

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

2SK2741

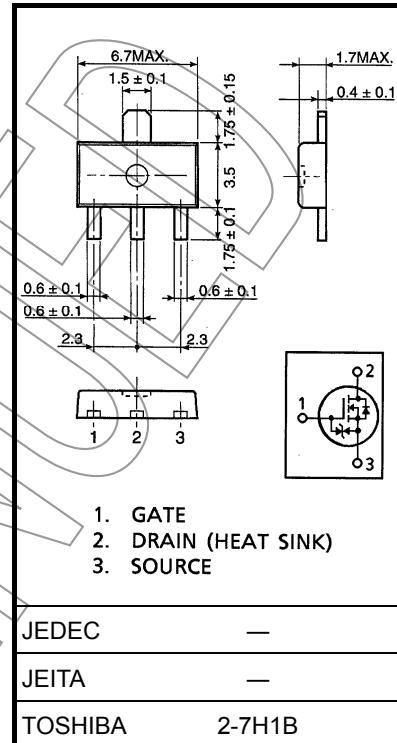
Chopper Regulator, DC-DC Converter and Motor Drive Applications

Unit: mm

- 4 V gate drive
- Low drain-source ON resistance : $R_{DS(ON)} = 0.12 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 5.0 \text{ S}$ (typ.)
- Low leakage current : $ID_{SS} = 100 \mu\text{A}$ (max) ($V_{DS} = 60 \text{ V}$)
- Enhancement-mode : $V_{th} = 0.8 \sim 2.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $ID = 1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	60	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	60	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	5	A
	Pulse (Note 1)	I_{DP}	20	
Drain power dissipation (Note 2)		P_D	2.5	W
Single pulse avalanche energy (Note 3)		E_{AS}	129	mJ
Avalanche current		I_{AR}	5	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.25	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~150	$^\circ\text{C}$



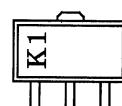
Weight: 0.12 g (typ.)

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Thermal Characteristics

Marking

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C} / \text{W}$



Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: Mounted on ceramic substrate (25.4 mm × 25.4 mm × 0.8 mm)

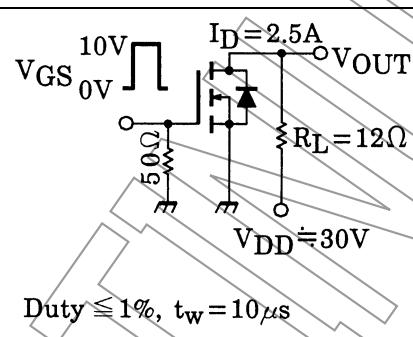
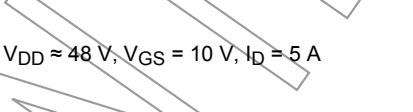
Note 3: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 7 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 5 \text{ A}$

Note 4: Repetitive rating; Pulse width limited by maximum channel temperature.

This transistor is an electrostatic sensitive device.

