

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

2SK2777

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 0.9 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 5.5 S$ (typ.)
- Low leakage current : $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 600 V$)
- Enhancement mode : $V_{th} = 2.0$ to $4.0 V$ ($V_{DS} = 10 V$, $I_D = 1 mA$)

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	600	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	600	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current	DC (Note 1)	I_D	A
	Pulse (Note 1)	I_{DP}	A
Drain power dissipation ($T_c = 25^\circ C$)	P_D	65	W
Single pulse avalanche energy (Note 2)	E_{AS}	345	mJ
Avalanche current	I_{AR}	6	A
Repetitive avalanche energy (Note 3)	E_{AR}	6.5	mJ
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	-55 to 150	$^\circ C$

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

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(ch-c)$	1.92	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th}(ch-a)$	83.3	$^\circ C / W$

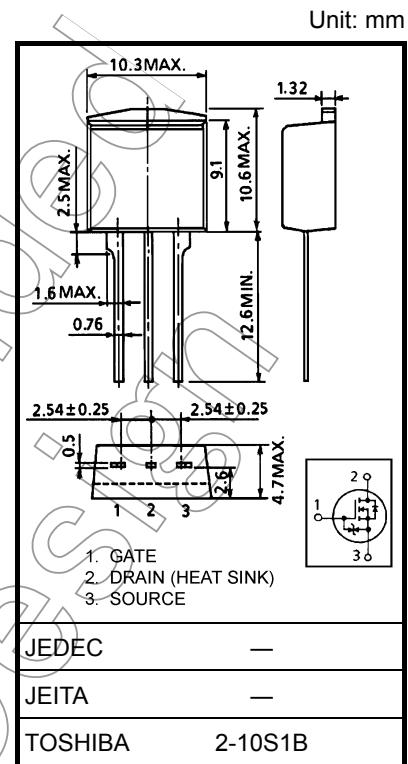
Note 1: Ensure that the channel temperature does not exceed $150^\circ C$.

Note 2: $V_{DD} = 90 V$, $T_{ch} = 25^\circ C$ (initial), $L = 16.8 mH$, $R_G = 25 \Omega$, $I_{AR} = 6 A$

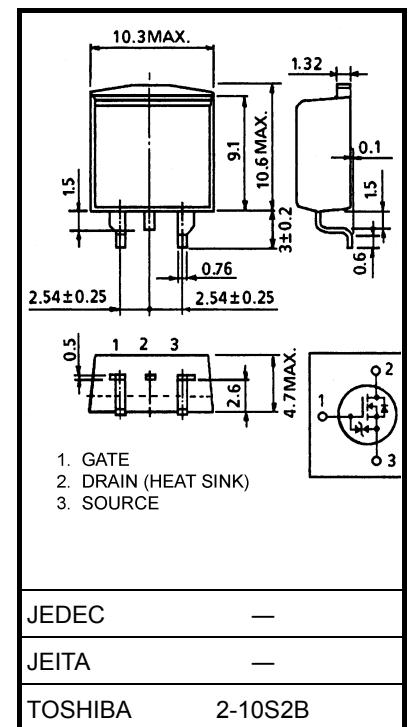
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.



Weight: 1.5 g (typ.)



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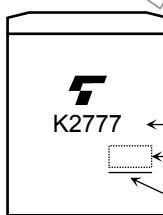
Electrical Characteristics ($T_a = 25^\circ C$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25 V, V_{DS} = 0 V$	—	—	± 10	μA
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	± 30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = 600 V, V_{GS} = 0 V$	—	—	100	μA
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 mA, V_{GS} = 0 V$	600	—	—	V
Gate threshold voltage	V_{th}	$V_{DS} = 10 V, I_D = 1 mA$	2.0	—	4.0	V
Drain-source ON resistance	$R_{DS (ON)}$	$V_{GS} = 10 V, I_D = 3 A$	—	0.9	1.25	Ω
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 V, I_D = 3 A$	2.0	5.5	—	S
Input capacitance	C_{iss}	$V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz$	—	1300	—	pF
Reverse transfer capacitance	C_{rss}		—	130	—	
Output capacitance	C_{oss}		—	400	—	
Switching time	Rise time	t_r	—	25	—	ns
	Turn-on time	t_{on}	—	45	—	
	Fall time	t_f	—	40	—	
	Turn-off time	t_{off}	—	150	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 400 V, V_{GS} = 10 V, I_D = 6 A$	—	30	—	nC
Gate-source charge	Q_{gs}		—	18	—	
Gate-drain ("miller") Charge	Q_{gd}		—	12	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	6	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	24	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 6 A, V_{GS} = 0 V$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 6 A, V_{GS} = 0 V, dI_{DR} / dt = 100 A / \mu s$	—	1000	—	ns
Reverse recovery charge	Q_{rr}		—	7	—	μC

