

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (π -MOSVI)**2SK3863**

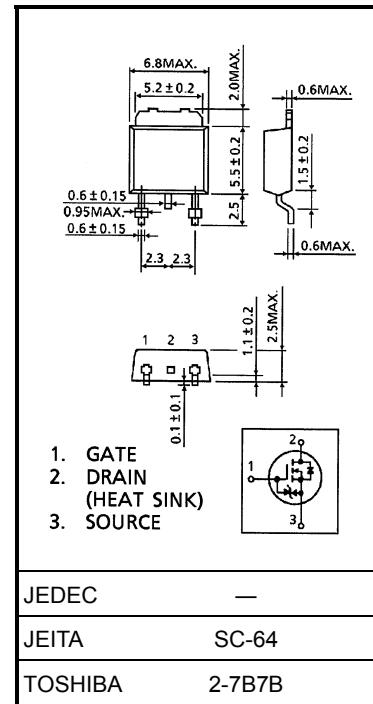
Switching Regulator Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 1.35 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.8S$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu A$ ($V_{DS} = 500 V$)
- Enhancement model: $V_{th} = 2.0 \sim 4.0 V$ ($V_{DS} = 10 V$, $I_D = 1 mA$)

Maximum Ratings (Ta = 25°C)

Characteristic		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	5	A
	Pulse ($t = 1 ms$) (Note 1)	I_{DP}	20	
Drain power dissipation ($T_c = 25^\circ C$)		P_D	40	W
Single pulse avalanche energy (Note 2)		E_{AS}	180	mJ
Avalanche current		I_{AR}	5	A
Repetitive avalanche energy (Note 3)		E_{AR}	4	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55~150	°C



Weight: 0.36 g (typ.)

Thermal Characteristics

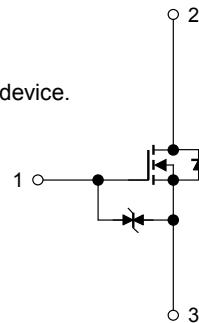
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	3.125	°C/W

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

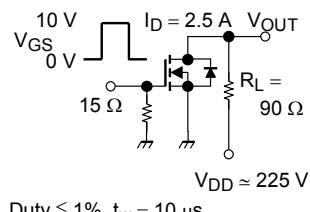
Note 2: $V_{DD} = 90 V$, $T_{ch} = 25^\circ C$ (initial), $L = 12.2 mH$, $I_{AR} = 5 A$, $R_G = 25 \Omega$

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

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



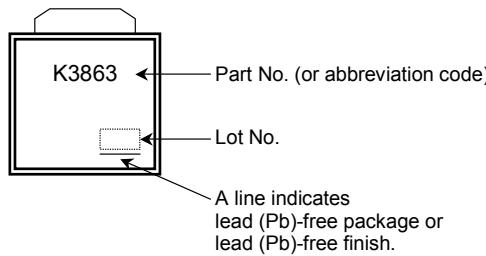
Electrical Characteristics (Ta = 25°C)

