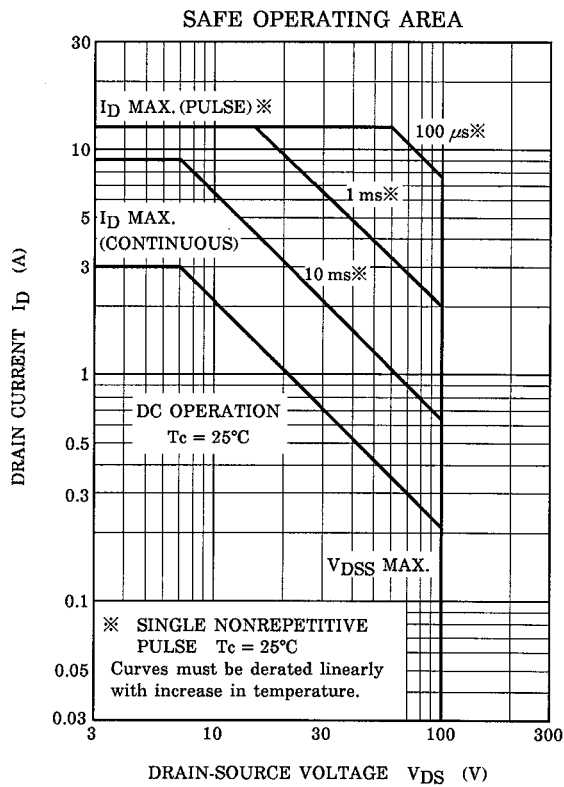
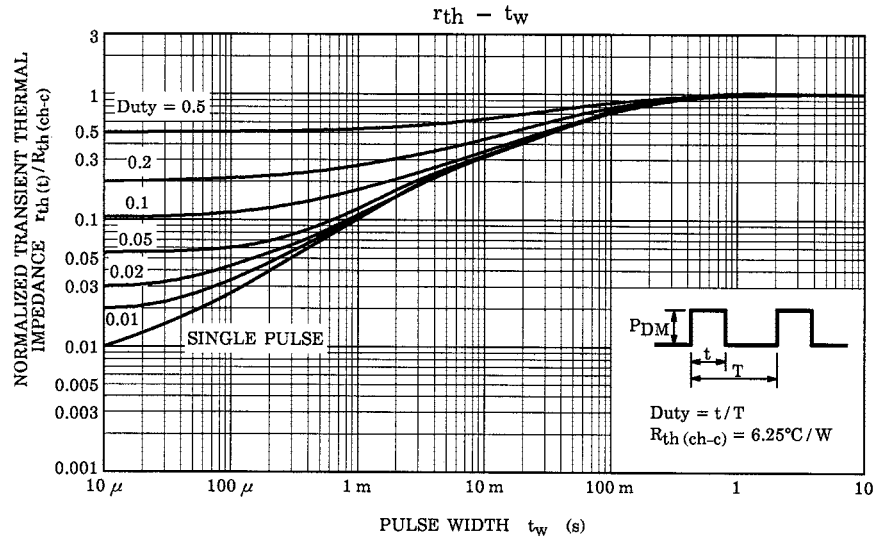
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







$R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}, L = 25 \text{ mH}$

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

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