

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

## 2SK3934

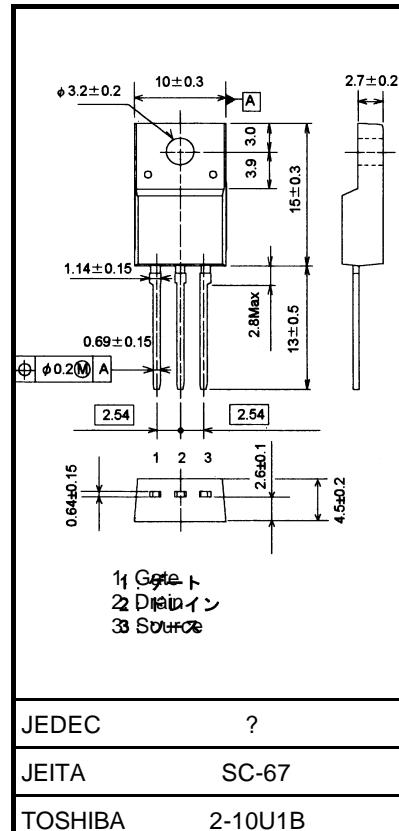
## Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance:  $R_{DS(ON)} = 0.23$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 8.2$  S (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  ( $V_{DS} = 500$  V)
- Enhancement-mode:  $V_{th} = 2.0 \sim 4.0$  V ( $V_{DS} = 10$  V,  $I_D = 1$  mA)

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	500	V
Drain-gate voltage ( $R_{GS} = 20$ k $\Omega$ )	$V_{DGR}$	500	V
Gate-source voltage	$V_{GSS}$	$\pm 30$	V
Drain current	DC (Note 1)	$I_D$	A
	Pulse ( $t = 1$ ms) (Note 1)	$I_{DP}$	
Drain power dissipation ( $T_c = 25^\circ C$ )	$P_D$	50	W
Single pulse avalanche energy (Note 2)	$E_{AS}$	1.08	J
Avalanche current	$I_{AR}$	15	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	5.0	mJ
Channel temperature	$T_{ch}$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C



Weight : 1.7 g (typ.)

## Thermal Characteristics

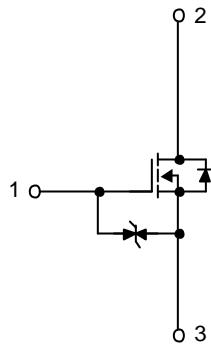
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}$ (ch-c)	2.5	°C/W
Thermal resistance, channel to ambient	$R_{th}$ (ch-a)	62.5	°C/W

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

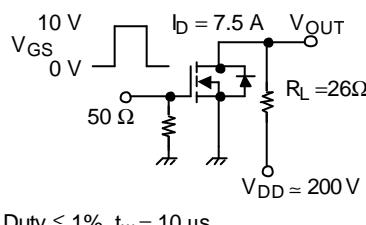
Note 2:  $V_{DD} = 90$  V,  $T_{ch} = 25^\circ C$  (initial),  $L = 8.16$  mH,  $I_{AR} = 15$  A,  $R_G = 25$   $\Omega$ 

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

This transistor is an electrostatic sensitive device. Please handle with caution.



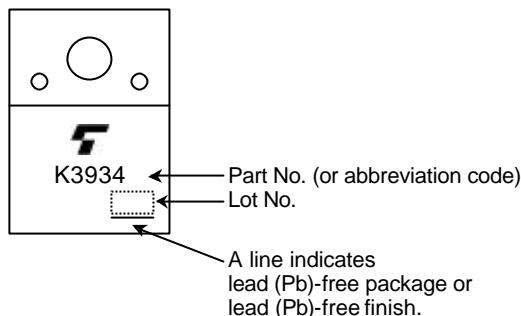
Electrical Characteristics ( $T_a = 25^\circ C$ )