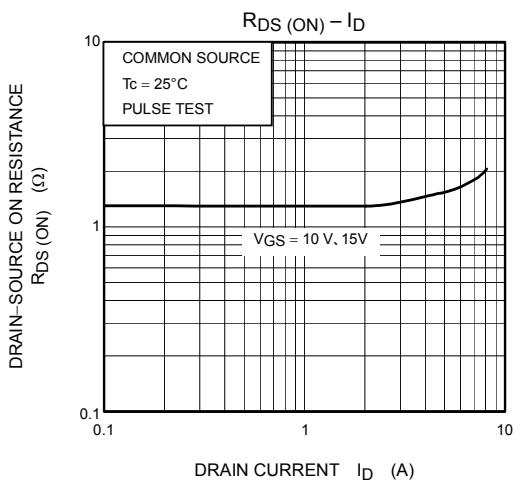
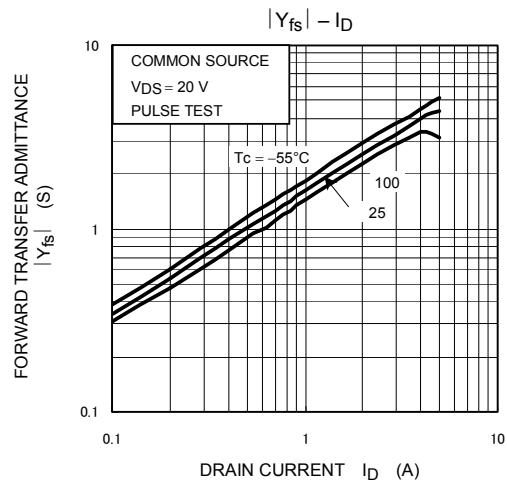
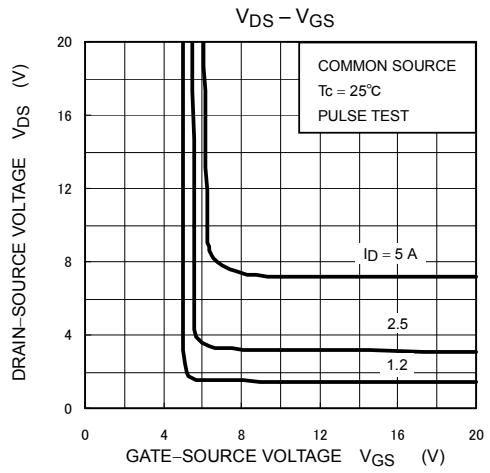
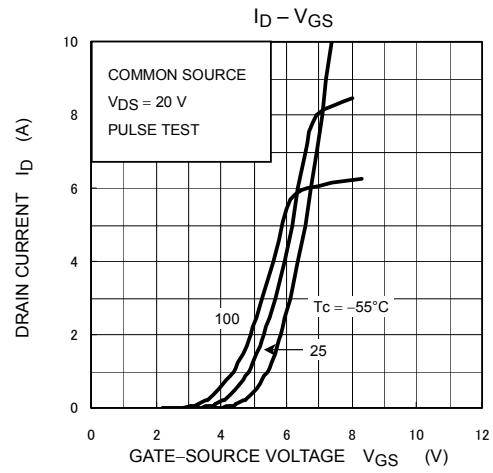
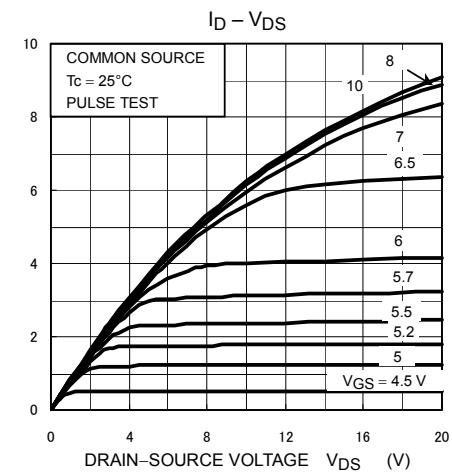
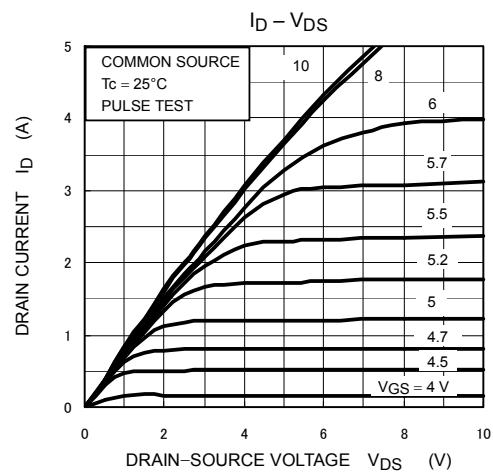
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I _{GSS}	V _{GS} = ±25 V, V _{DS} = 0 V	—	—	±10	μA	
Gate-source breakdown voltage	V _{(BR) GSS}	I _D = 10 μA, V _{GS} = 0 V	±30	—	—	V	
Drain cutoff current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	—	—	100	μA	
Drain-source breakdown 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} (ON)	V _{GS} = 10 V, I _D = 2.5 A	—	1.35	1.50	Ω	
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 2.5 A	1.4	2.8	—	S	
Input capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	—	550	—	pF	
Reverse transfer capacitance	C _{rss}		—	7	—		
Output capacitance	C _{oss}		—	70	—		
Switching time	Rise time	t _r	 10 V V _{GS} 0 V 15 Ω ID = 2.5 A V _{OUT} RL = 90 Ω V _{DD} ≈ 225 V Duty ≤ 1%, t _w = 10 μs	—	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} ≈ 400 V, V _{GS} = 10 V, I _D = 5 A	—	16	—	nC	
Gate-source charge	Q _{gs}		—	10	—		
Gate-drain charge	Q _{gd}		—	6	—		

