

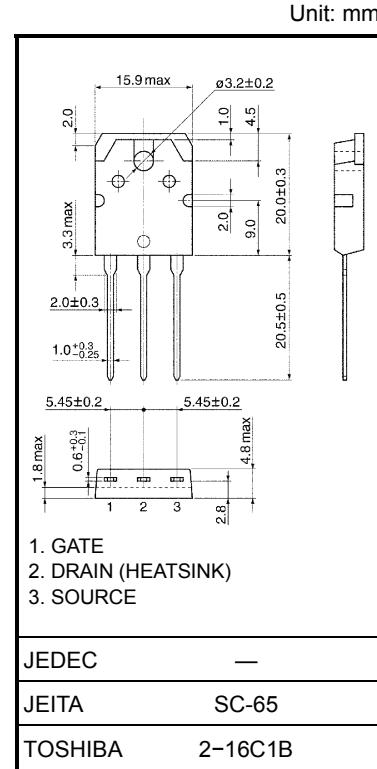
TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (π - MOSIV)**2SK3878**

Switching Regulator Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 1.0 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.0 \text{ S}$ (typ.)
- Low leakage current: $Id_{SS} = 100 \mu\text{A}$ (max) ($V_{DS} = 720 \text{ V}$)
- Enhancement mode: $V_{th} = 2.0 \sim 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $Id = 1 \text{ mA}$)

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}	± 30	V
Drain current	DC (Note 1)	I_D	A
	Pulse (Note 1)	I_{DP}	
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	150	W
Single pulse avalanche energy (Note 2)	E_{AS}	778	mJ
Avalanche current	I_{AR}	9	A
Repetitive avalanche energy (Note 3)	E_{AR}	15	mJ
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55~150	°C



Weight: 4.6 g (typ.)

Thermal Characteristics

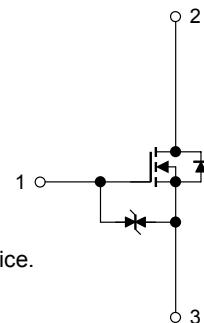
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	0.833	°C/W
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	°C/W

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

Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 17.6 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 9 \text{ A}$

Note 3: Repetitive rating: pulse width limited by max junction temperature

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



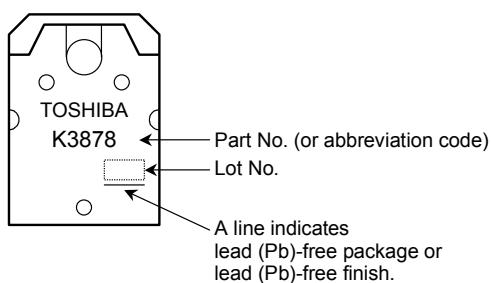
Electrical Characteristics (Ta = 25°C)