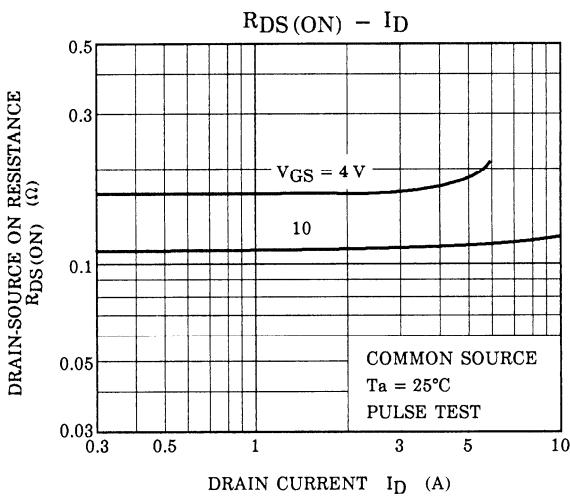
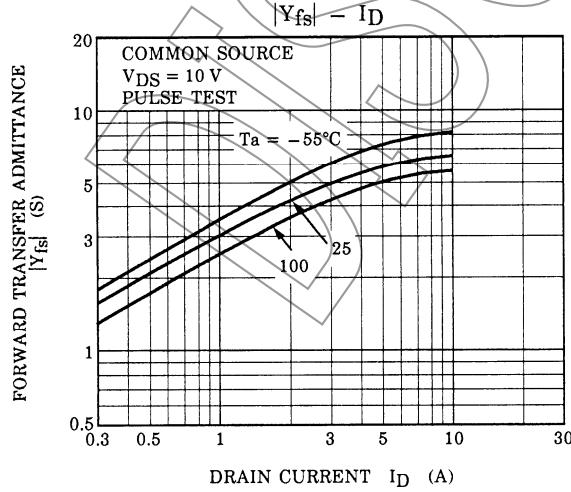
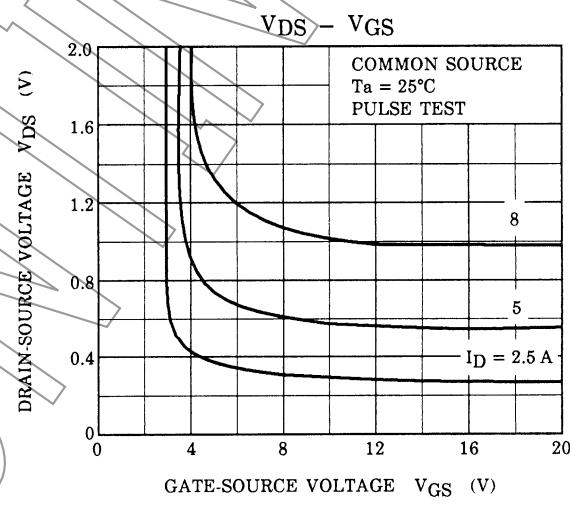
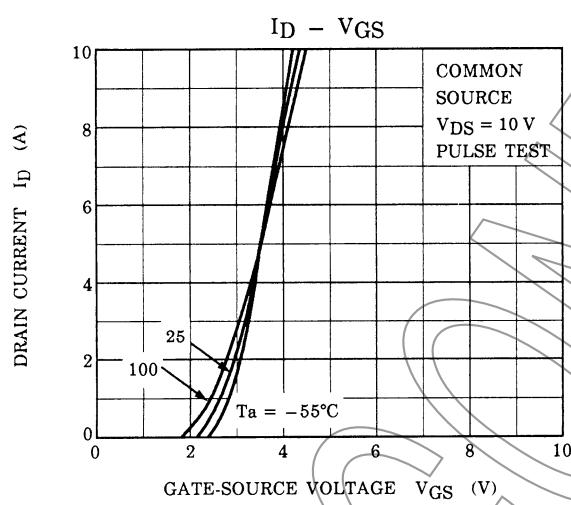
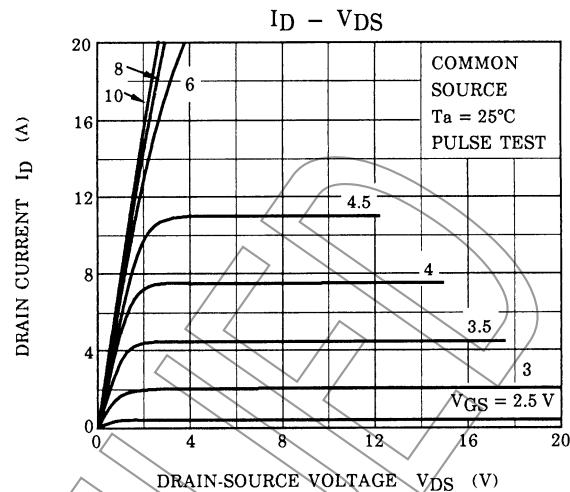
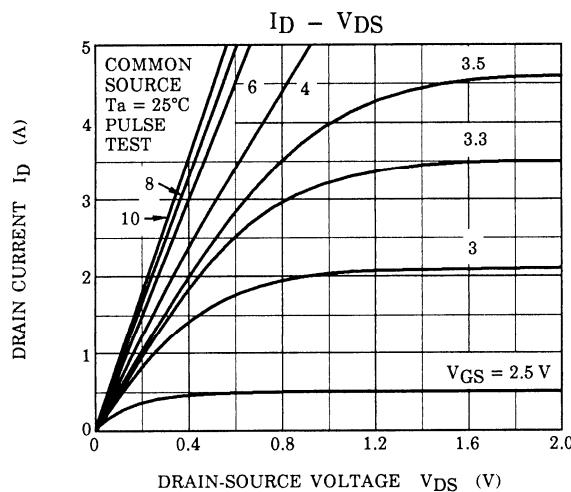
Please handle with caution.

