

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

2SK3669

Switching Regulators, for Audio Amplifier and Motor Drive Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 95 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 6 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement mode: $V_{th} = 3.0 \text{ to } 5.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	100	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	10	A
	Pulse ($t_w \leq 10 \text{ ms}$) (Note 1)	I_{DP}	15	
	Pulse ($t_w \leq 1 \text{ ms}$) (Note 1)	I_{DP}	28	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	20	W
Single pulse avalanche energy (Note 2)		E_{AS}	280	mJ
Avalanche current		I_{AR}	10	A
Repetitive avalanche energy (Note 3)		E_{AR}	2	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	6.25	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	125	$^\circ\text{C/W}$

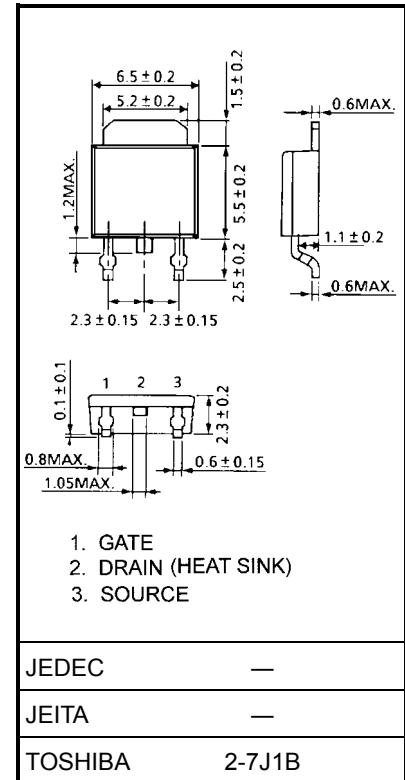
Note 1: Please use devices on condition that the channel temperature is below 150°C .

Note 2: $V_{DD} = 50 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 3.44 \text{ mH}$, $I_{AR} = 10 \text{ A}$, $R_G = 25 \Omega$

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

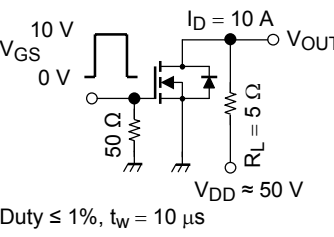
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.36 g (typ.)

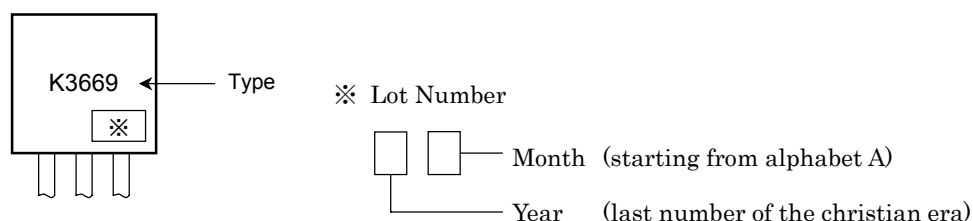
Electrical Characteristics (Ta = 25°C)

