

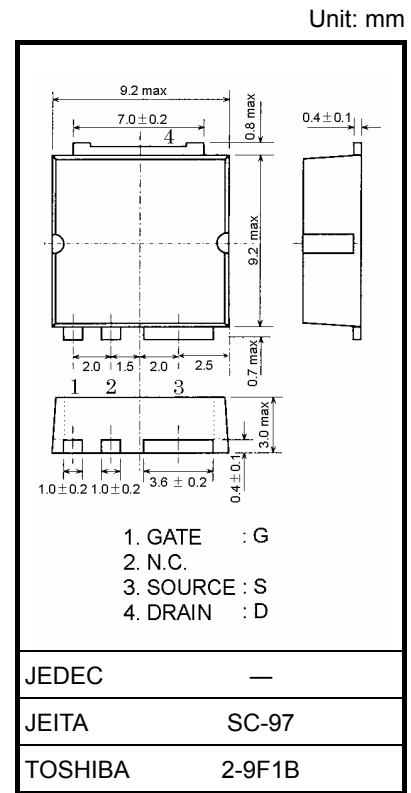
# 2SK3843

Switching Regulator, DC/DC Converter and Motor Drive Applications

- Low drain-source ON resistance :  $R_{DS(ON)} = 2.7 \text{ m}\Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 120 \text{ S}$  (typ.)
- Low leakage current :  $I_{DSS} = 10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = 40 \text{ V}$ )
- Enhancement mode :  $V_{th} = 1.5\sim 3.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

## Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	40	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )	$V_{DGR}$	40	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	75 A
	Pulse (Note 1)	$I_{DP}$	300 A
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	125	W
Single-pulse avalanche energy (Note 2)	$E_{AS}$	542	mJ
Avalanche current	$I_{AR}$	75	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	12.5	mJ
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~150	$^\circ\text{C}$



Weight: 0.74 g (typ.)

## Thermal Characteristics

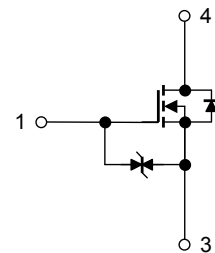
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.0	$^\circ\text{C/W}$

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

Note 2:  $V_{DD} = 25 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 100 \text{ }\mu\text{H}$ ,  $I_{AR} = 75 \text{ A}$ ,  $R_G = 25 \text{ }\Omega$

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

This transistor is an electrostatic-sensitive device. Handle with care.



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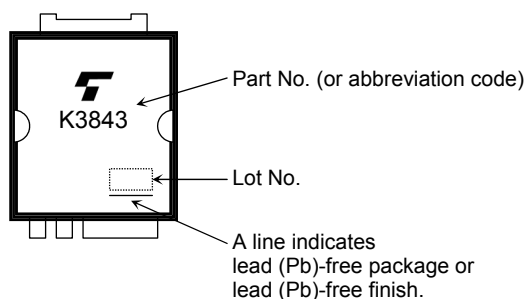
## Electrical Characteristics (Ta = 25°C)

Characteristic		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 cutoff current		$I_{DSS}$	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	$\mu\text{A}$
Drain–source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	40	—	—	V
		$V_{(BR)DSX}$	$I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$	15	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	1.5	—	3.0	V
Drain–source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4.5 \text{ V}, I_D = 38 \text{ A}$	—	4.3	8.0	m $\Omega$
			$V_{GS} = 10 \text{ V}, I_D = 38 \text{ A}$	—	2.7	3.5	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 38 \text{ A}$	60	120	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	11200	—	pF
Reverse transfer capacitance		$C_{rss}$		—	800	—	
Output capacitance		$C_{oss}$		—	1350	—	
Switching time	Rise time	$t_r$		—	12	—	ns
	Turn-on time	$t_{on}$		—	40	—	
	Fall time	$t_f$		—	65	—	
	Turn-off time	$t_{off}$		Duty $\leq 1\%$ , $t_w = 10 \mu\text{s}$	—	260	
Total gate charge (gate–source plus gate–drain)		$Q_g$	$V_{DD} \approx 32 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 75 \text{ A}$	—	210	—	nC
Gate–source charge		$Q_{gs}$		—	150	—	
Gate–drain (“Miller”) Charge		$Q_{gd}$		—	60	—	