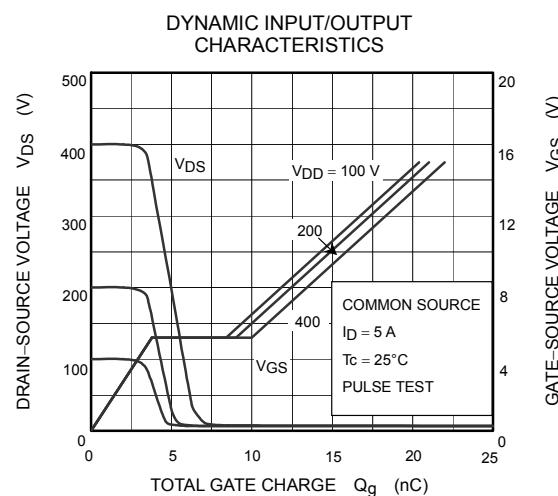
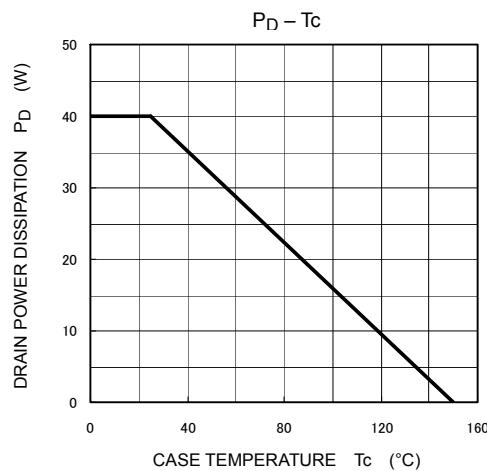
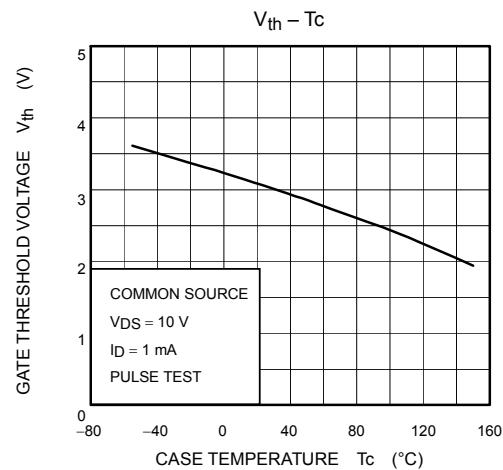
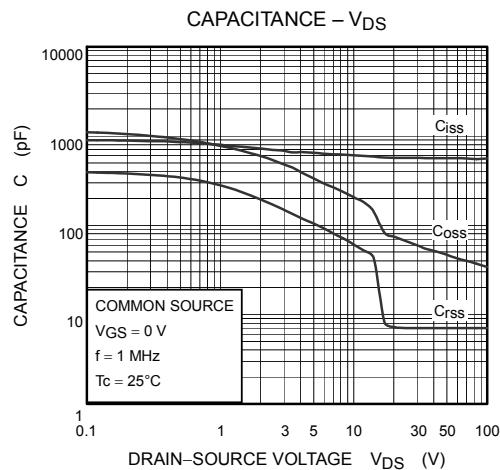
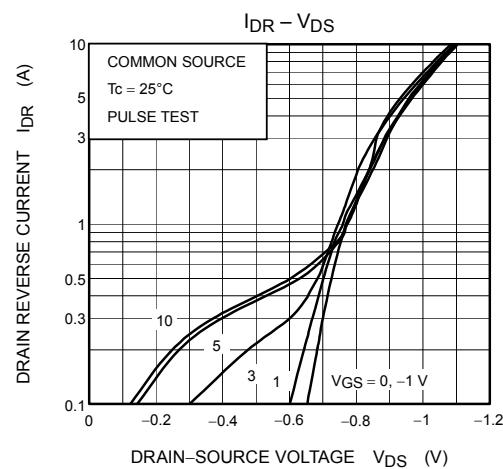
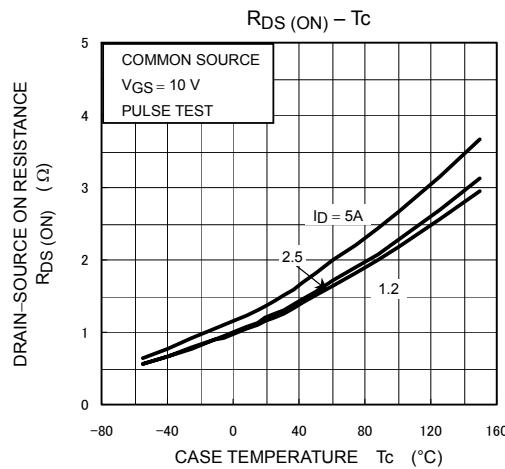
Source-Drain Ratings and Characteristics (Ta = 25°C)