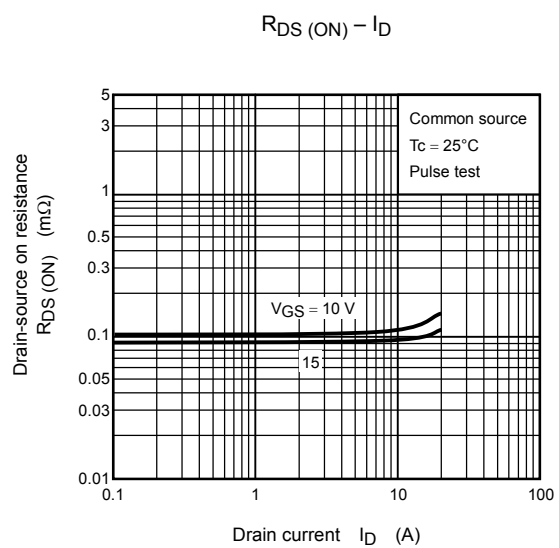
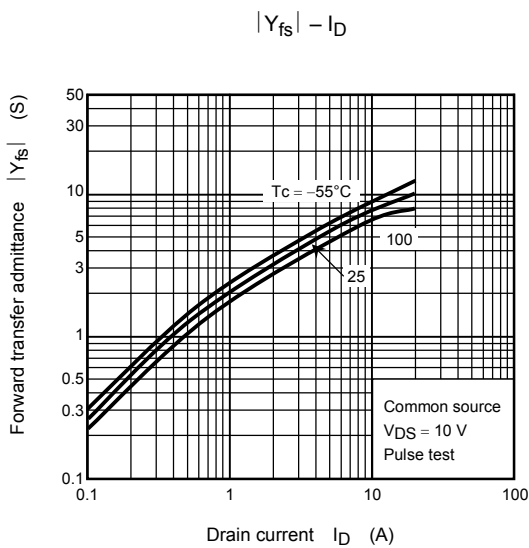
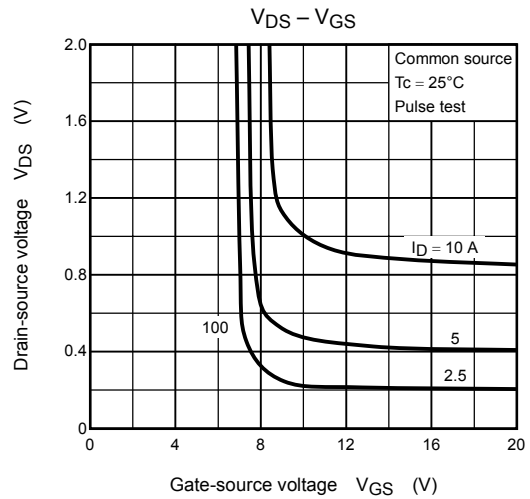
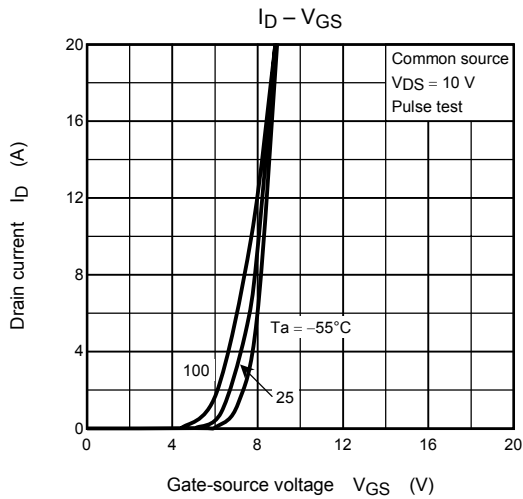
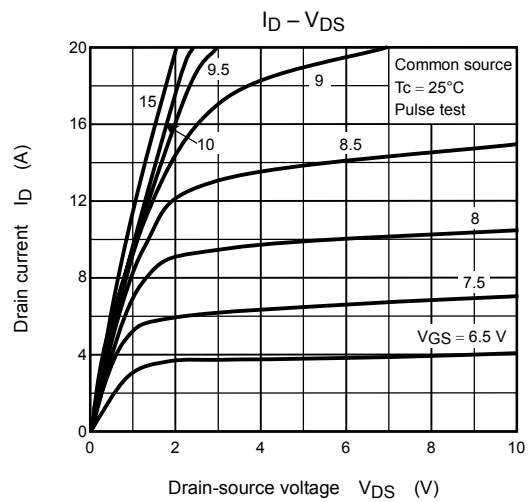
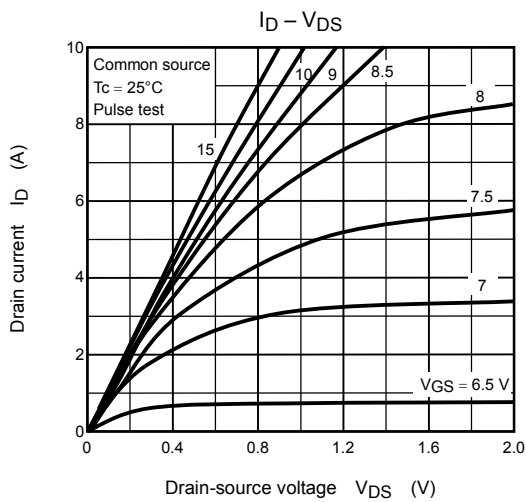
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 100	nA
Drain cut-off current		I_{DSS}	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	100	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	3.0	—	5.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	95	125	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 5 \text{ A}$	3	6	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	480	—	pF
Reverse transfer capacitance		C_{rss}		—	9	—	
Output capacitance		C_{oss}		—	220	—	
Switching time	Rise time	t_r		—	2	—	ns
	Turn-on time	t_{on}		—	12	—	
	Fall time	t_f		—	2	—	
	Turn-off time	t_{off}		—	12	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$	—	8.0	—	nC
Gate-source charge		Q_{gs}		—	5.6	—	
Gate-drain ("miller") charge		Q_{gd}		—	2.4	—	