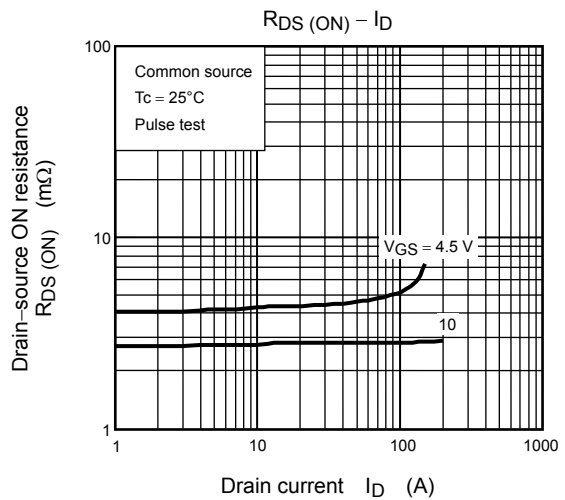
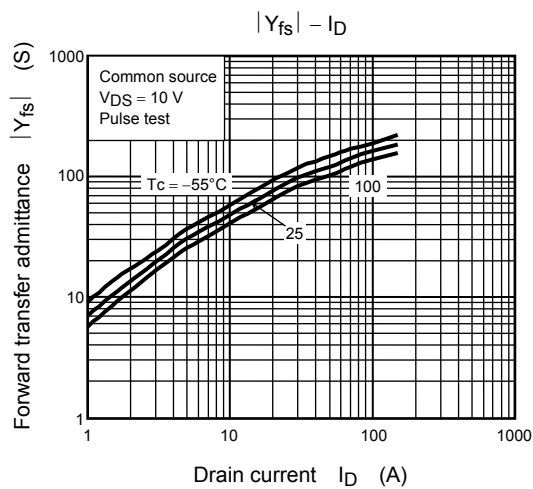
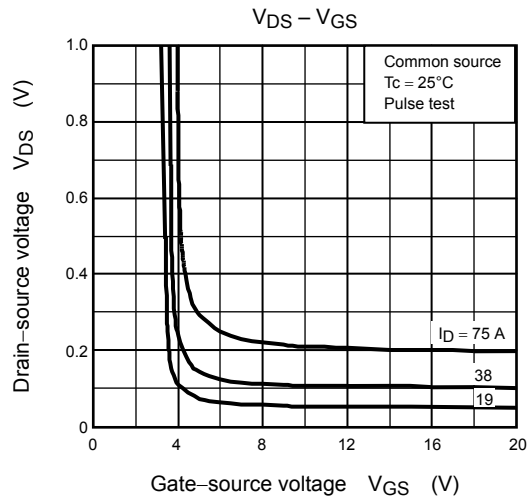
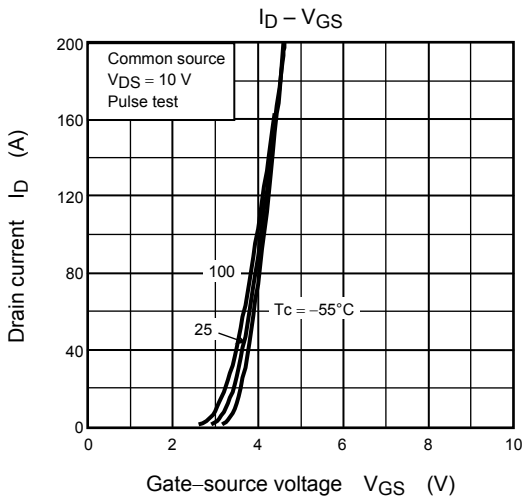
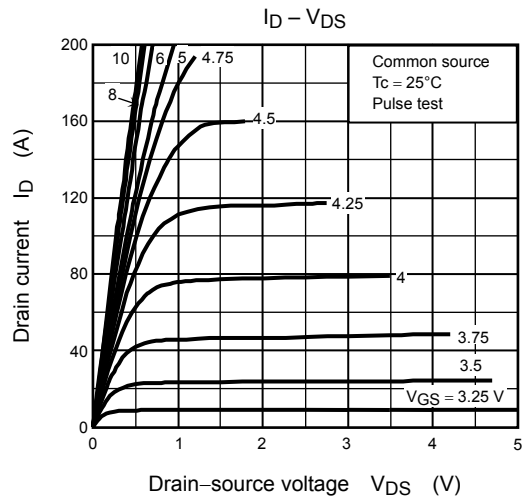
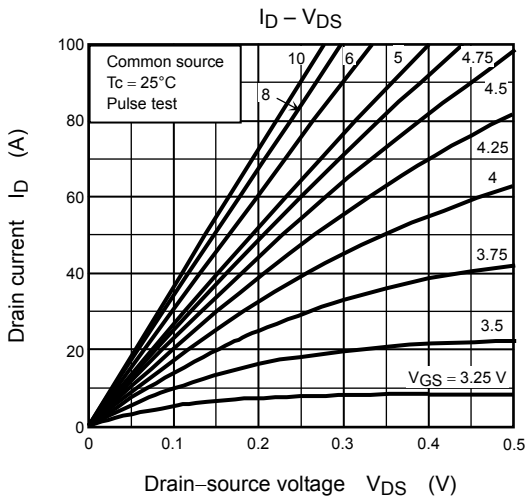
## Source–Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	75	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	300	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR1} = 75 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.5	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 75 \text{ A}, V_{GS} = 0 \text{ V}$	—	100	—	ns
Reverse recovery charge	$Q_{rr}$	$dI_{DR}/dt = 30 \text{ A}/\mu\text{s}$	—	120	—	nC

