

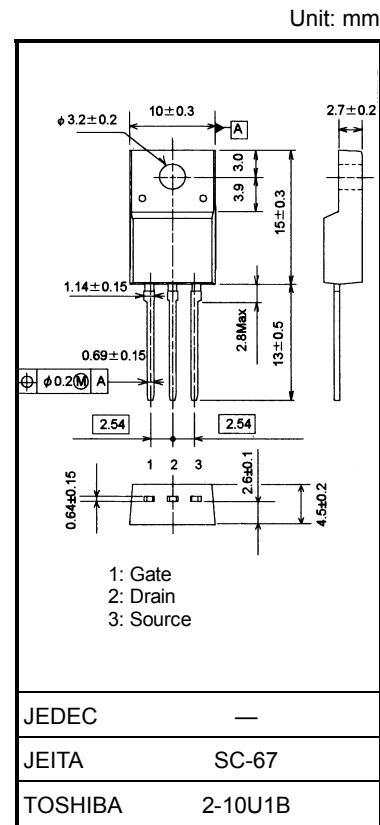
# 2SK3742

## Switching Regulator Applications

- Low drain-source ON resistance:  $R_{DS(ON)} = 2.2 \text{ } \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 3.5 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \text{ } \mu\text{A}$  ( $V_{DS} = 720 \text{ V}$ )
- Enhancement model:  $V_{th} = 4.0\sim 5.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

### Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	900	V
Drain-gate voltage ( $R_{GS} = 20\text{ k}\Omega$ )		$V_{DGR}$	900	V
Gate-source voltage		$V_{GSS}$	$\pm 30$	V
Drain current	DC (Note 1)	$I_D$	5	A
	Pulse ( $t = 1\text{ ms}$ ) (Note 1)	$I_{DP}$	15	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )		$P_D$	45	W
Single pulse avalanche energy (Note 2)		$E_{AS}$	595	mJ
Avalanche current		$I_{AR}$	5	A
Repetitive avalanche energy (Note 3)		$E_{AR}$	4.5	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55~150	$^\circ\text{C}$



Weight: 1.7 g (typ.)

## Thermal Characteristics

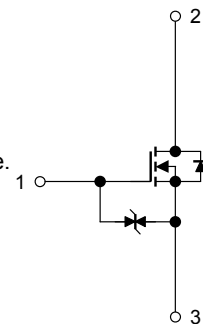
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	2.78	°C/W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

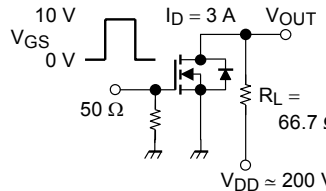
Note 2:  $V_{DD} = 90 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 43.6 \text{ mH}$ ,  $I_{AR} = 5.0 \text{ A}$ ,  $R_G = 25 \Omega$

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

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



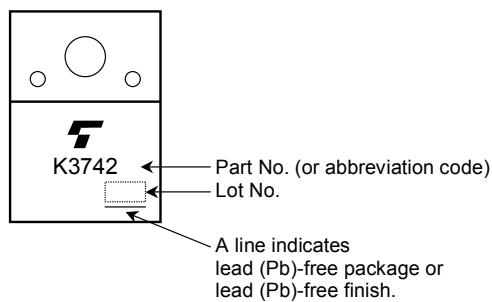
## Electrical Characteristics (Ta = 25°C)