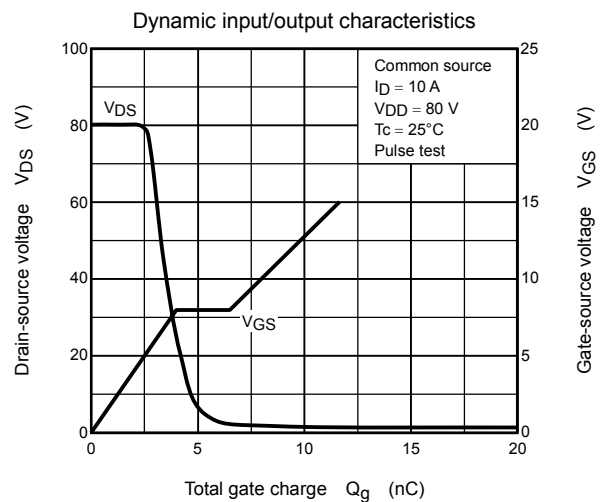
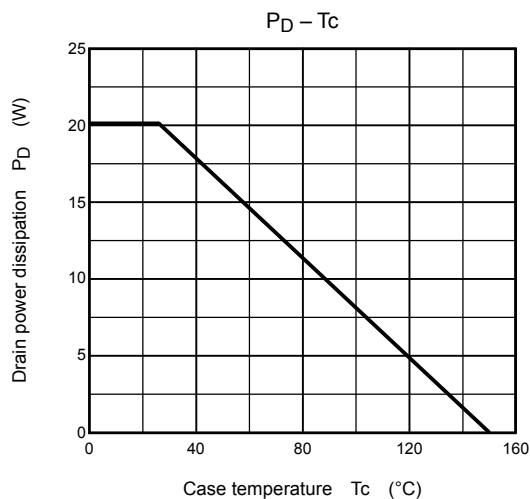
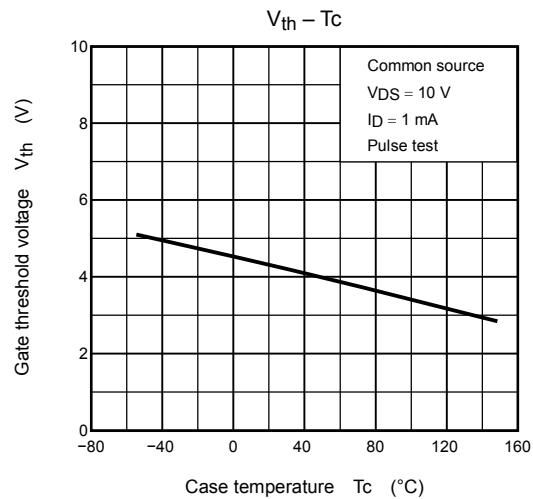
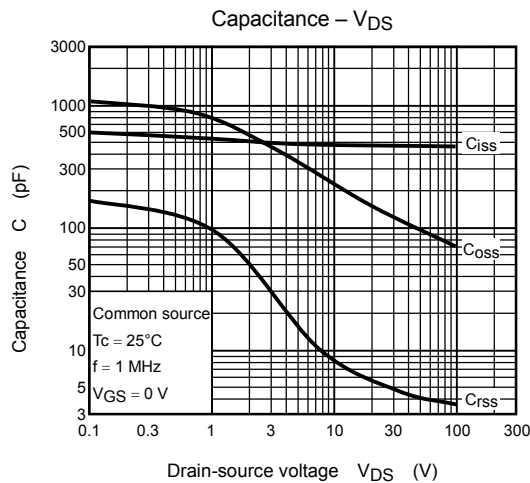
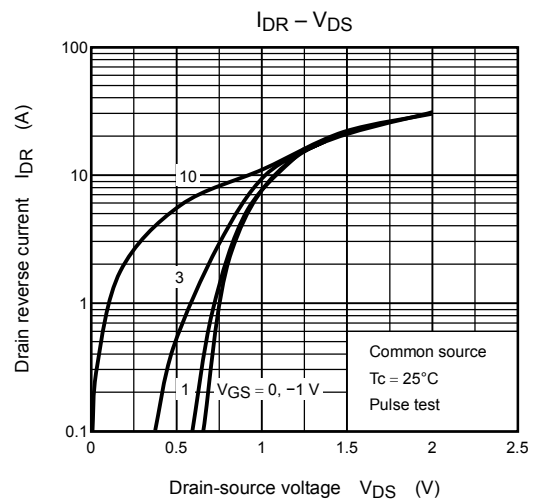
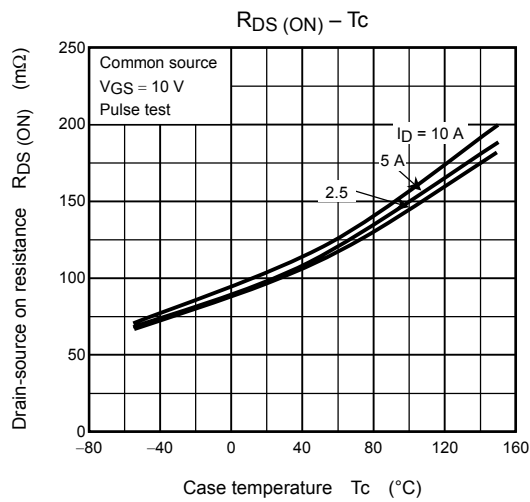
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