Marking



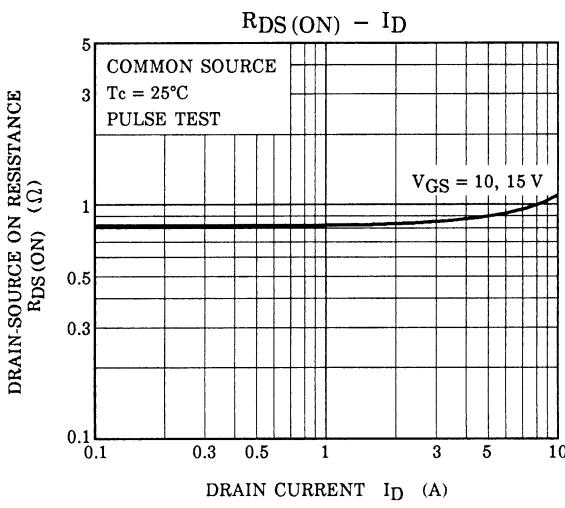
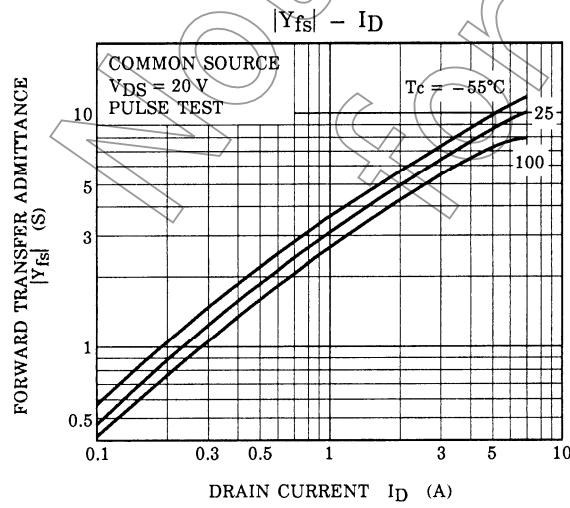
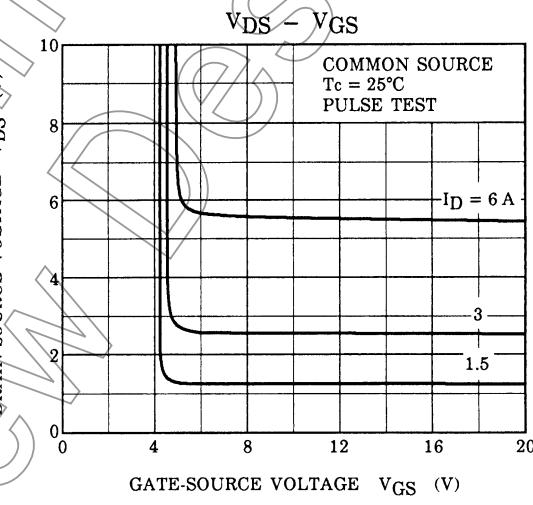
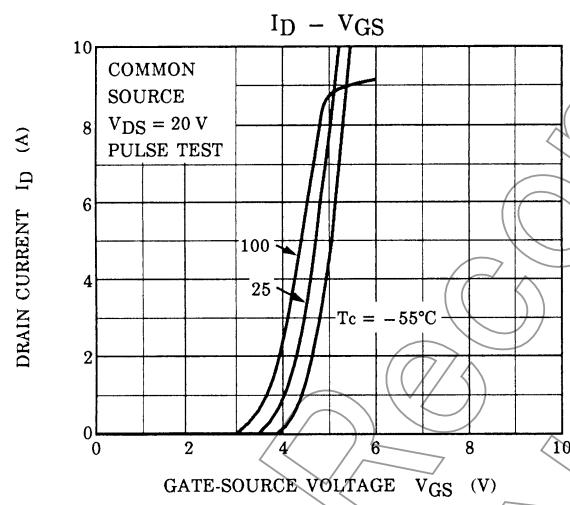
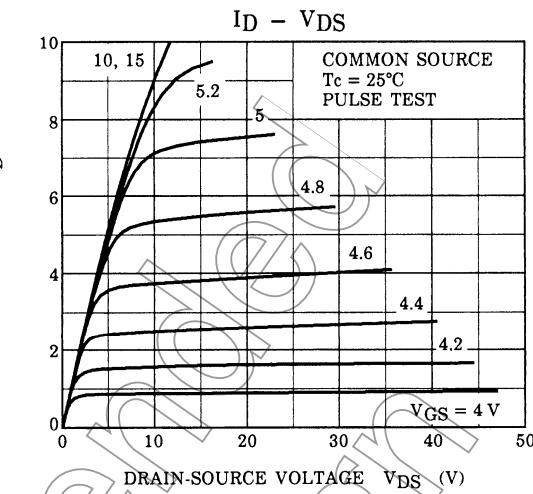
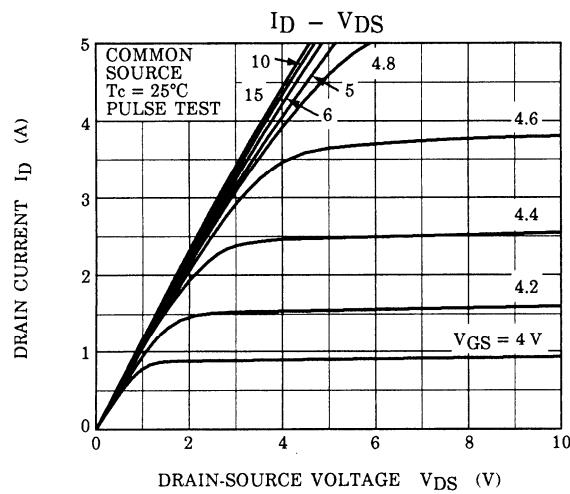
Part No. (or abbreviation code)
Lot No.
Note 4

