

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type ($L^2-\pi$ -MOS V)

2SK4019

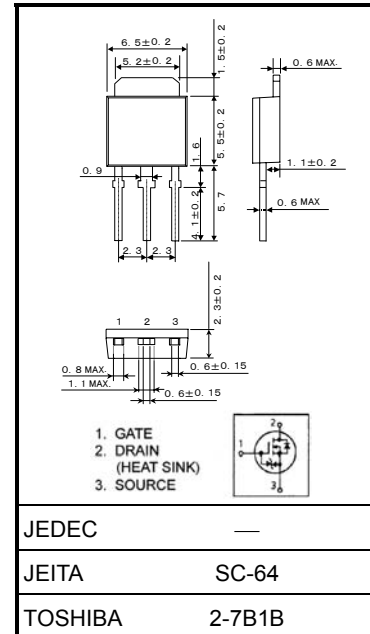
Chopper Regulator, DC/DC Converter and Motor Drive Applications

Unit: mm

- 4 V gate drive
- Low drain-source ON-resistance : $R_{DS(ON)} = 0.17 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 4.5 S$ (typ.)
- Low leakage current : $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 100 V$)
- Enhancement mode : $V_{th} = 0.8 \sim 2.0 V$ ($V_{DS} = 10 V$, $I_D = 1 mA$)

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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	100	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	5
	Pulse (Note 1)	I_{DP}	20
Drain power dissipation ($T_c = 25^\circ C$)	P_D	20	W
Single-pulse avalanche energy (Note 2)	E_{AS}	180	mJ
Avalanche current	I_{AR}	5	A
Repetitive avalanche energy (Note 3)	E_{AR}	2	mJ
Channel temperature	T_{ch}	150	$^\circ C$
Storage temperature range	T_{stg}	$-55 \sim 150$	$^\circ C$



Weight: 0.36 g (typ.)

Thermal Characteristics

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

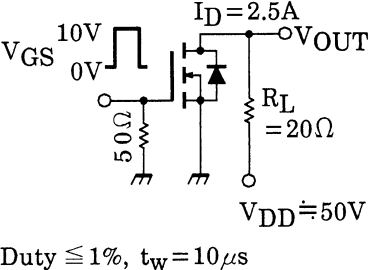
Note 1: Ensure that the channel temperature does not exceed $150^\circ C$.

Note 2: $V_{DD} = 25 V$, $T_{ch} = 25^\circ C$ (initial), $L = 11.6 mH$, $R_G = 25 \Omega$, $I_{AR} = 5 A$

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

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

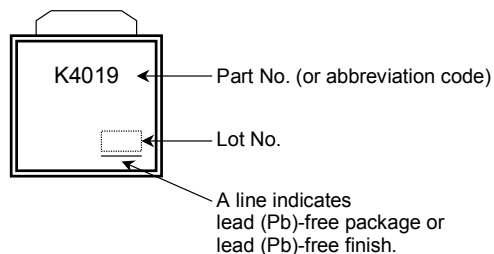
Electrical Characteristics (Ta = 25°C)

