

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

## 2SK2400

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- 4 V gate drive
- Low drain-source ON resistance :  $R_{DS(ON)} = 17 \Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 4.5 S$  (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		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	5	A
	Pulse (Note 1)	$I_{DP}$	20	A
Drain power dissipation		$P_D$	1.3	W
Single pulse avalanche energy (Note 2)		$E_{AS}$	180	mJ
Avalanche current		$I_{AR}$	5	A
Repetitive avalanche energy (Note 3)		$E_{AR}$	0.13	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 ambient	$R_{th(ch-a)}$	96.1	$^\circ C / W$

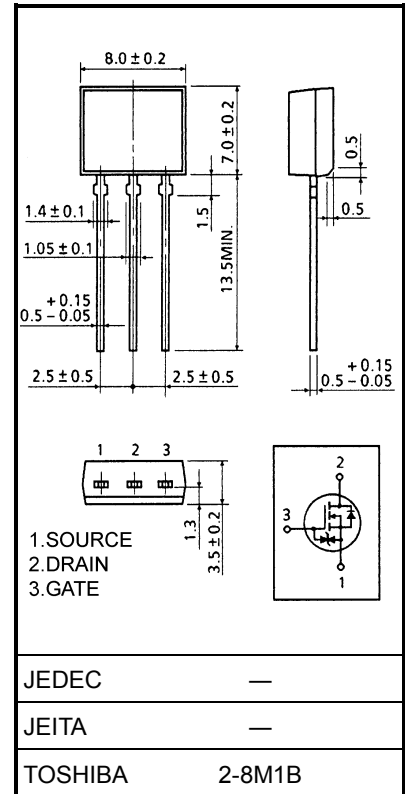
Note 1: Please use devices on condition that the channel temperature is below  $150^\circ C$ .

Note 2:  $V_{DD} = 25 V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 11.6 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 5 A$

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

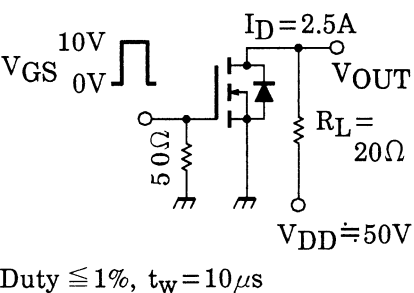
This transistor is an electrostatic sensitive device.  
Please handle with caution.

Unit: mm



Weight: 0.54 g (typ.)

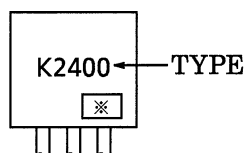
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	$\mu\text{A}$
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		$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 2.5 \text{ A}$	—	0.22	0.30	$\Omega$
			$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	0.17	0.23	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	2.0	4.5	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	500	—	pF
Reverse transfer capacitance		$C_{rss}$		—	80	—	
Output capacitance		$C_{oss}$		—	190	—	
Switching time	Rise time	$t_r$		—	17	—	ns
	Turn-on time	$t_{on}$		—	25	—	
	Fall time	$t_f$		—	50	—	
	Turn-off time	$t_{off}$		—	195	—	
Total gate charge (Gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	22	—	nC
Gate-source charge		$Q_{gs}$		—	15	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	7	—	


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


Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	5	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	20	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}, dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	160	—	ns
Reverse recovery charge	$Q_{rr}$		—	0.28	—	$\mu\text{C}$