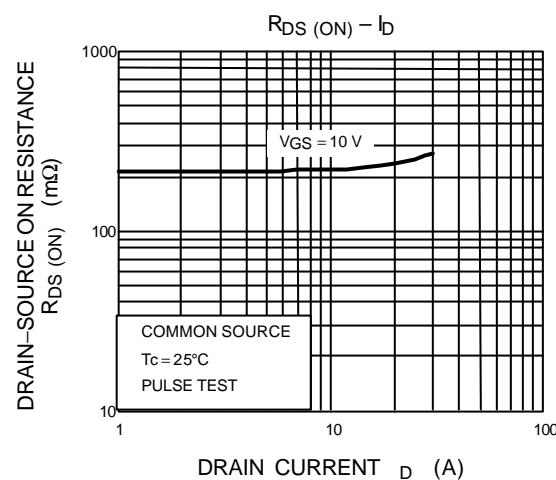
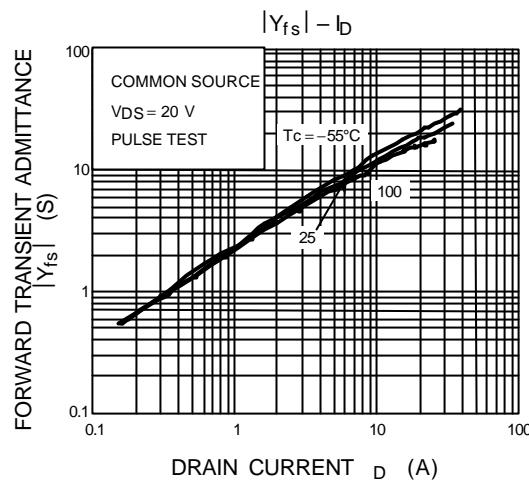
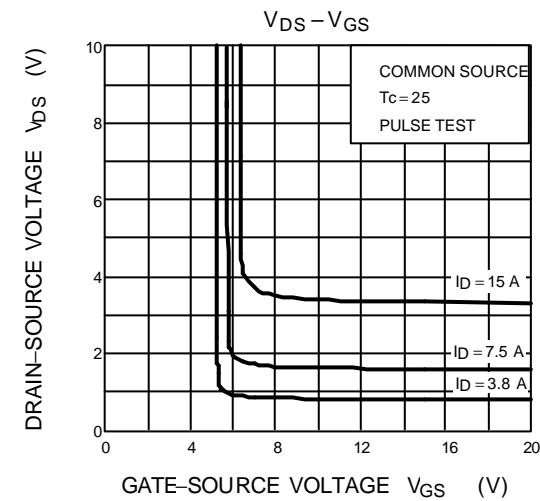
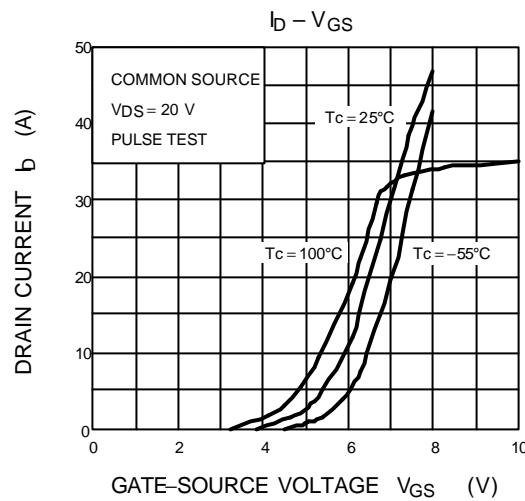
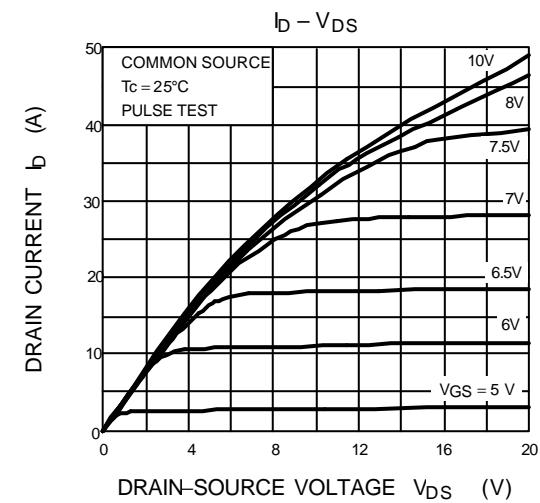
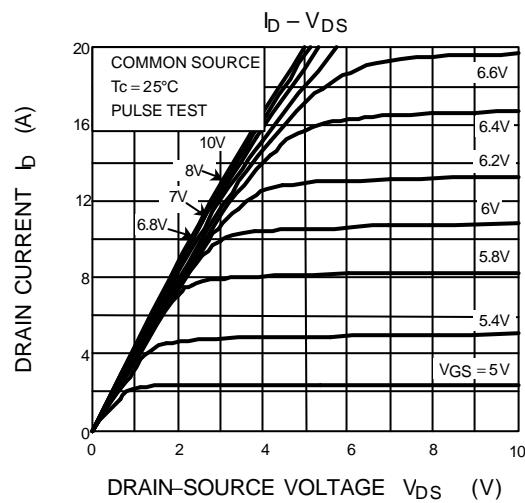
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 25 V, V_{DS} = 0 V$	—	—	$\pm 10$	$\mu A$	
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu A, V_{DS} = 0 V$	$\pm 30$	—	—	V	
Drain cut-off current	$I_{DSS}$	$V_{DS} = 500 V, V_{GS} = 0 V$	—	—	100	$\mu A$	
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 mA, V_{GS} = 0 V$	500	—	—	V	
Gate threshold voltage	$V_{th}$	$V_{DS} = 10 V, I_D = 1 mA$	2.0	—	4.0	V	
Drain-source ON resistance	$R_{DS (\text{ON})}$	$V_{GS} = 10 V, I_D = 7.5 A$	—	0.23	0.3	$\Omega$	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 V, I_D = 7.5 A$	2.3	8.2	—	S	
Input capacitance	$C_{iss}$	$V_{DS} = 25 V, V_{GS} = 0 V, f = 1 \text{ MHz}$	—	3100	—	pF	
Reverse transfer capacitance	$C_{rss}$		—	20	—		
Output capacitance	$C_{oss}$		—	270	—		
Switching time	Rise time	$t_r$	 $V_{GS}$ (0 V to 10 V)	—	70	—	ns
	Turn-on time	$t_{on}$		—	130	—	
	Fall time	$t_f$		—	70	—	
	Turn-off time	$t_{off}$		—	280	—	
Total gate charge	$Q_g$	$V_{DD} = 400 V, V_{GS} = 10 V, I_D = 15 A$	—	62	—	nC	
Gate-source charge	$Q_{gs}$		—	40	—		
Gate-drain charge	$Q_{gd}$		—	22	—		

