

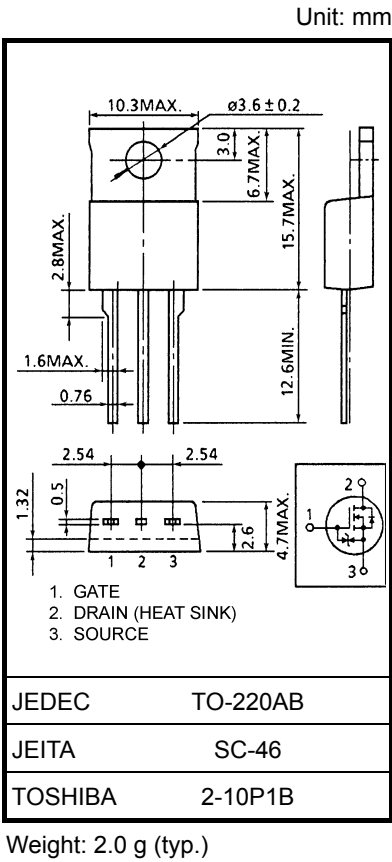
2SK2544

Switching Regulator 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 : $V_{th} = 2.0\sim 4.0\ V$ ($V_{DS} = 10\ V$, $I_D = 1\ mA$)

Absolute Maximum Ratings (Ta = 25°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	6	A
	Pulse (Note 1)	I_{DP}	24	A
Drain power dissipation ($T_c = 25^\circ C$)		P_D	80	W
Single pulse avalanche energy (Note 2)		E_{AS}	345	mJ
Avalanche current		I_{AR}	6	A
Repetitive avalanche energy (Note 3)		E_{AR}	8	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55~150	°C



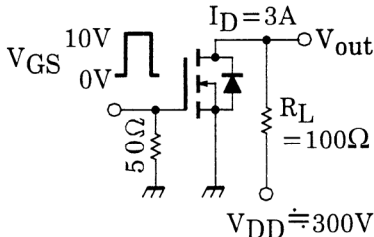
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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	$R_{th(ch-c)}$	1.56	°C / W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	°C / W

- Note 1: Ensure that the channel temperature does not exceed 150°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.

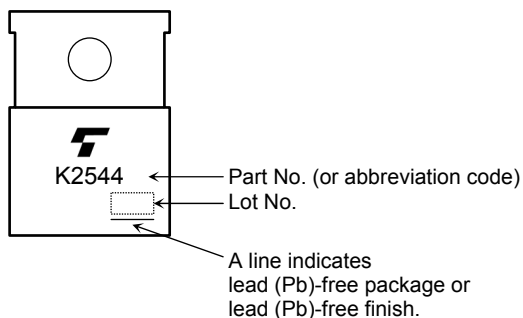
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Gate-source breakdown voltage		$V_{(BR) GSS}$	$I_G = \pm 10 \mu\text{A}, V_{GS} = 0 \text{ V}$	± 30	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	600	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	2.0	—	4.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 3 \text{ A}$	—	0.9	1.25	Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 3 \text{ A}$	2.0	5.5	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1300	—	pF
Reverse transfer capacitance		C_{rss}		—	130	—	
Output capacitance		C_{oss}		—	400	—	
Switching time	Rise time	t_r	 <p>$I_D = 3 \text{ A}$ $V_{DD} \approx 300 \text{ V}$ $R_L = 100 \Omega$ $V_{GS} = 10 \text{ V}, 0 \text{ V}$ 50Ω V_{out}</p> <p>Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$</p>	—	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	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$	—	30	—	nC
Gate-source charge		Q_{gs}		—	18	—	
Gate-drain ("miller") charge		Q_{gd}		—	12	—	