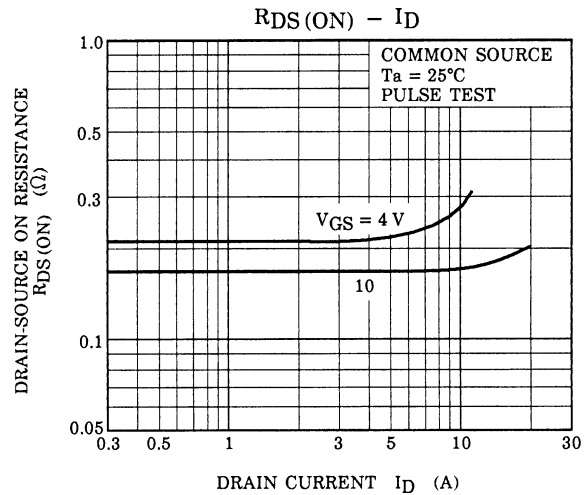
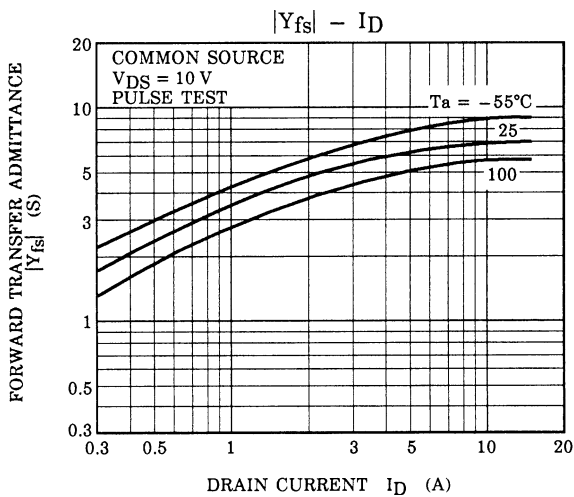
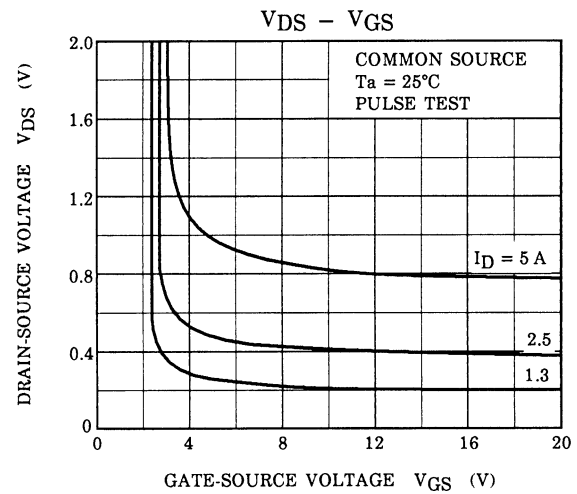
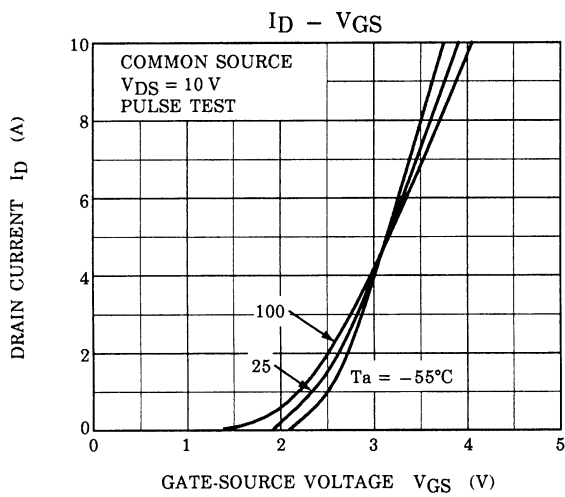
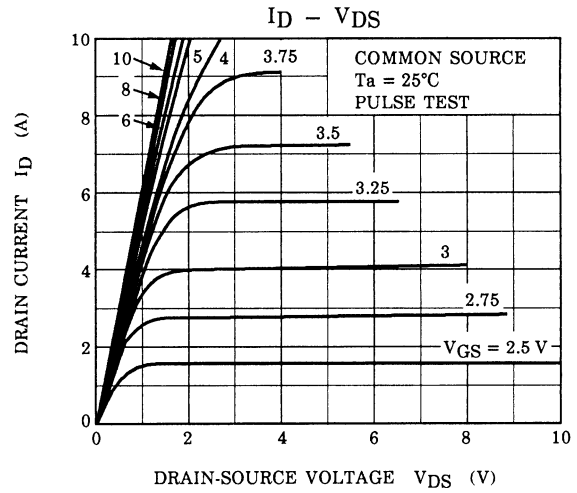
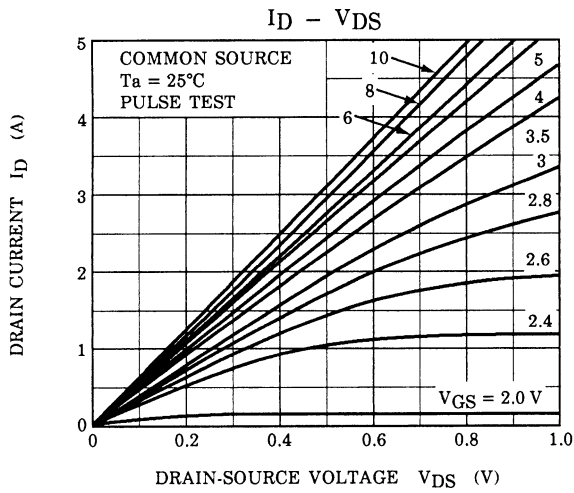
## Marking