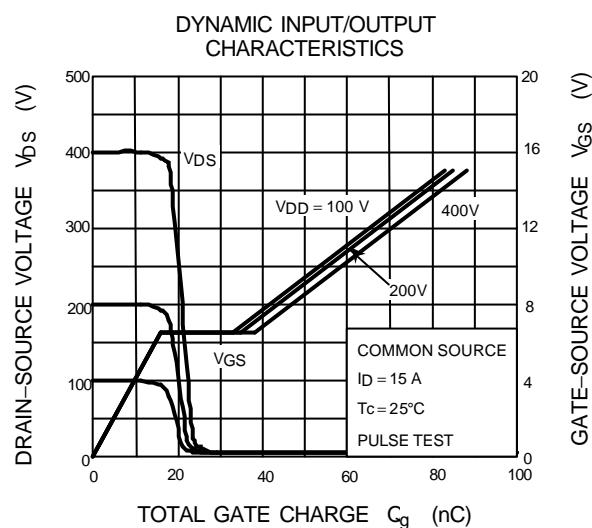
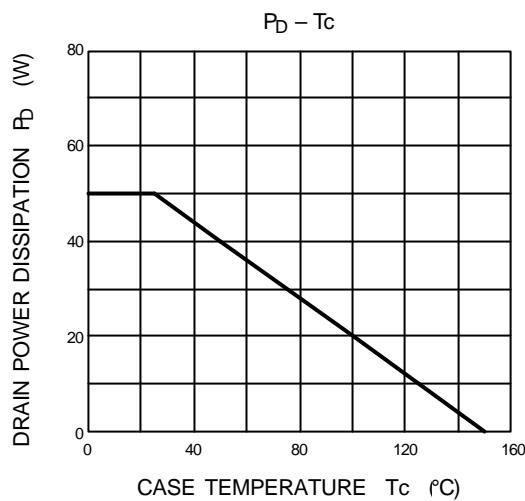
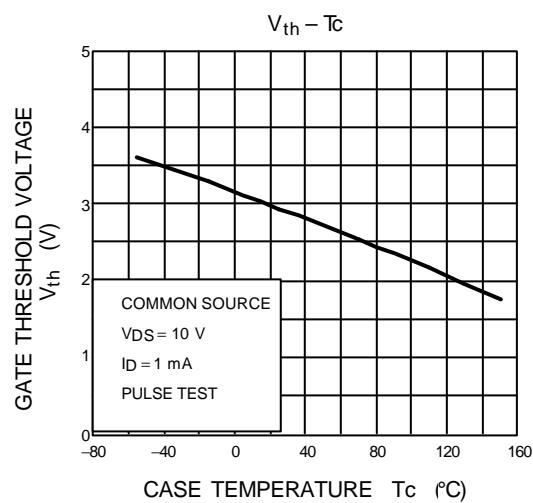
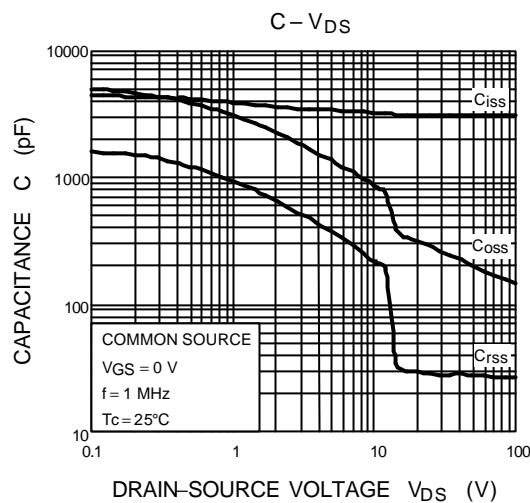
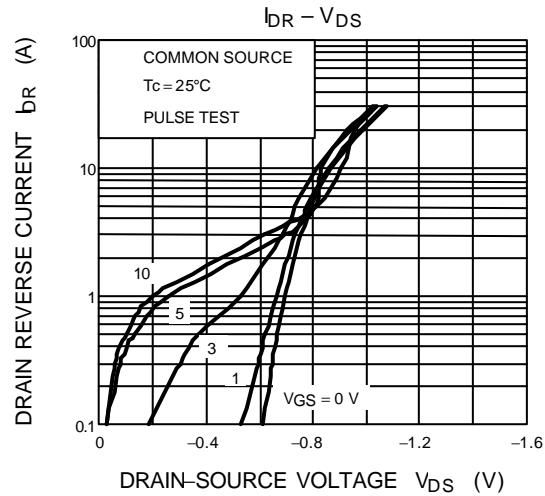
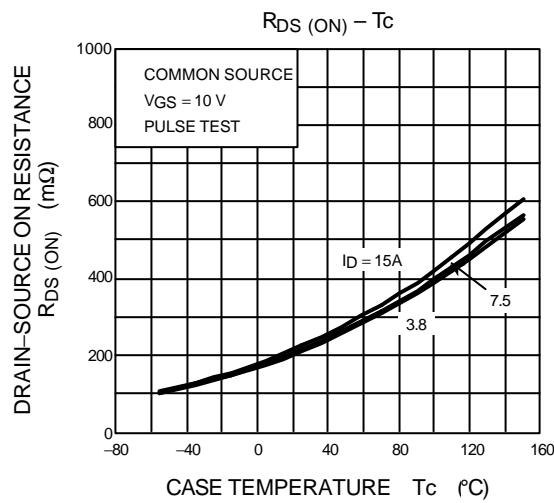
Source-Drain Ratings and Characteristics ( $T_a = 25^\circ C$ )