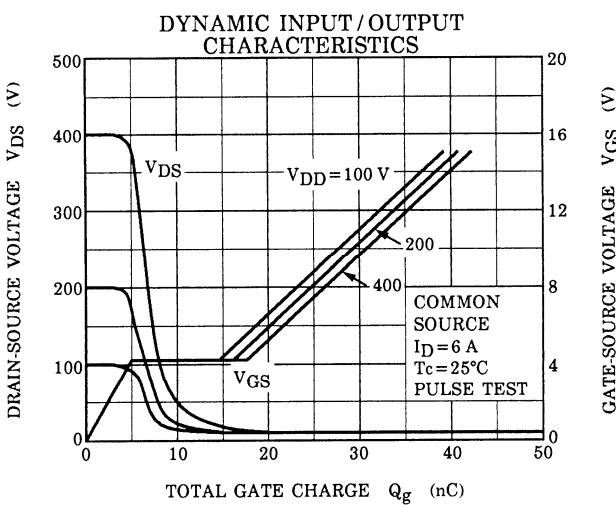
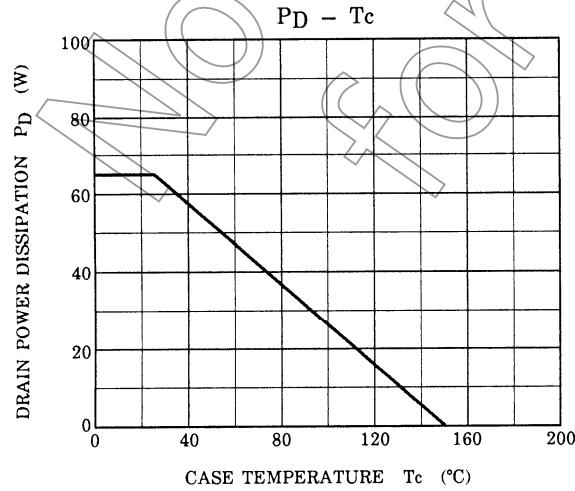
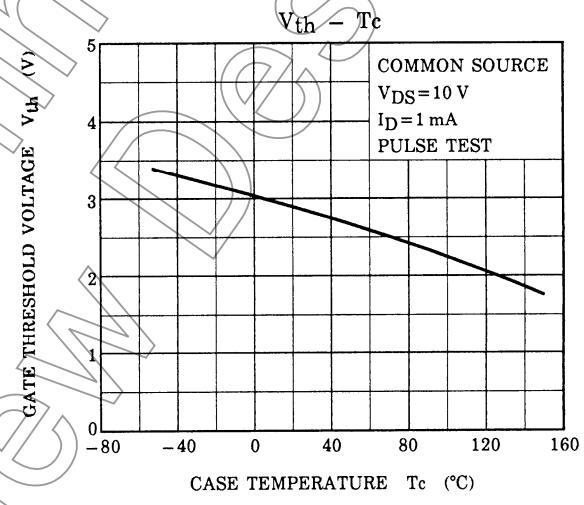
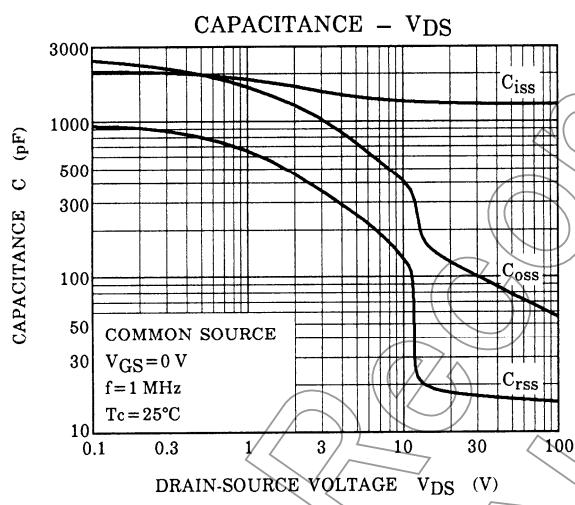