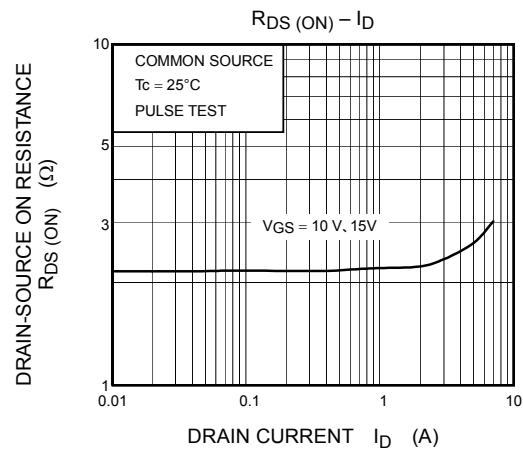
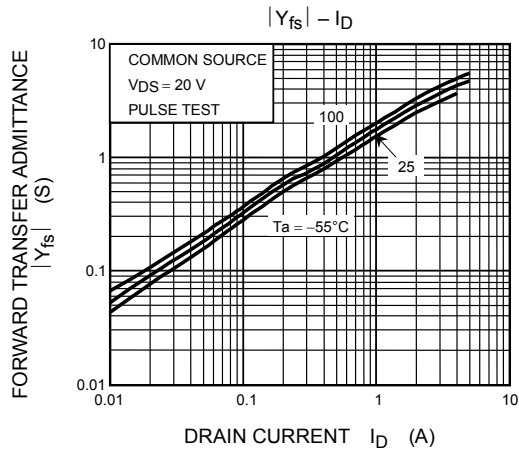
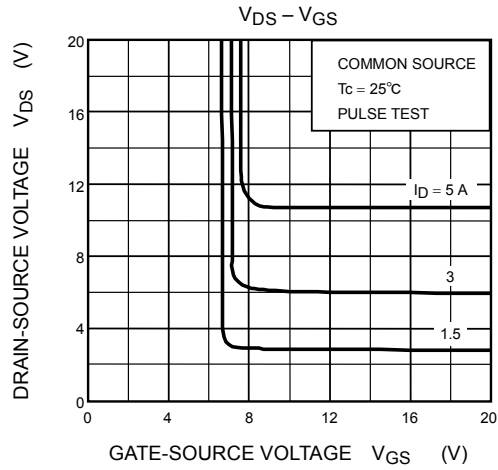
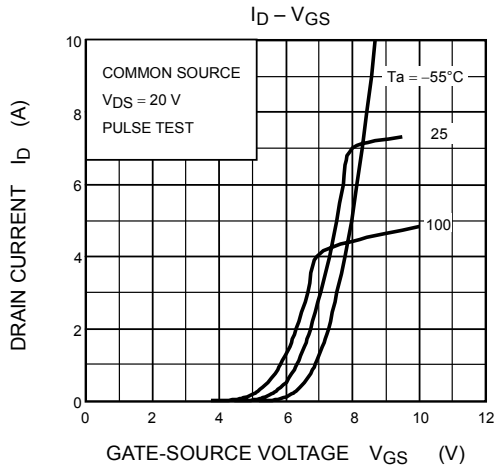
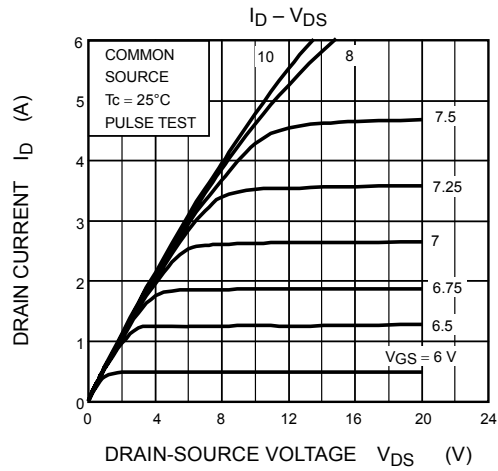
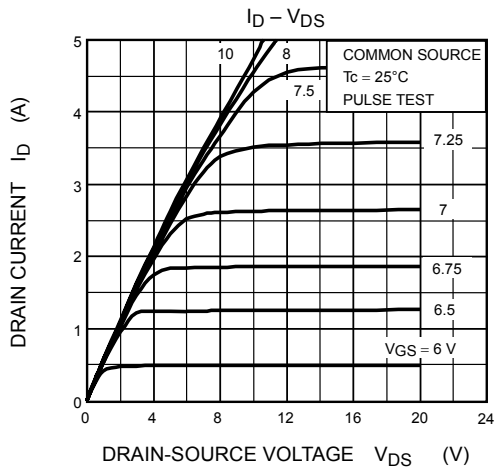
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Gate-source breakdown voltage		$V_{(BR)GSS}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	$\pm 30$	—	—	V
Drain cutoff current		$I_{DSS}$	$V_{DS} = 720 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	900	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	4.0	—	5.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 3 \text{ A}$	—	2.2	2.5	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 20 \text{ V}, I_D = 3 \text{ A}$	1.5	3.5	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1150	—	pF
Reverse transfer capacitance		$C_{rss}$		—	20	—	
Output capacitance		$C_{oss}$		—	110	—	
Switching time	Rise time	$t_r$		—	100	—	ns
	Turn-on time	$t_{on}$		—	140	—	
	Fall time	$t_f$		—	40	—	
	Turn-off time	$t_{off}$		—	130	—	
Total gate charge		$Q_g$	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	25	—	nC
Gate-source charge		$Q_{gs}$		—	11	—	
Gate-drain charge		$Q_{gd}$		—	14	—	