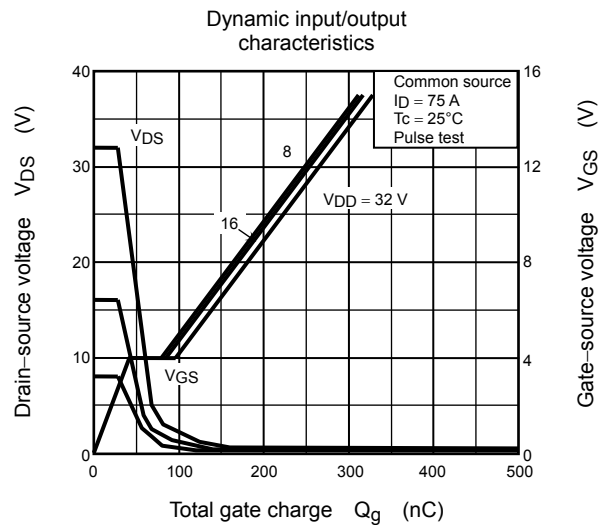
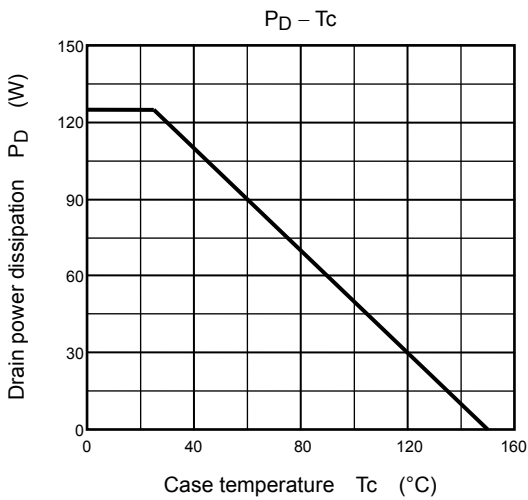
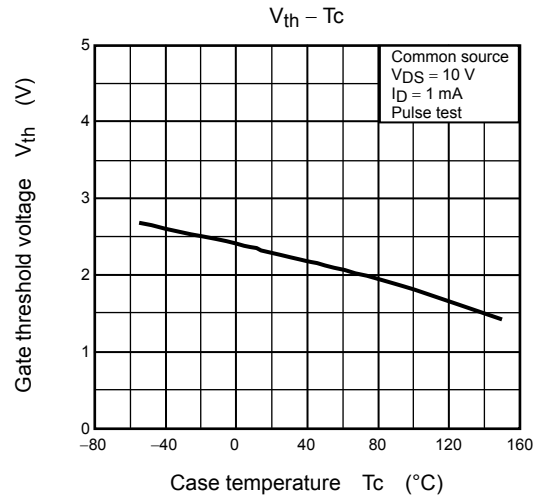
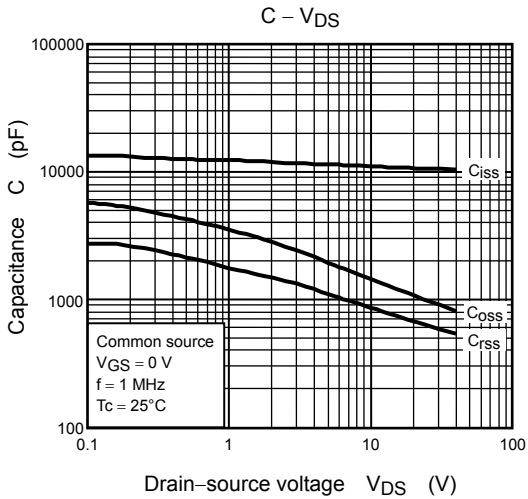
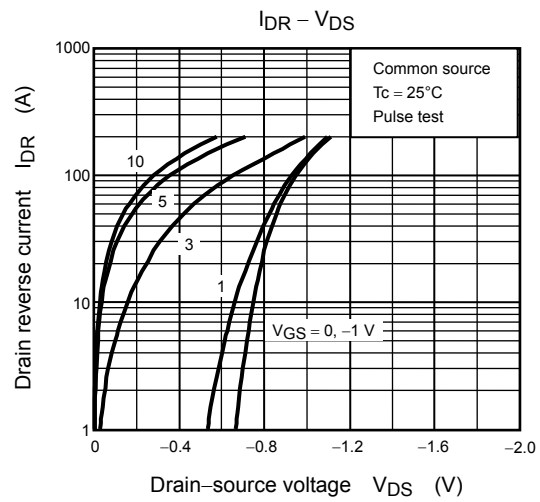
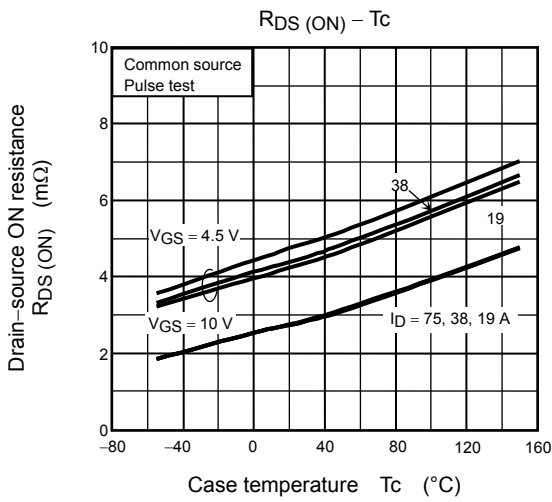
## Marking