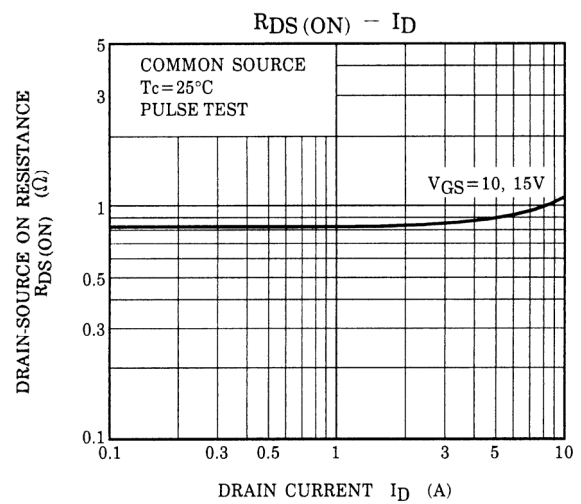
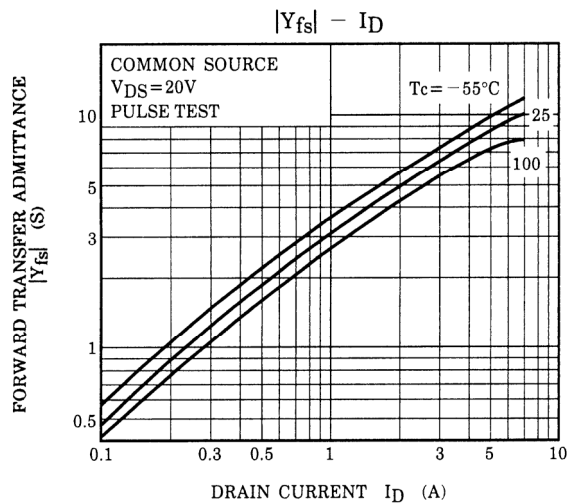
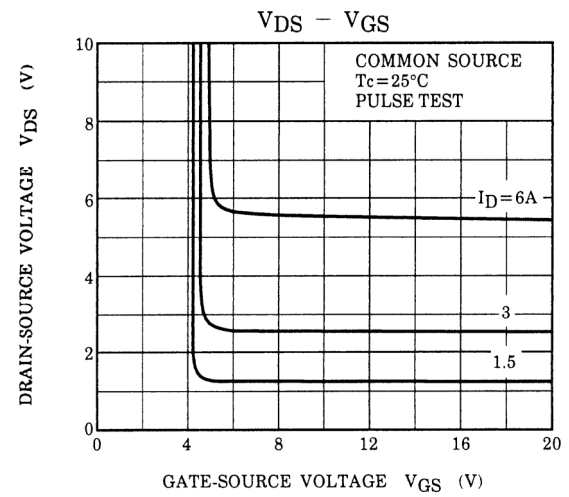
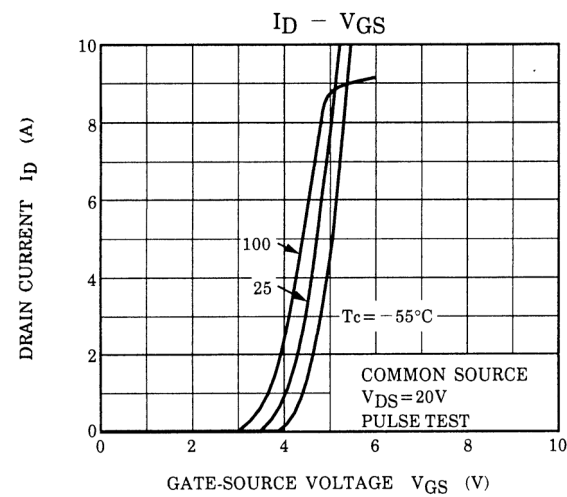
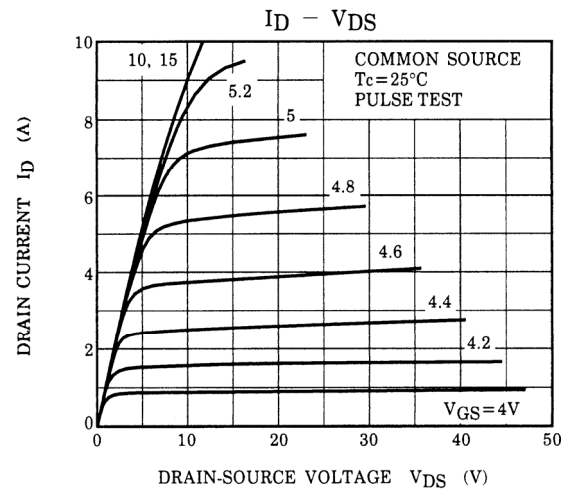
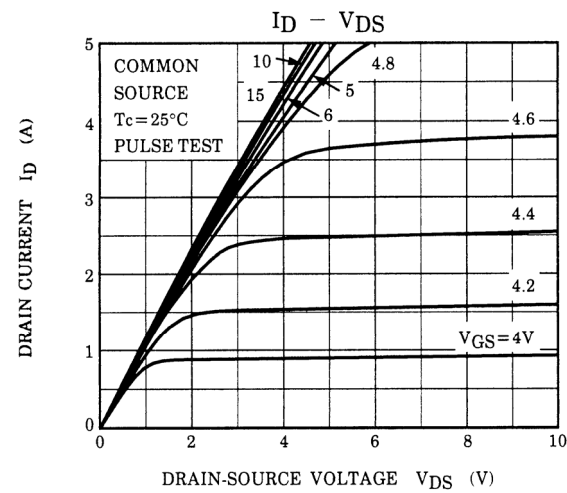
Source-Drain Ratings and Characteristics (Ta = 25°C)