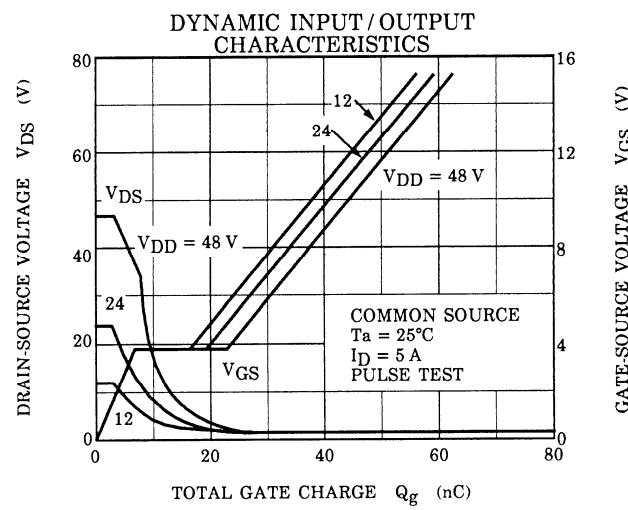
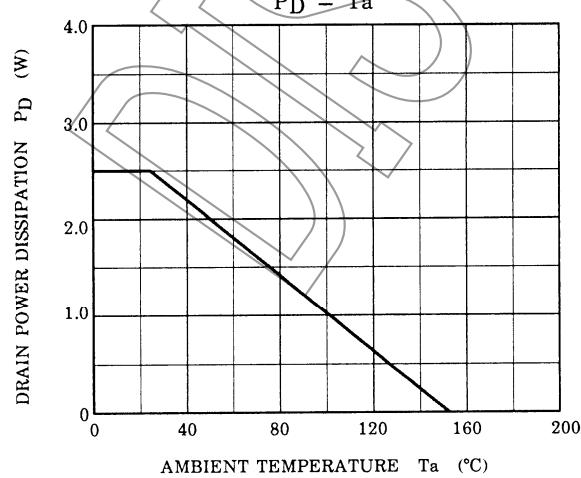
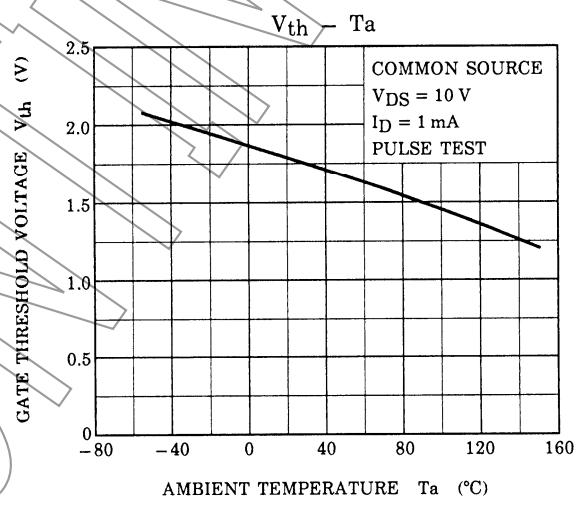
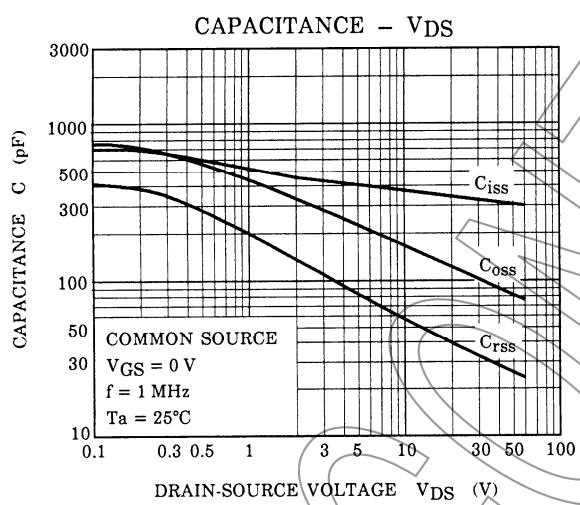