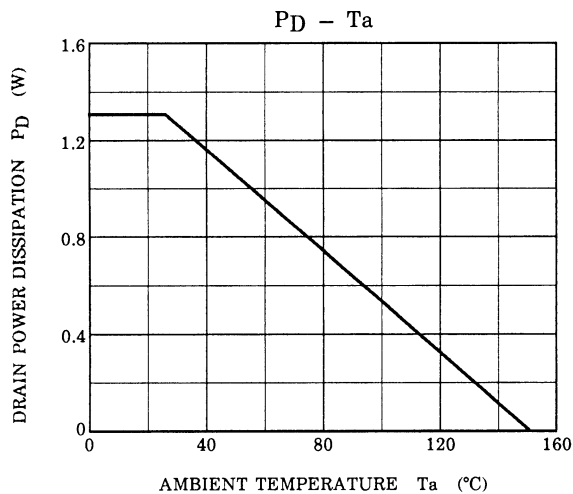
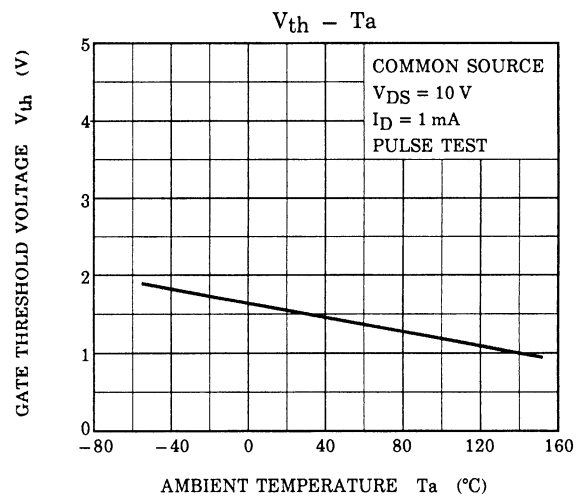
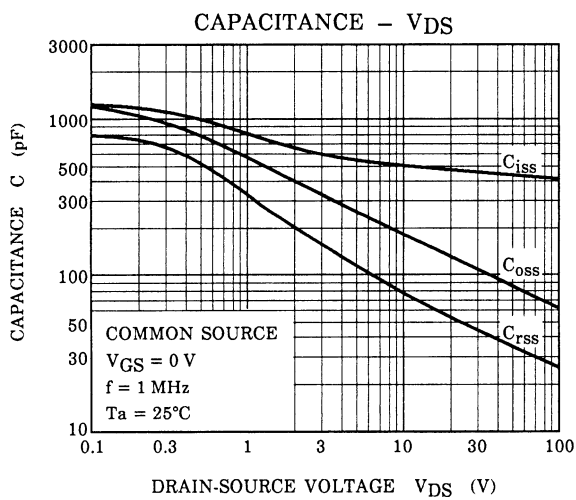
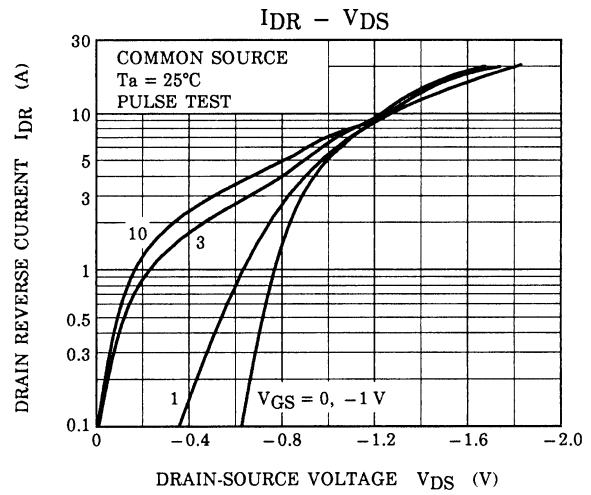
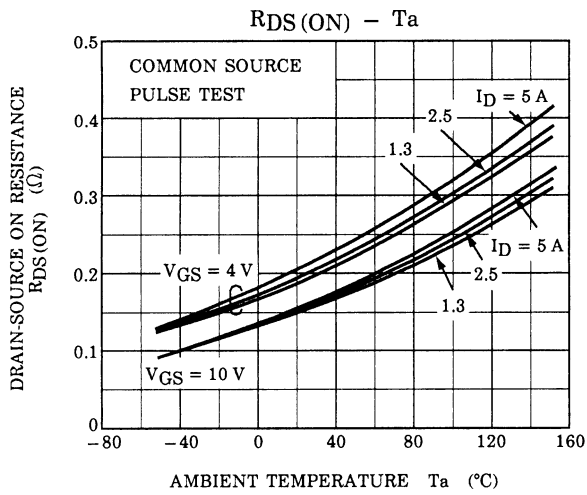