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}	$I_{DR} = 6 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 6 \text{ A}, V_{GS} = 0 \text{ V}$	—	1000	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 100 \text{ A} / \mu\text{s}$	—	7	—	μC

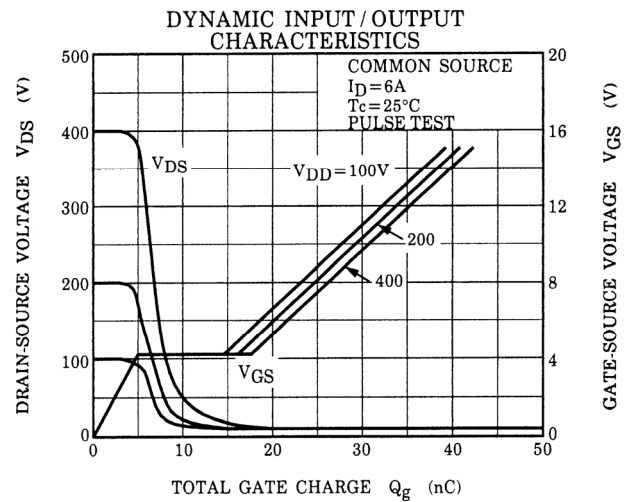
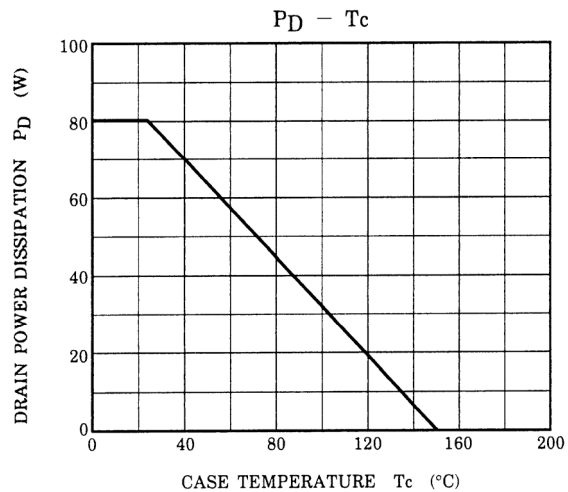