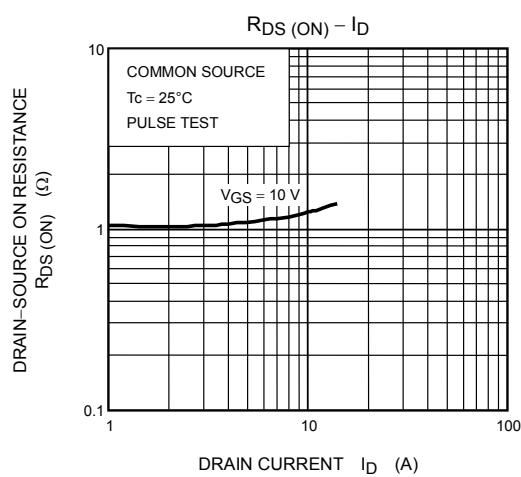
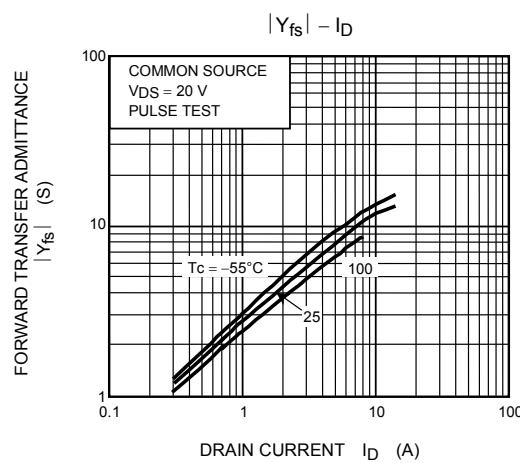
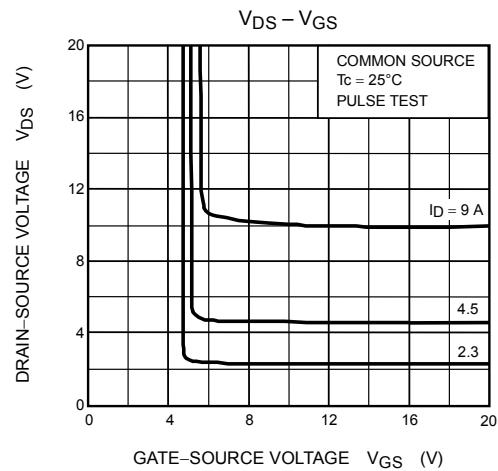
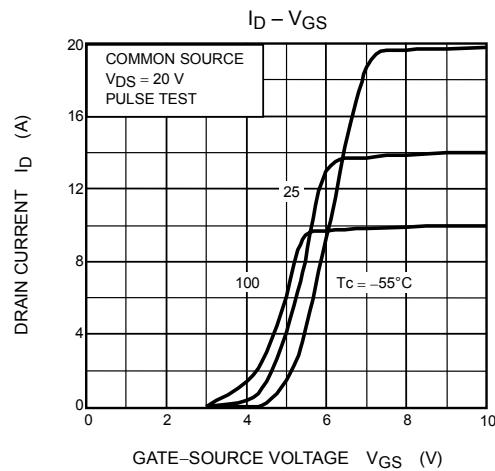
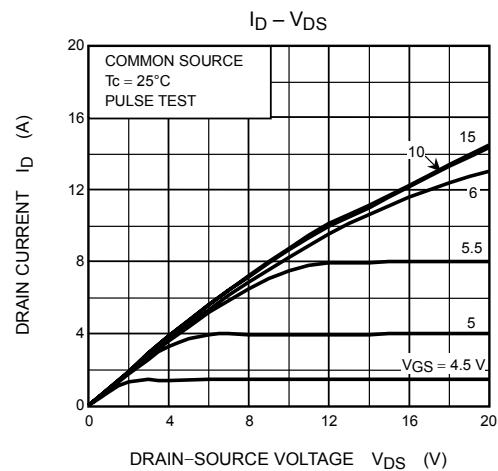
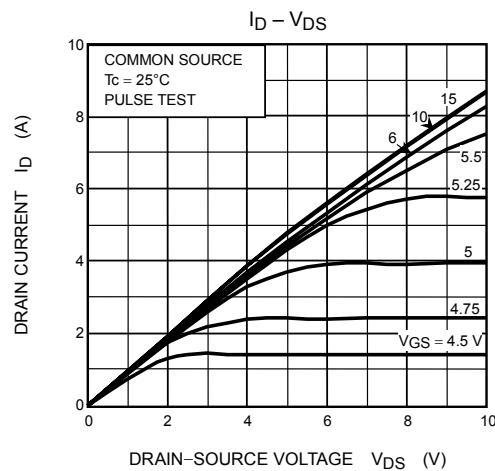
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V	—	—	±10	μA
Drain-source breakdown voltage	V _{(BR) GSS}	I _G = ±10 μA, V _{DS} = 0 V	±30	—	—	V
Drain cutoff current	I _{DSS}	V _{DS} = 720 V, V _{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	900	—	—	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 = 4 A	—	1.0	1.3	Ω
Forward transfer admittance	Y _{fs}	V _{DS} = 15 V, I _D = 4 A	3.5	7.0	—	S
Input capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	—	2200	—	pF
Reverse transfer capacitance	C _{rss}		—	45	—	
Output capacitance	C _{oss}		—	190	—	
Switching time	Rise time	t _r		—	25	—
	Turn-on time	t _{on}		—	65	—
	Fall time	t _f		—	20	—
	Turn-off time	t _{off}		—	120	—
Total gate charge (gate-source plus gate-drain)	Q _g	V _{DD} ≈ 400 V, V _{GS} = 10 V, I _D = 9 A	—	60	—	nC
Gate-source charge	Q _{gs}		—	34	—	
Gate-drain ("Miller") charge	Q _{gd}		—	26	—	