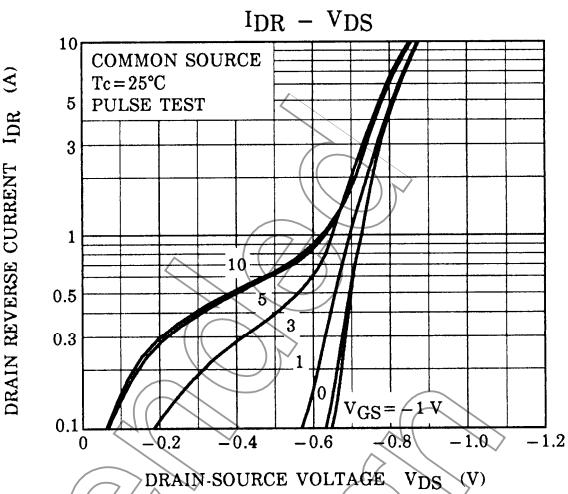
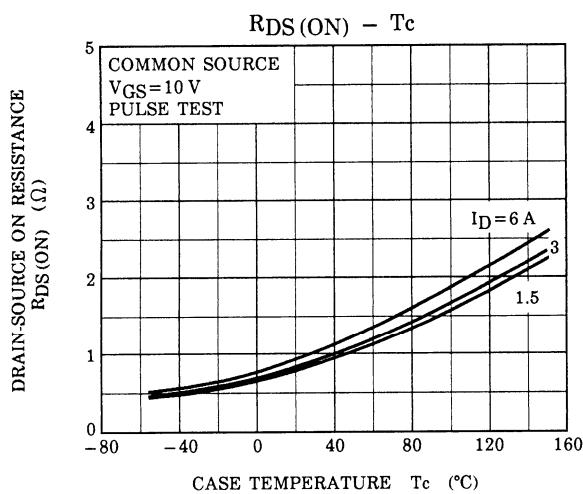
Note 4: A line under a Lot No. identifies the indication of product Labels.

