

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

2SK3868

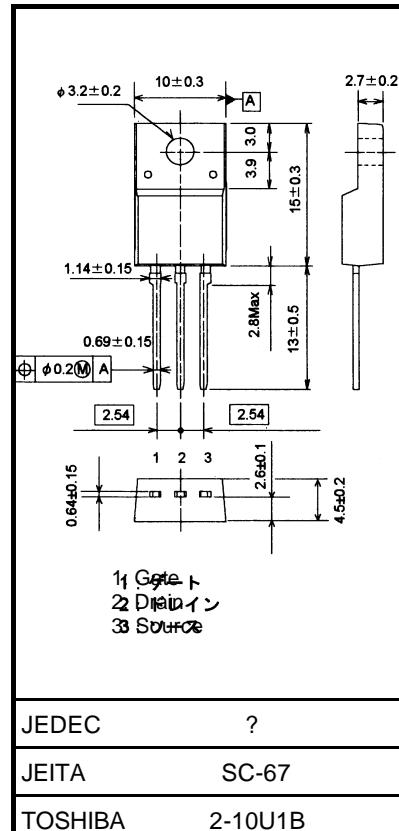
Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS\ (ON)} = 1.3$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 3S$ (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}	± 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	35	W
Single pulse avalanche energy (Note 2)	E_{AS}	180	mJ
Avalanche current	I_{AR}	5	A
Repetitive avalanche energy (Note 3)	E_{AR}	3.5	mJ
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55~150	°C



Weight : 1.7 g (typ.)

Thermal Characteristics

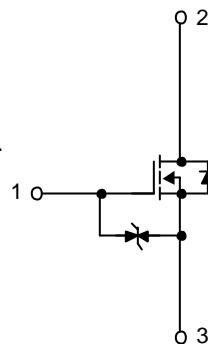
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R_{th} (ch-c)	3.57	°C/W
Thermal resistance, channel to ambient	R_{th} (ch-a)	62.5	°C/W

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

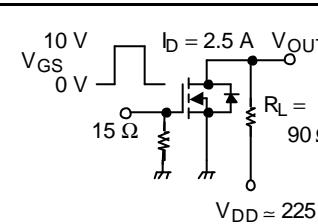
Note 2: $V_{DD} = 90$ V, $T_{ch} = 25^\circ C$ (initial), $L = 12.2$ mH, $I_{AR} = 5$ A, $R_G = 25 \Omega$

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

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



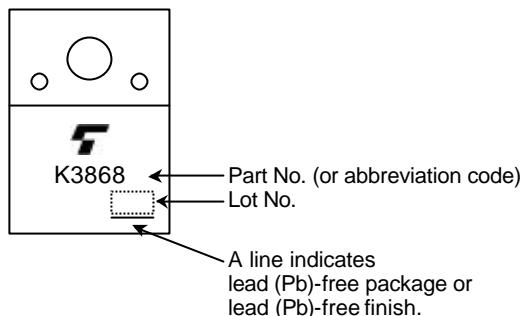
Electrical Characteristics (Ta = 25°C)