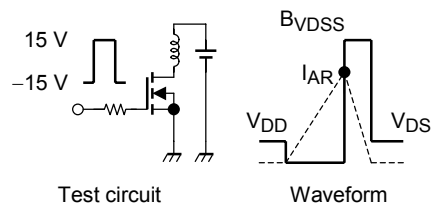
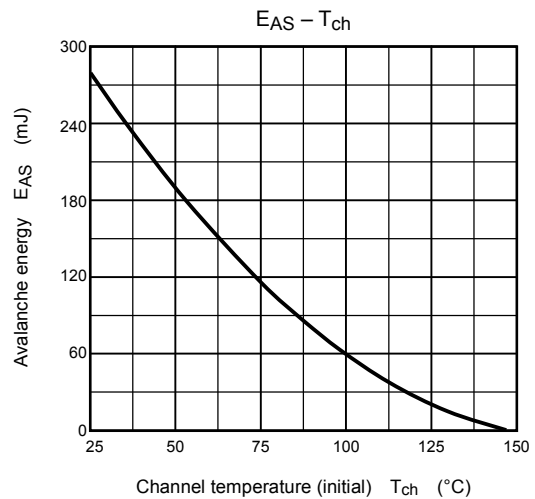
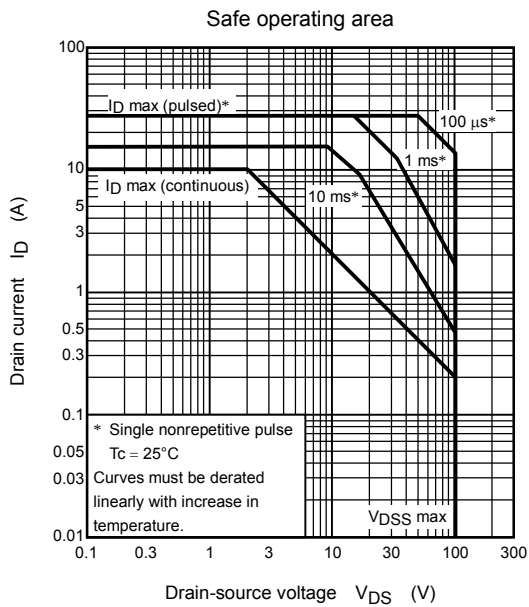
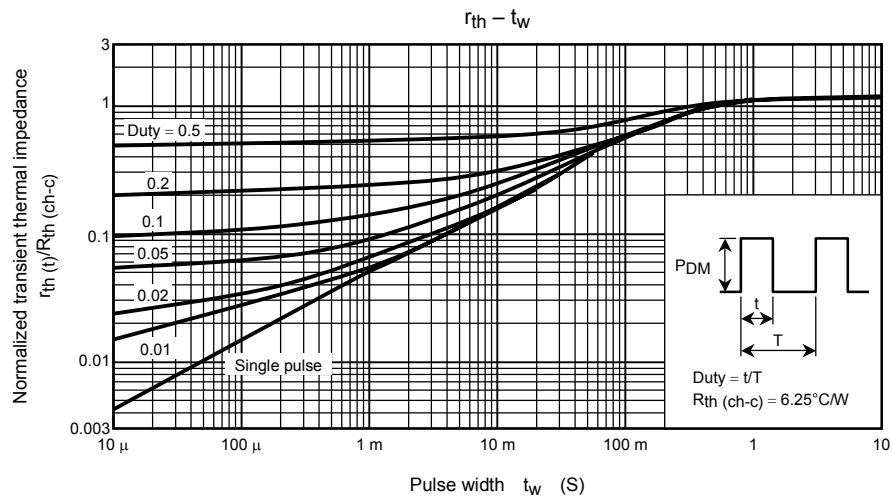
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	10	A
Pulse drain reverse current ($t_w \leq 10 \text{ ms}$) (Note 1)	I_{DRP}	—	—	—	15	A
Pulse drain reverse current ($t_w \leq 1 \text{ ms}$) (Note 1)	I_{DRP}	—	—	—	28	A
Forward voltage (diode)	V_{DS2F}	$I_{DR1} = 10 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 10 \text{ A}, V_{GS} = 0 \text{ V},$	—	65	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$	—	90	—	nC

Marking









$$R_G = 25 \, \Omega$$

$$V_{DD} = 50 \, V, L = 3.44 \, mH$$

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

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