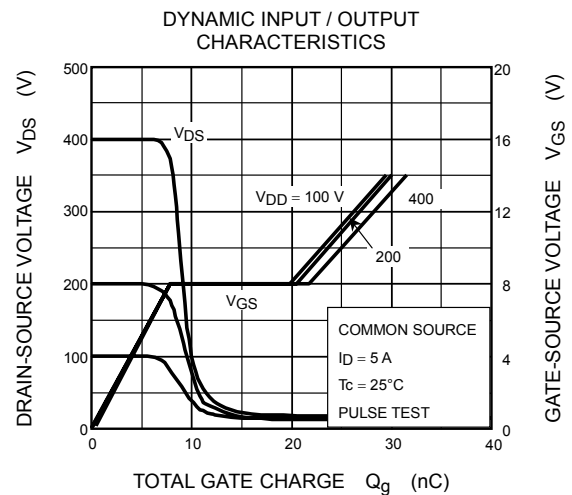
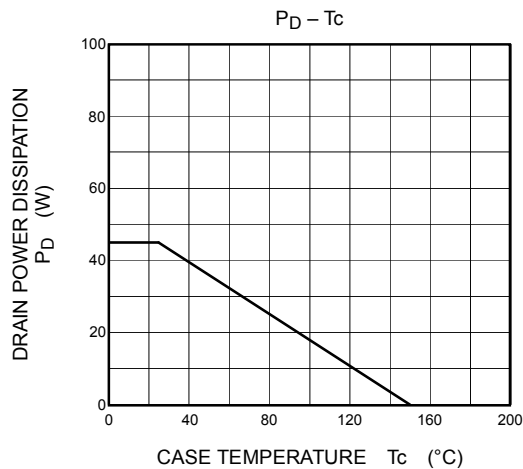
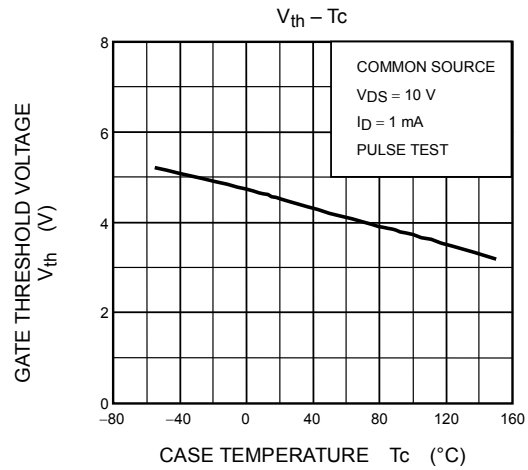
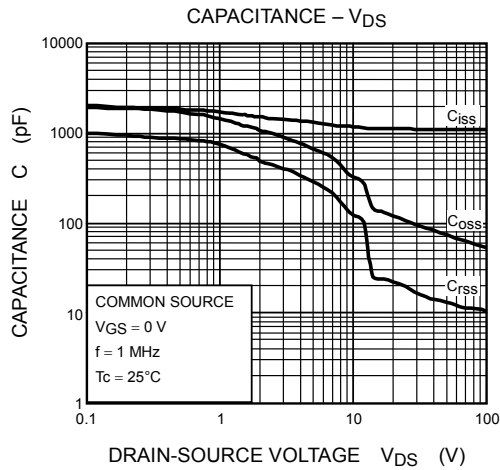
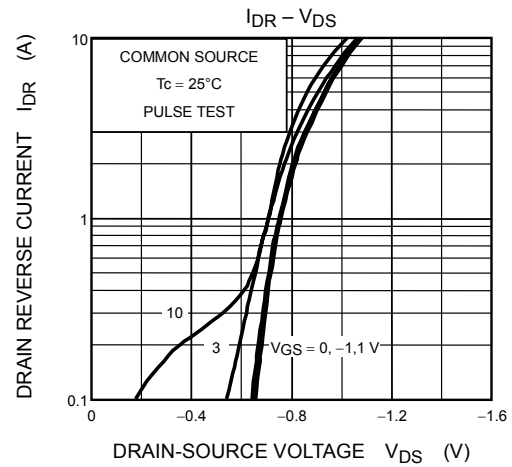
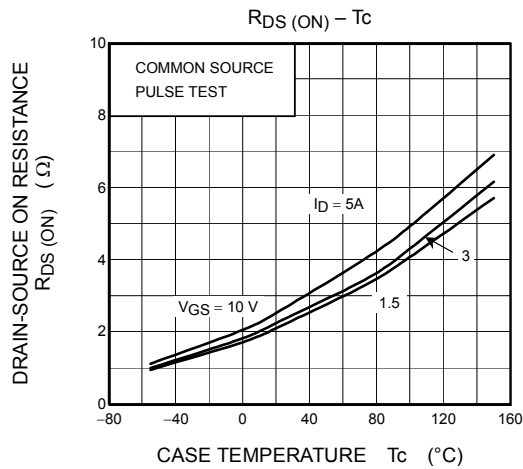
## Source-Drain Ratings and Characteristics (Ta = 25°C)