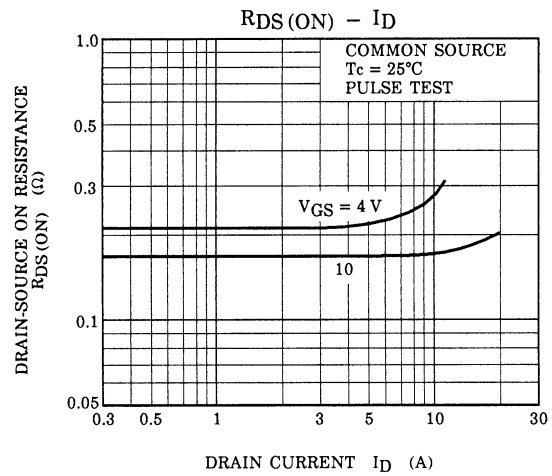
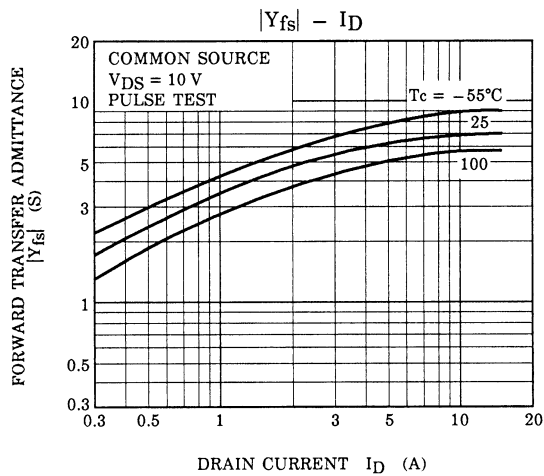
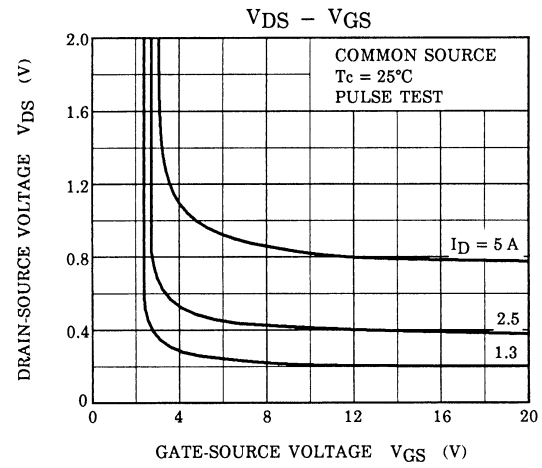
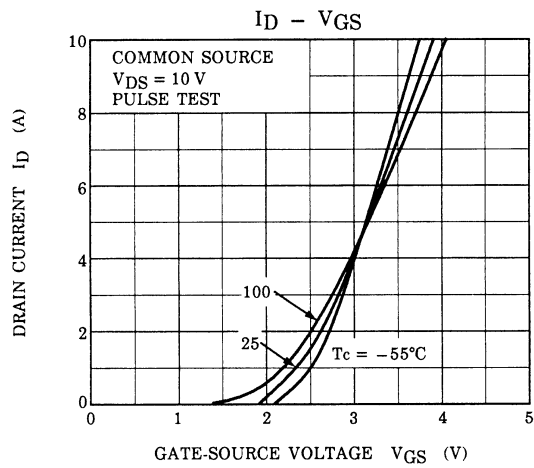
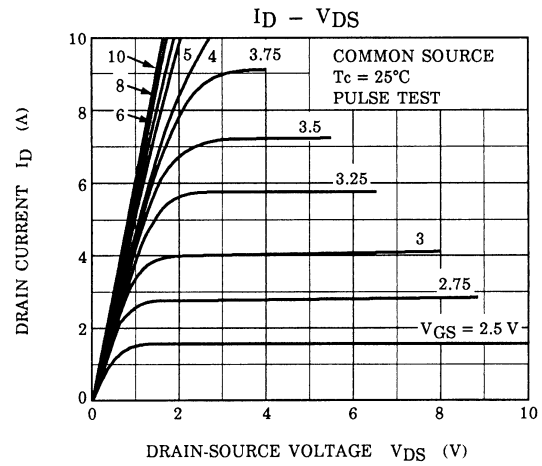
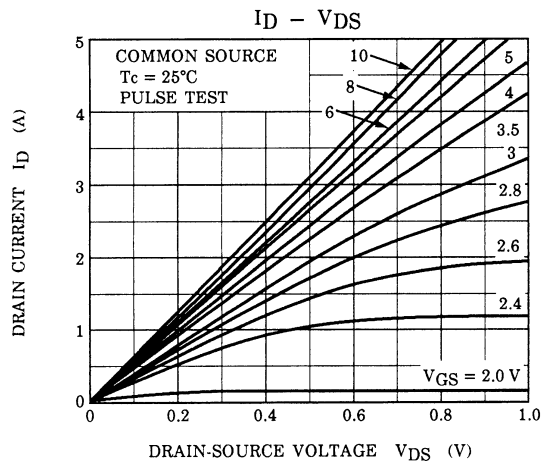
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cutoff current		I_{DSS}	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	100	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 2.5 \text{ A}$	—	0.22	0.30	Ω
			$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	—	0.17	0.23	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 2.5 \text{ A}$	2.0	4.5	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	500	—	pF
Reverse transfer capacitance		C_{rss}		—	80	—	
Output capacitance		C_{oss}		—	190	—	
Switching time	Rise time	t_r		—	17	—	ns
	Turn-on time	t_{on}		—	25	—	
	Fall time	t_f		—	50	—	
	Turn-off time	t_{off}		—	195	—	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} \doteq 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 5 \text{ A}$	—	22	—	nC
Gate-source charge		Q_{gs}		—	15	—	
Gate-drain ("Miller") charge		Q_{gd}		—	7	—	