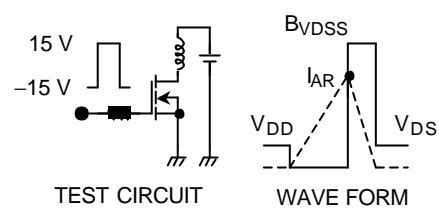
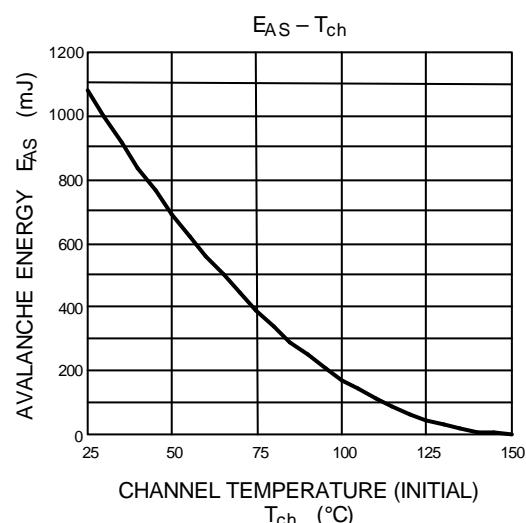
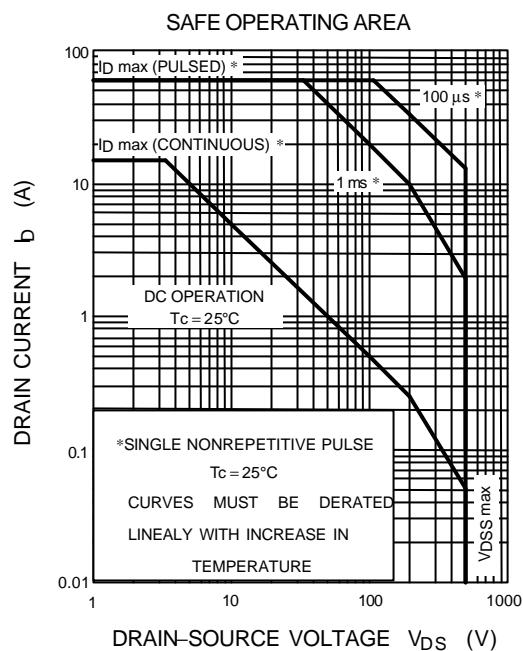
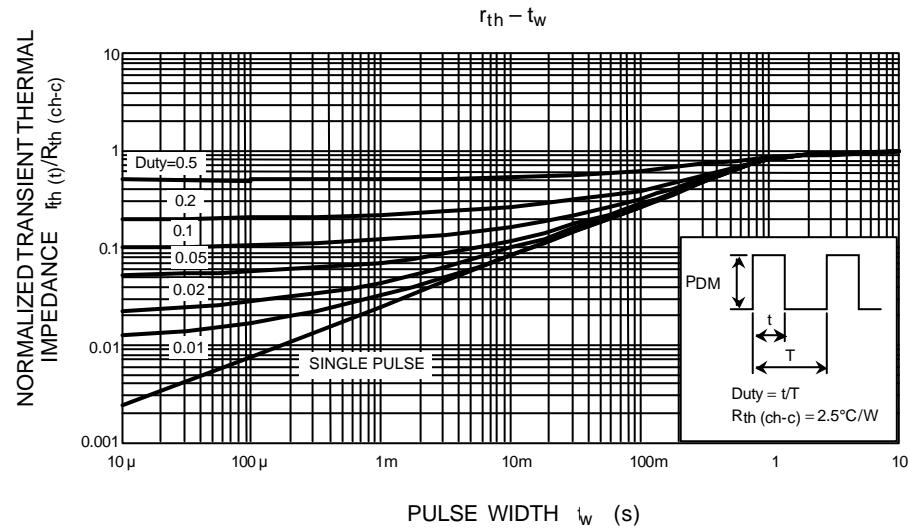
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	15	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	60	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 15 A, V_{GS} = 0 V$	—	—	-1.7	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 15 A, V_{GS} = 0 V,$ $dI_{DR}/dt = 100 A/\mu s$	—	1.3	—	$\mu s$
Reverse recovery charge	$Q_{rr}$		—	18	—	$\mu C$

## Marking









$$R_G = 25\ \Omega \quad V_{DD} = 90\ \text{V}, L = 8.13\ \text{mH} \quad ? AS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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