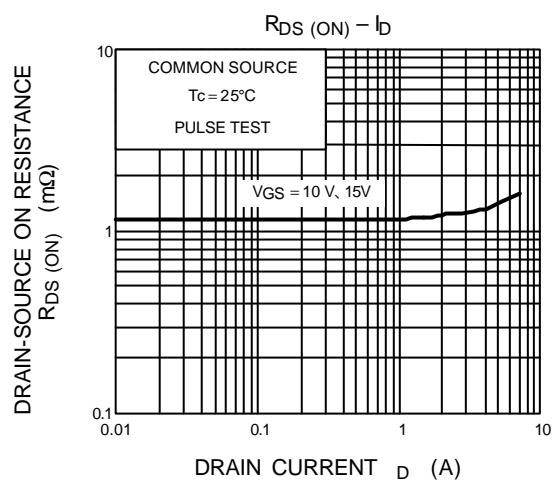
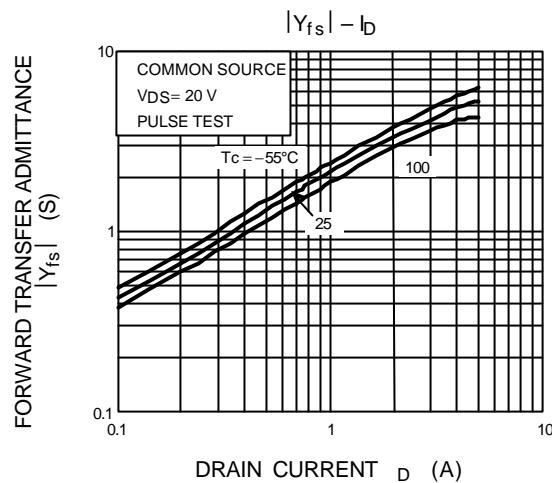
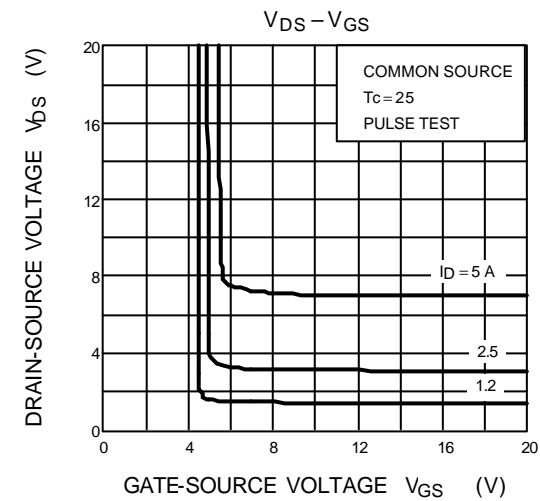
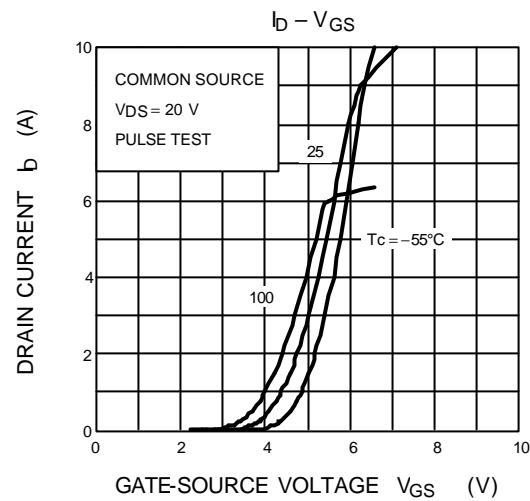
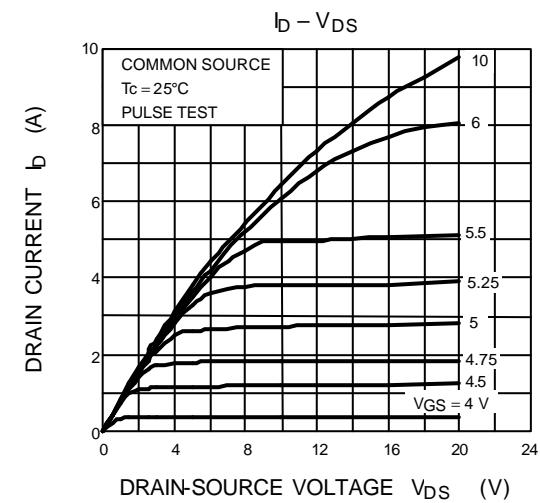
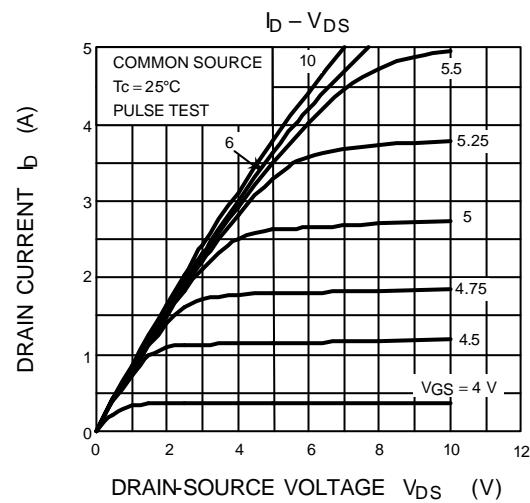
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA	
Gate-source breakdown voltage	$V_{(BR)GSS}$	$I_G = \pm 10 \mu\text{A}, V_{DS} = 0 \text{ V}$	± 30	—	—	V	
Drain cut-off current	I_{DSS}	$V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	500	—	—	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	$R_{DS(\text{ON})}$	$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	1.3	1.7	Ω	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	1.5	3.0	—	S	
Input capacitance	C_{iss}	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	550	—	pF	
Reverse transfer capacitance	C_{rss}		—	7	—		
Output capacitance	C_{oss}		—	70	—		
Switching time	Rise time	t_r	 V_{GS} 10 V 0 V 15 Ω $I_D = 2.5 \text{ A}$ V_{OUT} $V_{DD} \approx 225 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	10	—	ns
	Turn-on time	t_{on}		—	20	—	
	Fall time	t_f		—	10	—	
	Turn-off time	t_{off}		—	50	—	
Total gate charge	Q_g	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	16	—	nC	
Gate-source charge	Q_{gs}		—	10	—		
Gate-drain charge	Q_{gd}		—	6	—		