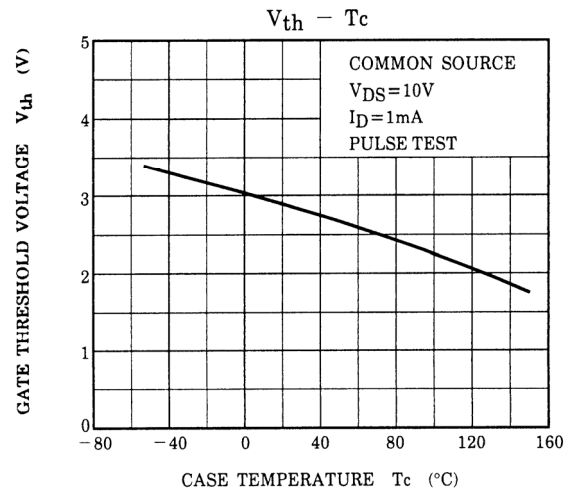
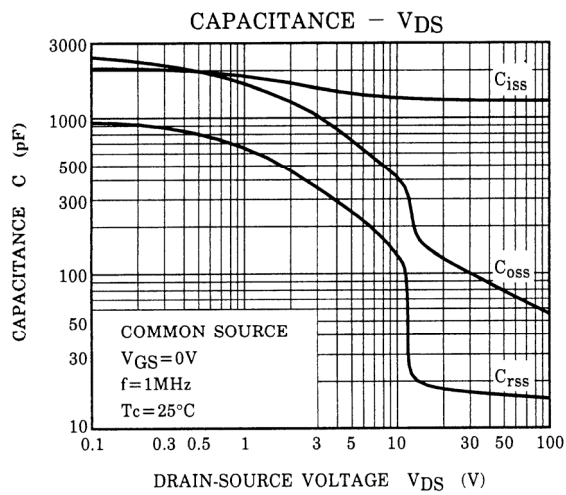
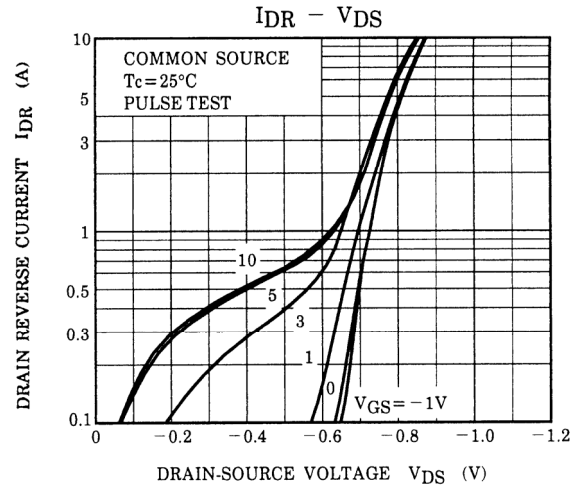
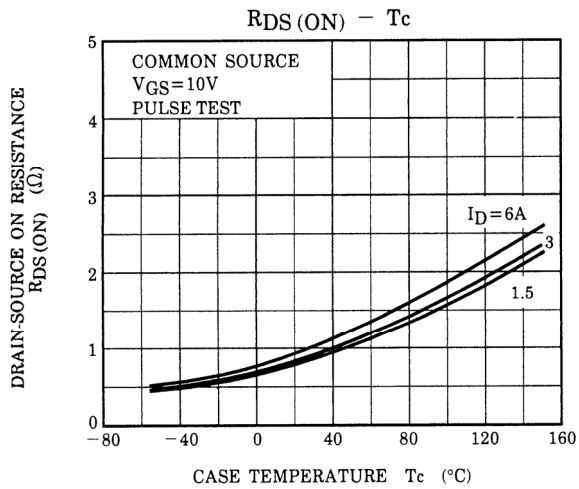
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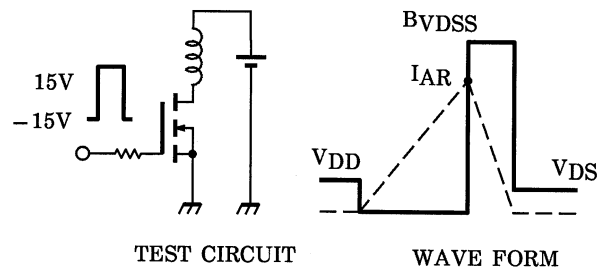
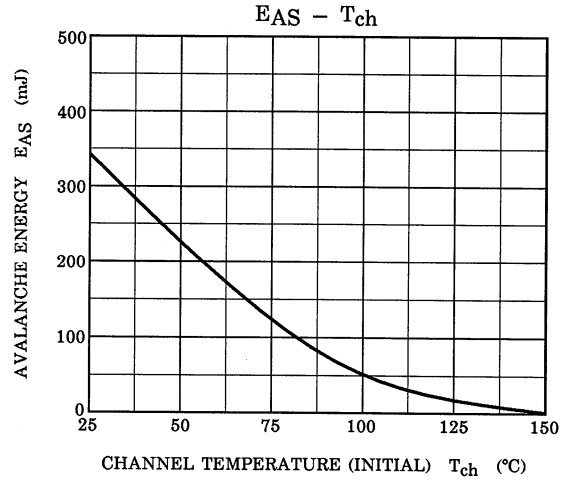
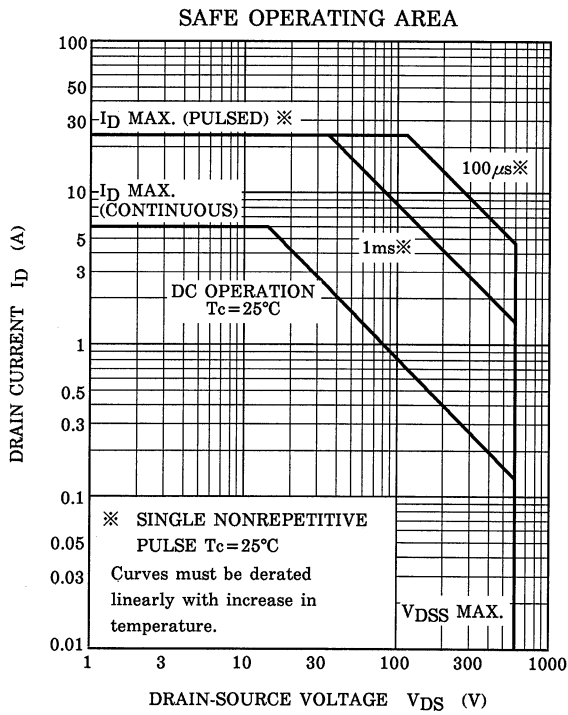