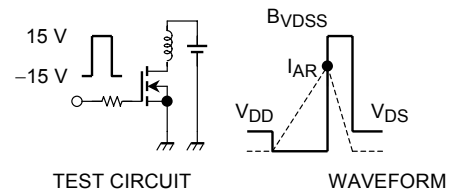
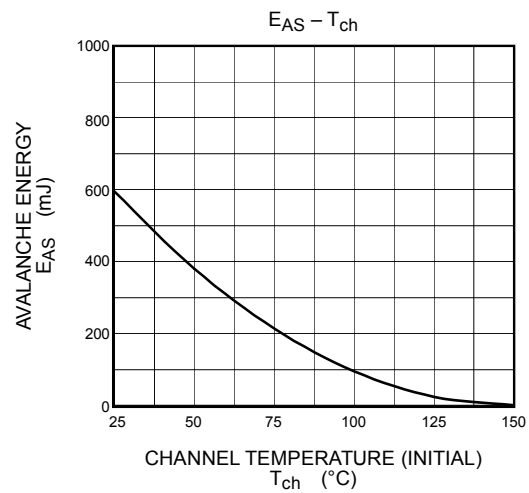
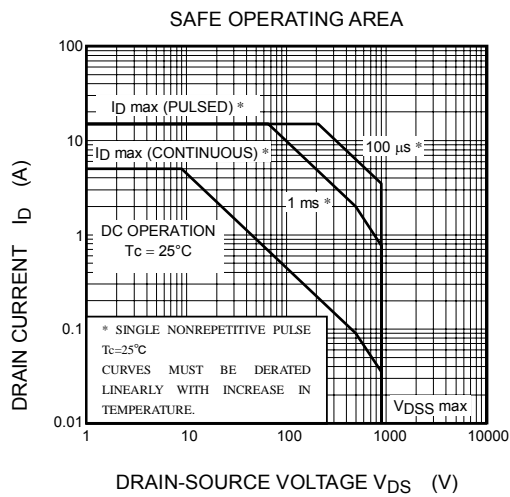
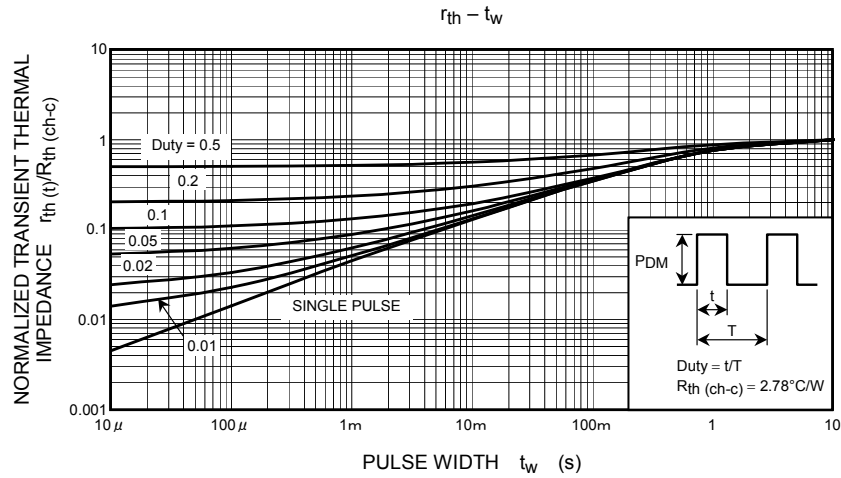
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	5	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	15	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V},$ $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	900	—	ns
Reverse recovery charge	$Q_{rr}$		—	5.4	—	$\mu\text{C}$

## Marking









$$R_G = 25 \, \Omega$$

$$V_{DD} = 90 \, \text{V}, L = 43.6 \, \text{mH}$$

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

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