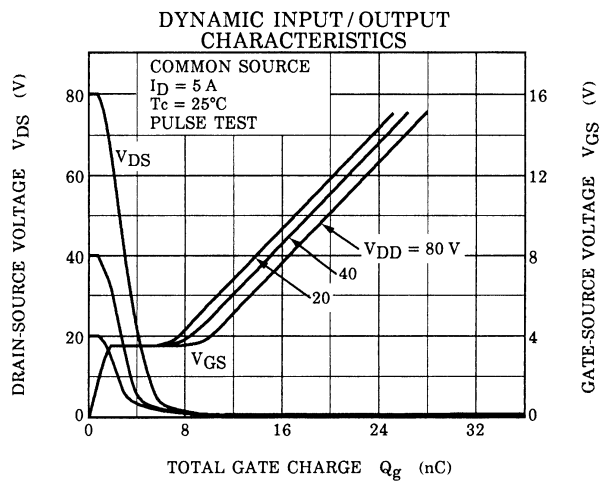
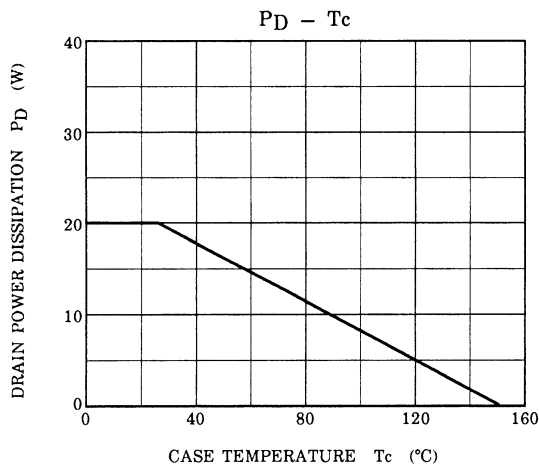
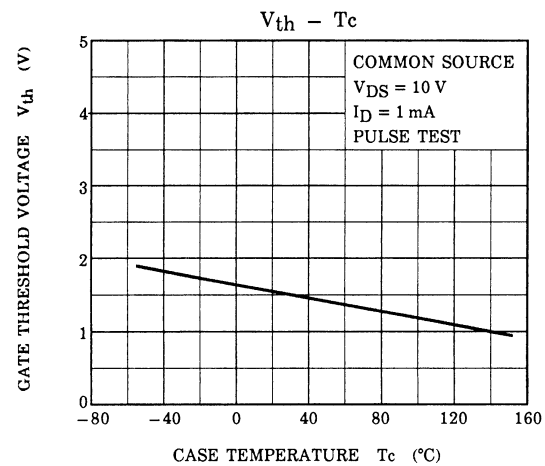
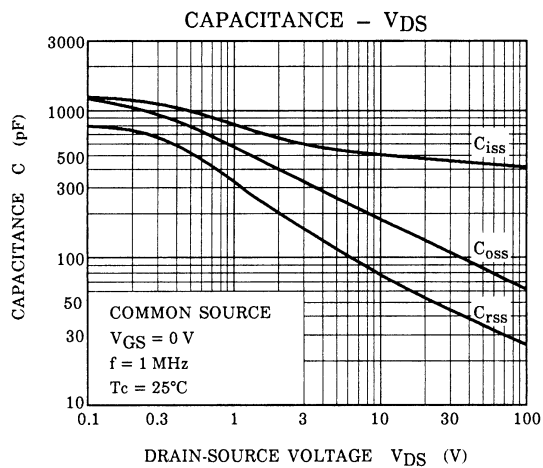
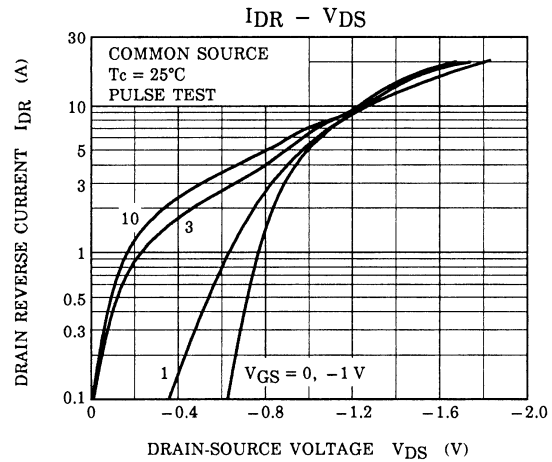
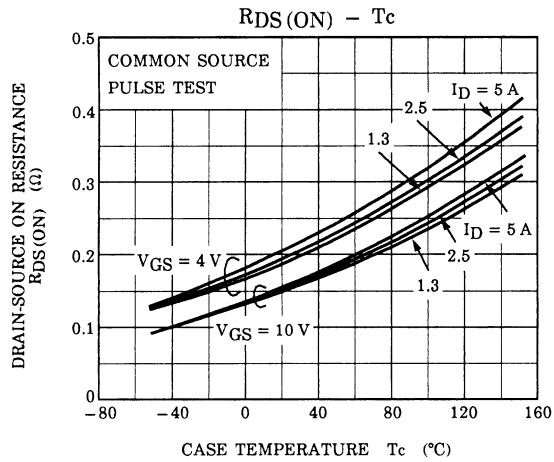
Source-Drain Ratings and Characteristics (Ta = 25°C)