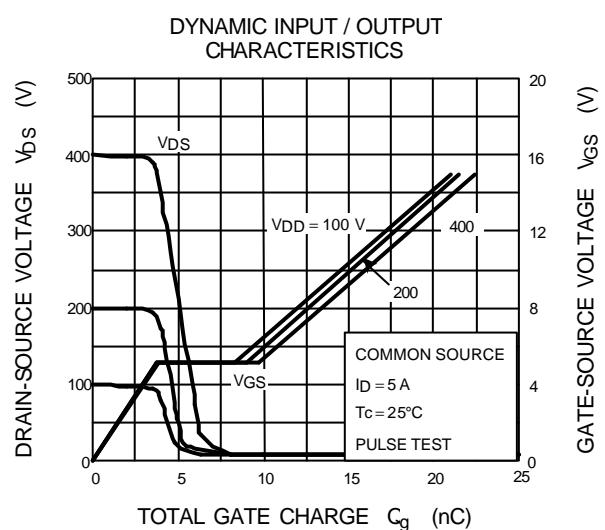
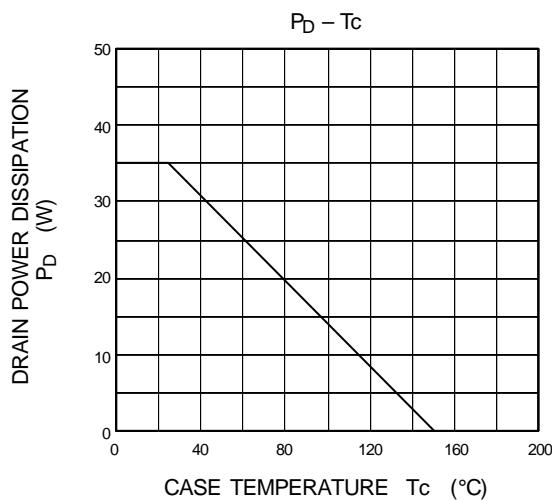
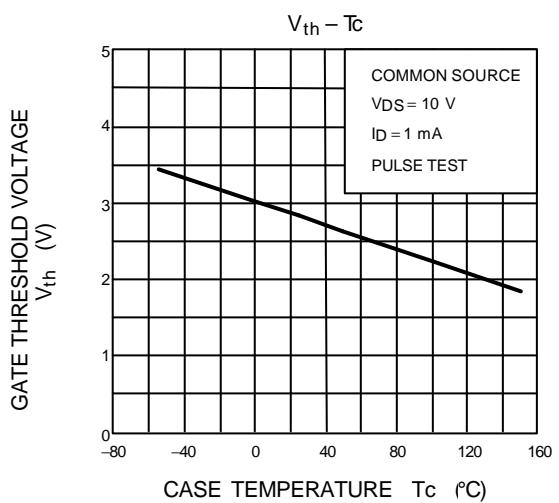
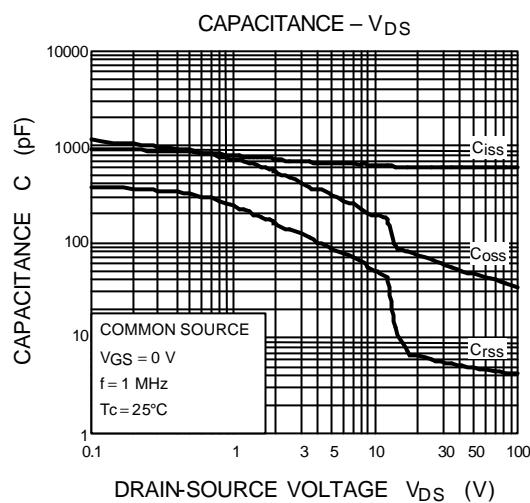
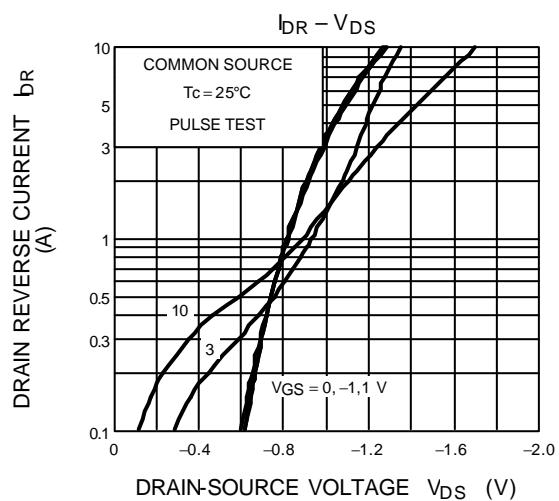
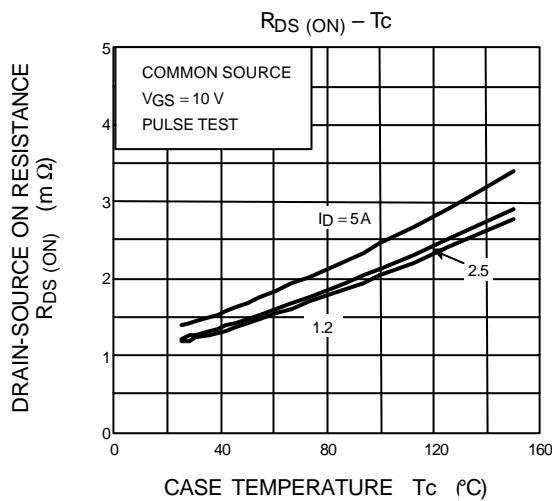
Source-Drain Ratings and Characteristics (Ta = 25°C)