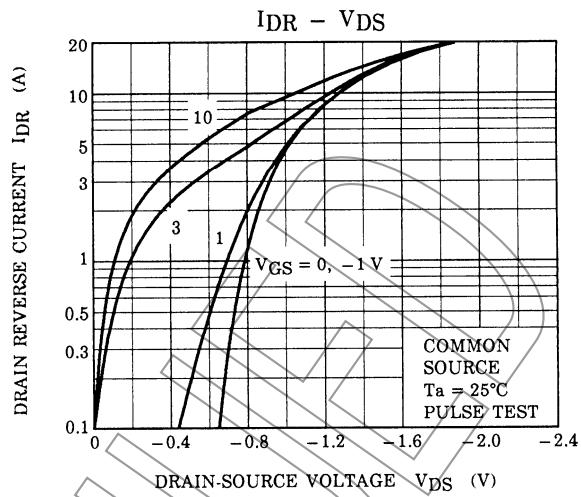
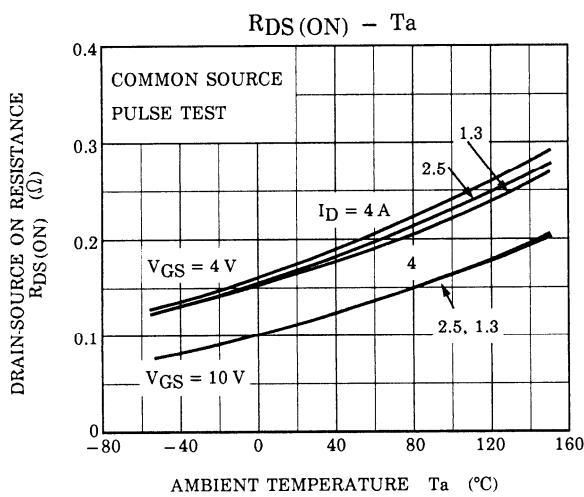
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