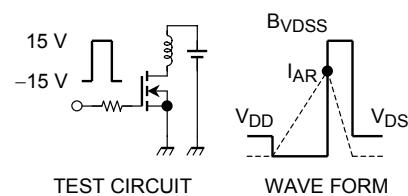
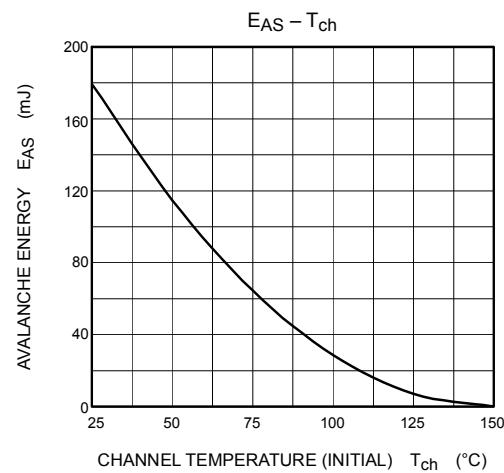
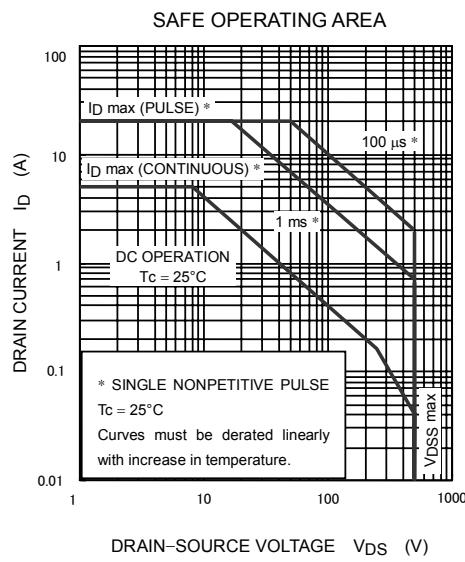
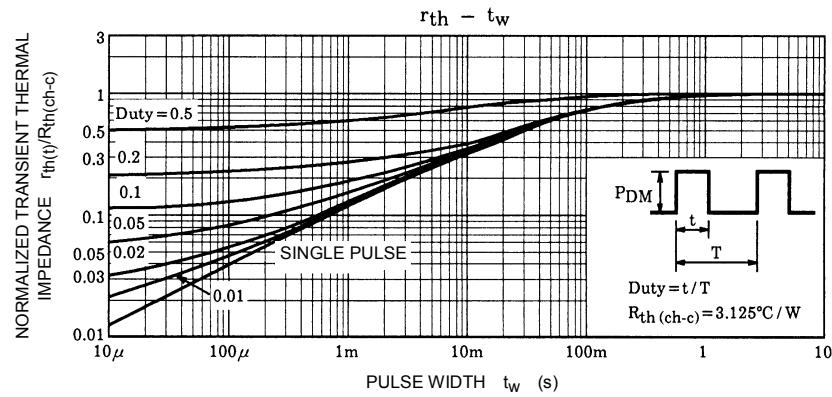
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	20	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 5 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 5 A, V _{GS} = 0 V, dI _{DR} /dt = 100 A/μs	—	1400	—	ns
Reverse recovery charge	Q _{rr}		—	9	—	μC

Marking









$$R_G = 25 \Omega \quad E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

$$V_{DD} = 90 \text{ V}, L = 12.2 \text{ mH}$$

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