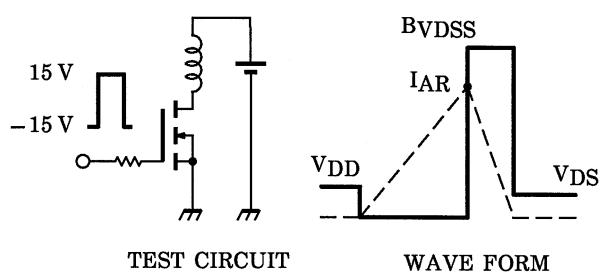
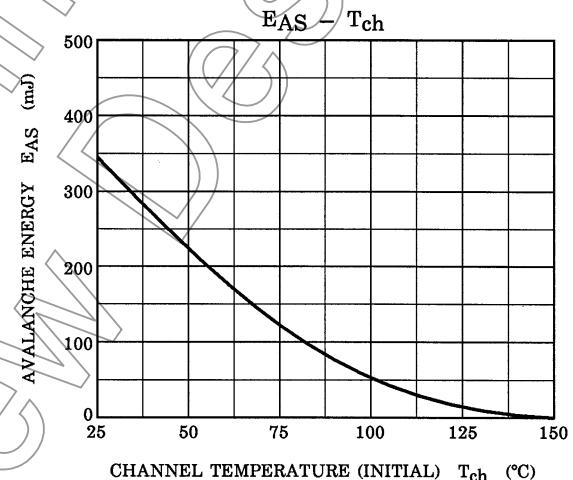
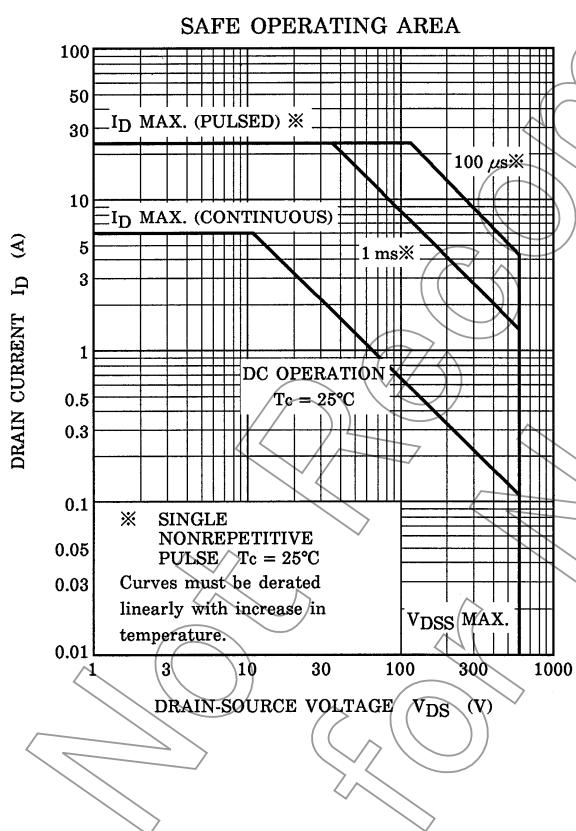
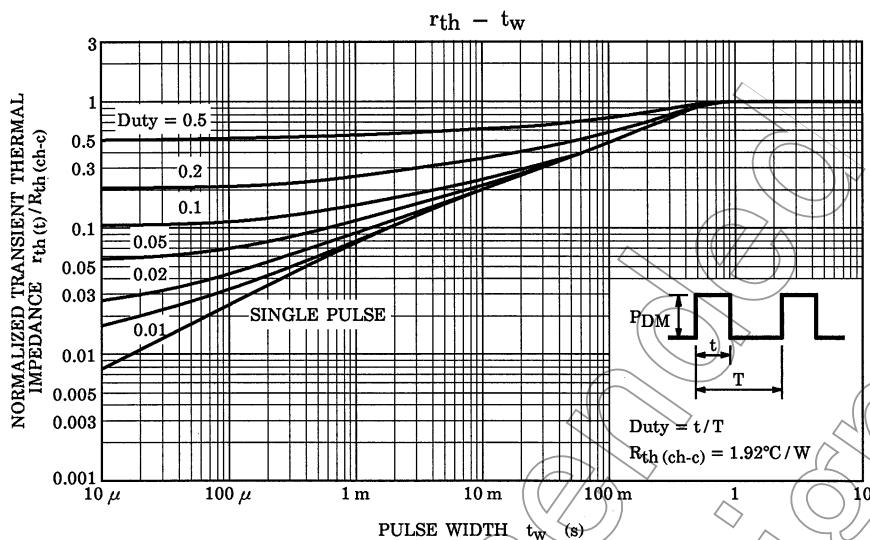
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 16.8 \text{ mH}$$

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

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