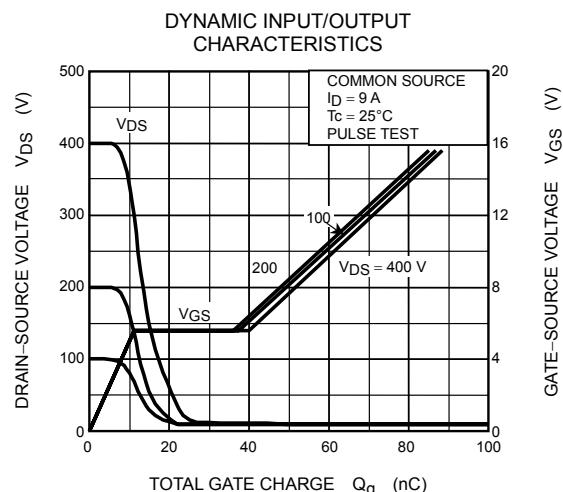
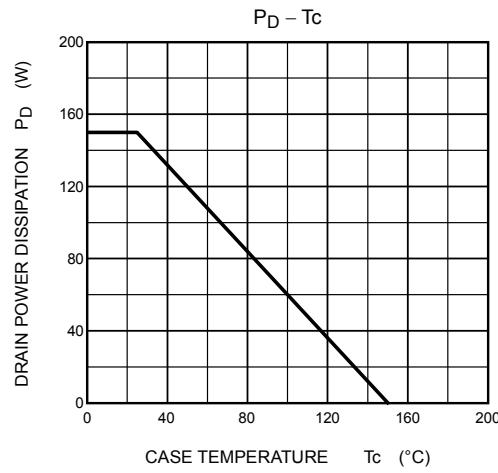
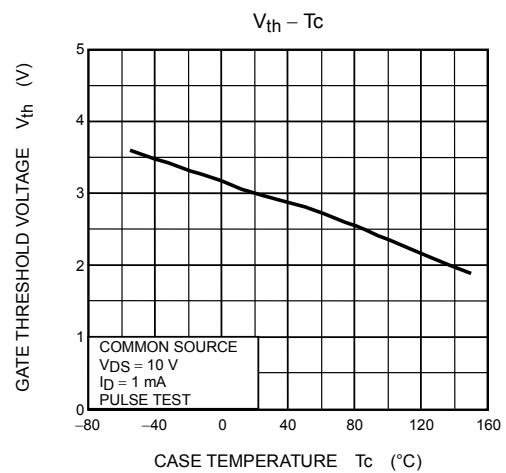
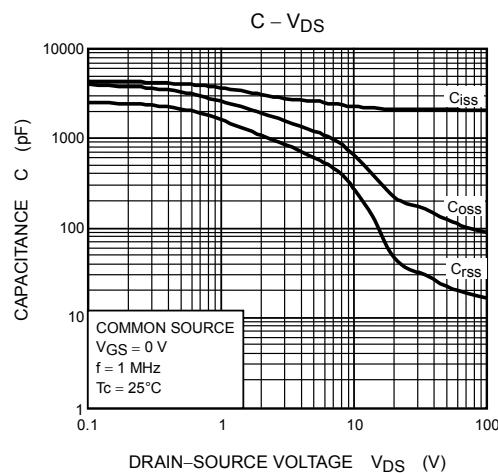
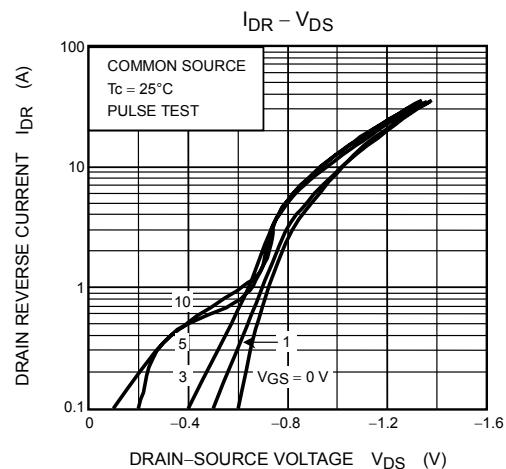
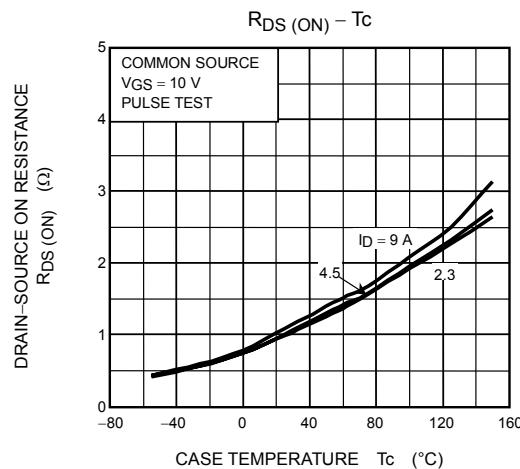
Source-Drain Ratings and Characteristics (Ta = 25°C)