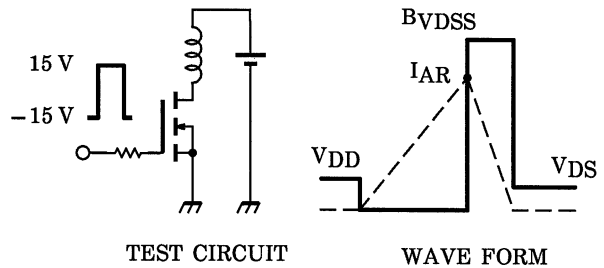
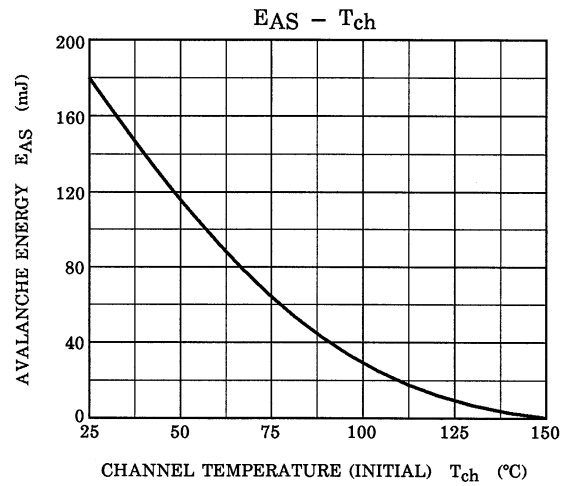
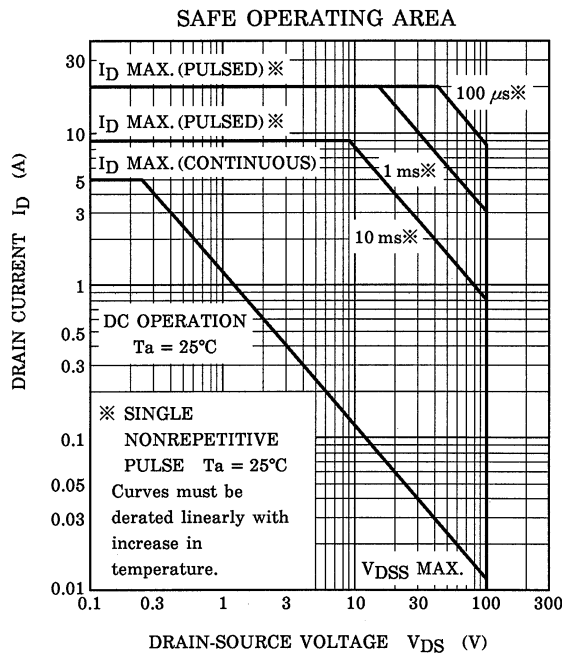
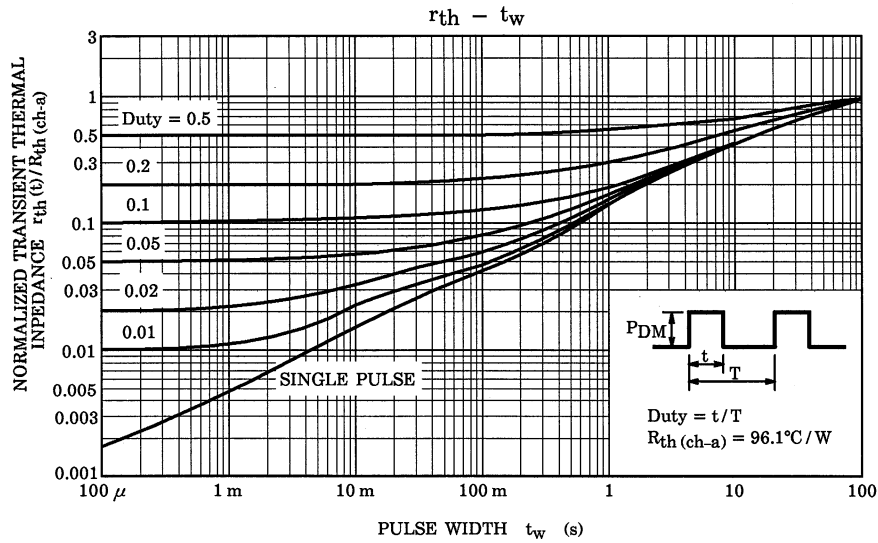
⌘ Lot Number

 Month (Starting from Alphabet A)

 Year (Last Number of the Christian Era)







$$R_G = 25 \, \Omega$$

$$V_{DD} = 25 \, V, L = 11.6 \, mH$$

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

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