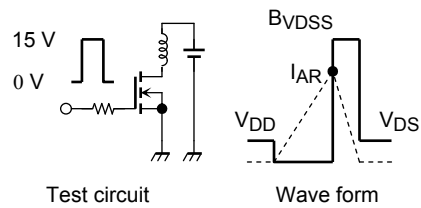
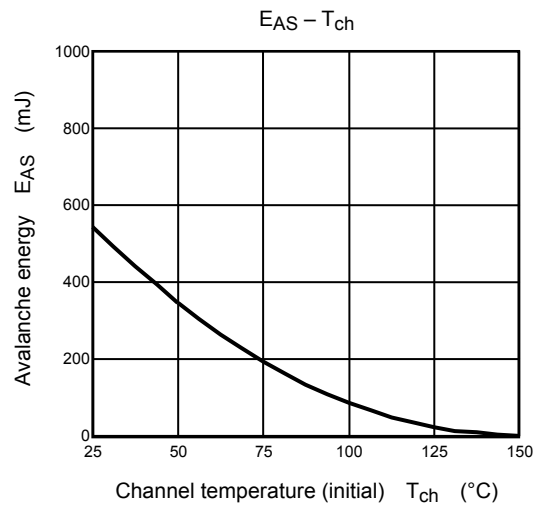
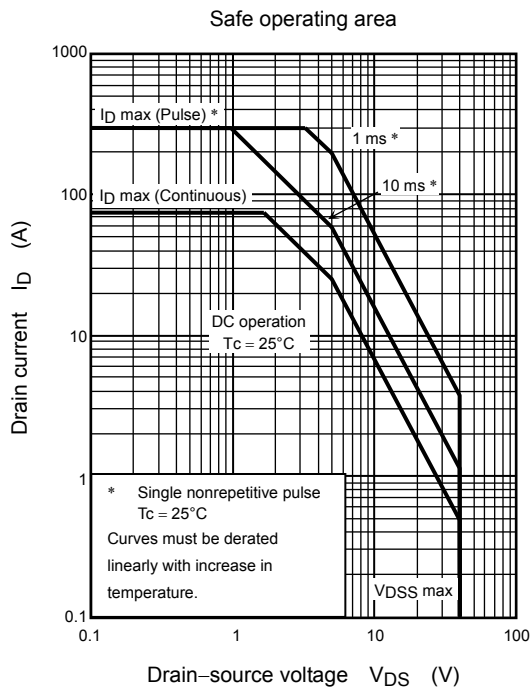
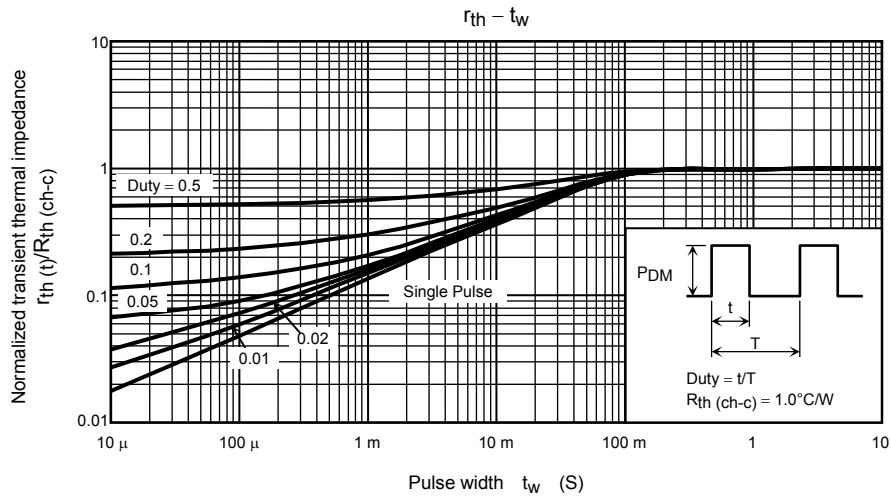
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$R_G = 25 \Omega$   
 $V_{DD} = 25 V, L = 100 \mu H$

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

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