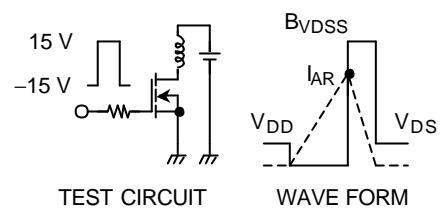
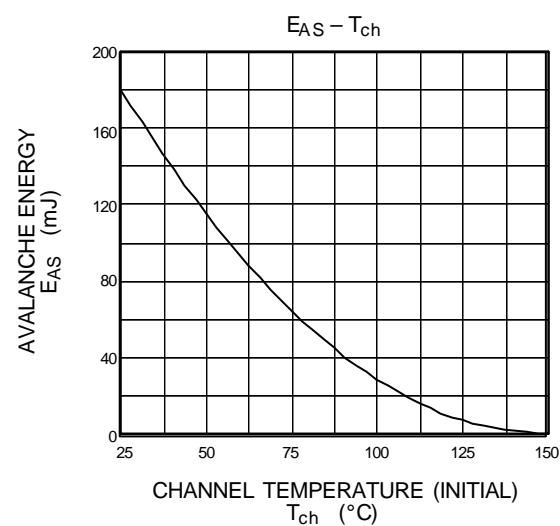
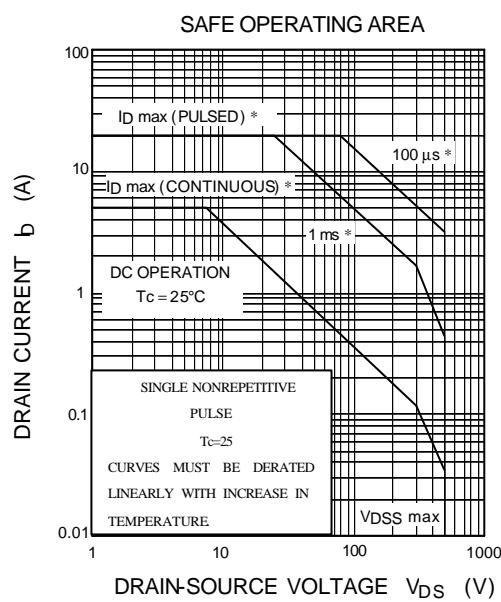
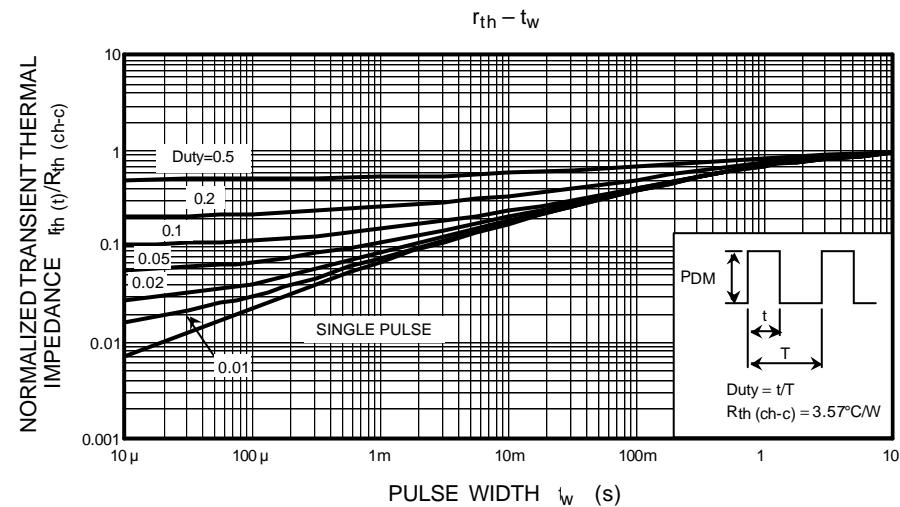
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	20	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V},$ $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	150	—	ns
Reverse recovery charge	Q_{rr}		—	0.3	—	μC

Marking









$$R_G = 25\ \Omega \quad V_{DD} = 90\ V, L = 12.2\text{mH} \quad ? AS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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