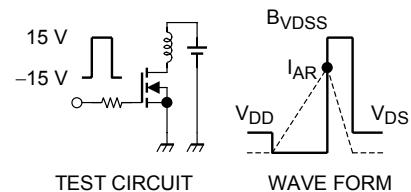
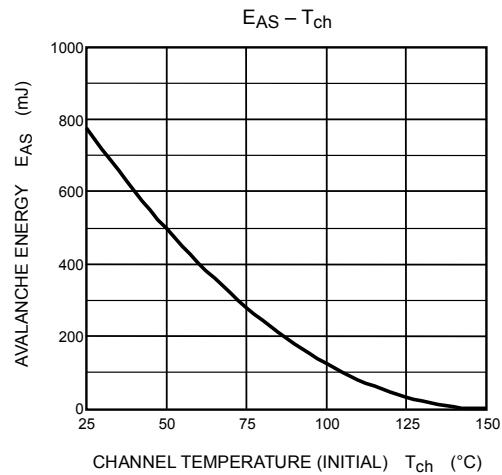
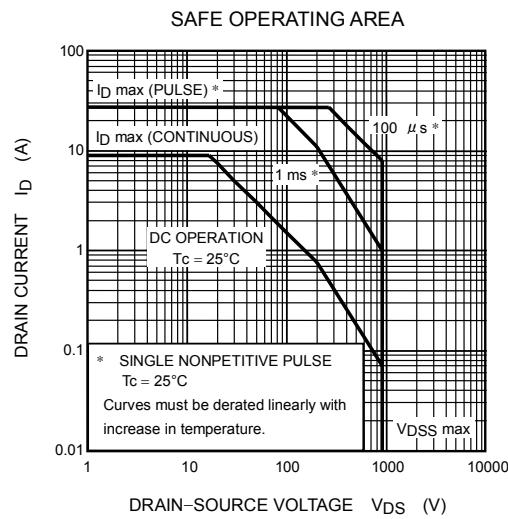
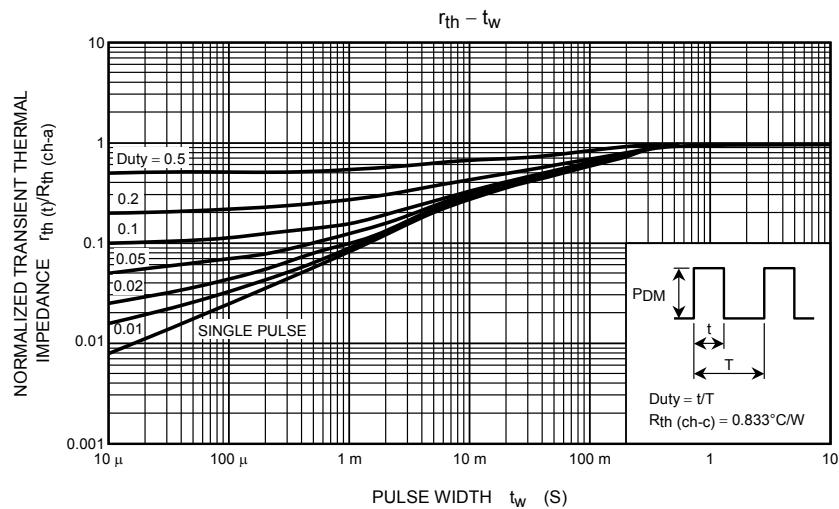
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	9	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	27	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 9 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 9 A, V _{GS} = 0 V, dI _{DR} /dt = 100 A/μs	—	1.4	—	μs
Reverse recovery charge	Q _{rr}		—	16	—	μC

Marking









$$R_G = 25\ \Omega$$

$$V_{DD} = 90\ \text{V}, L = 17.6\ \text{mH}$$

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

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