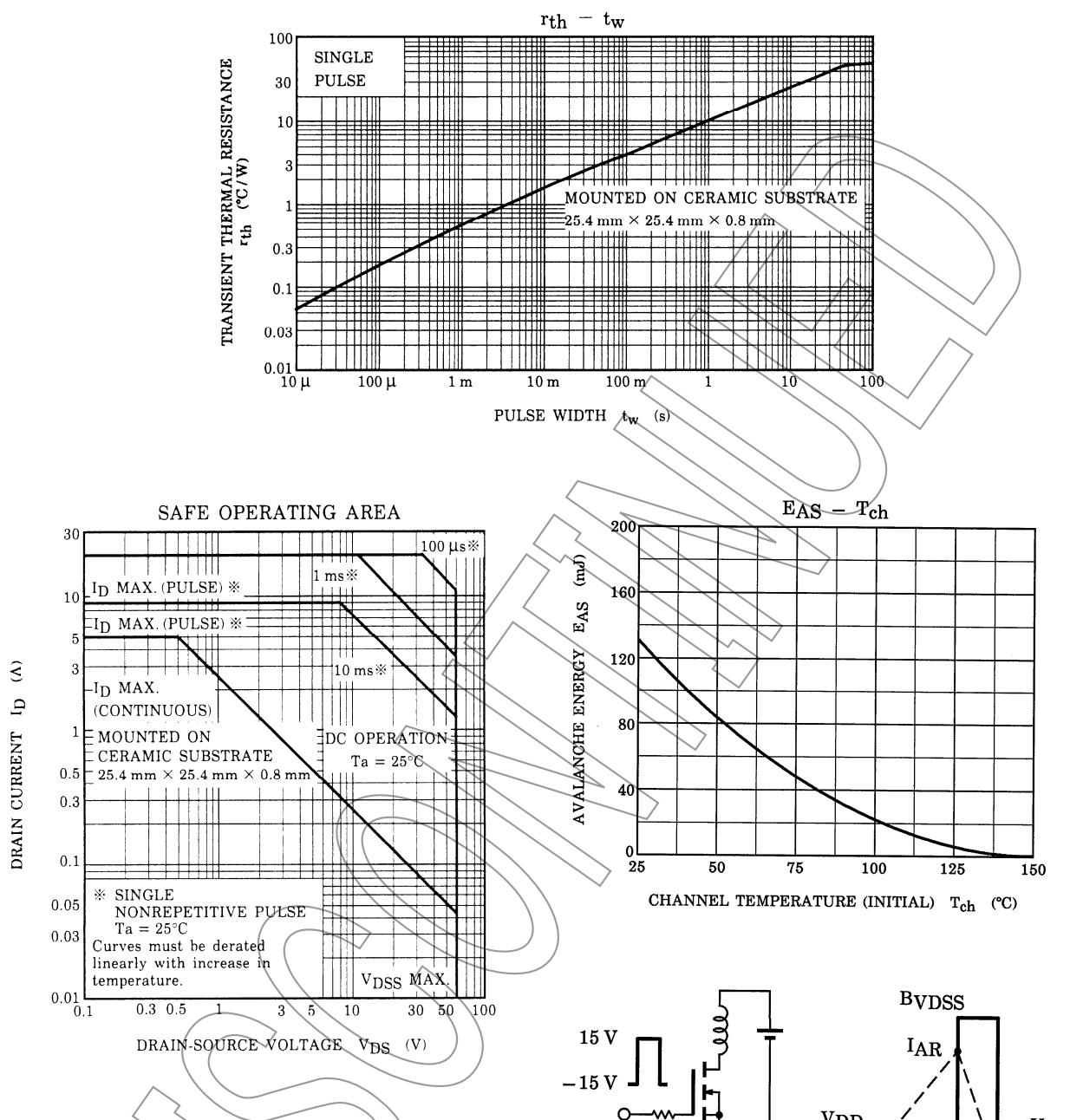
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current	I_{DSS}	$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	60	—	—	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	$R_{DS(\text{ON})}$	$V_{GS} = 4\text{ V}$, $I_D = 1.3\text{ A}$ $V_{GS} = 10\text{ V}$, $I_D = 2.5\text{ A}$	—	0.20	0.30	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 2.5\text{ A}$	—	0.12	0.16	
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	—	370	—	pF
Reverse transfer capacitance	C_{rss}		—	60	—	
Output capacitance	C_{oss}		—	180	—	
Switching time	Rise time	t_r		—	18	—
	Turn-on time	t_{on}		—	25	—
	Fall time	t_f		—	55	—
	Turn-off time	t_{off}		—	170	—
Total gate charge (gate-source plus gate-drain)	Q_g		—	12	—	nC
Gate-source charge	Q_{gs}		—	8	—	
Gate-drain ("miller") Charge	Q_{gd}		—	4	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

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}	$I_{DR} = 5\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	70	—	ns
Reverse recovery charge	Q_{rr}		—	0.1	—	μC







$$R_G = 25\ \Omega$$

$$V_{DD} = 25\text{ V}, L = 7\text{ mH}$$

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

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