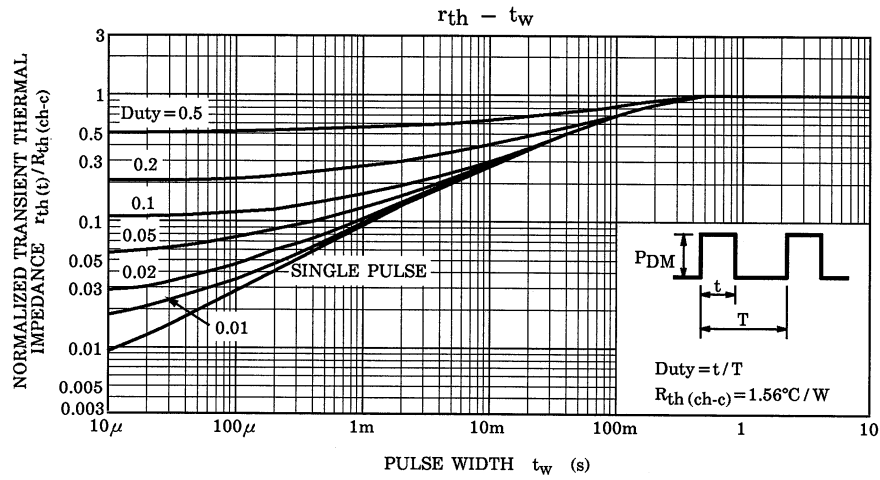


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$$R_G = 25 \, \Omega$$

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

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

RESTRICTIONS ON PRODUCT USE

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