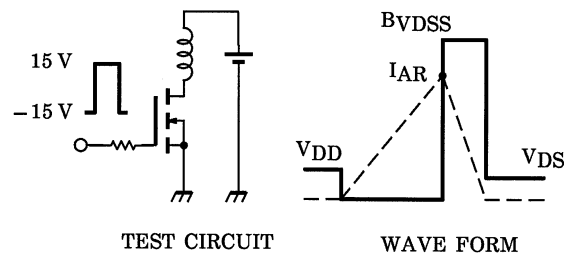
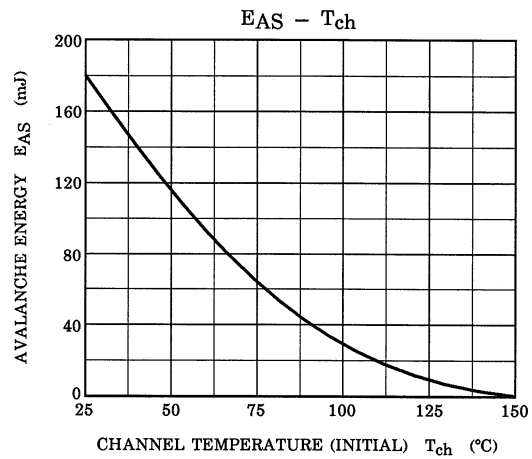
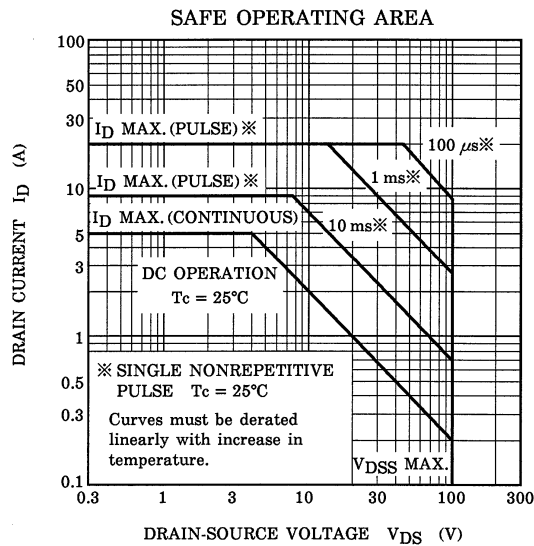
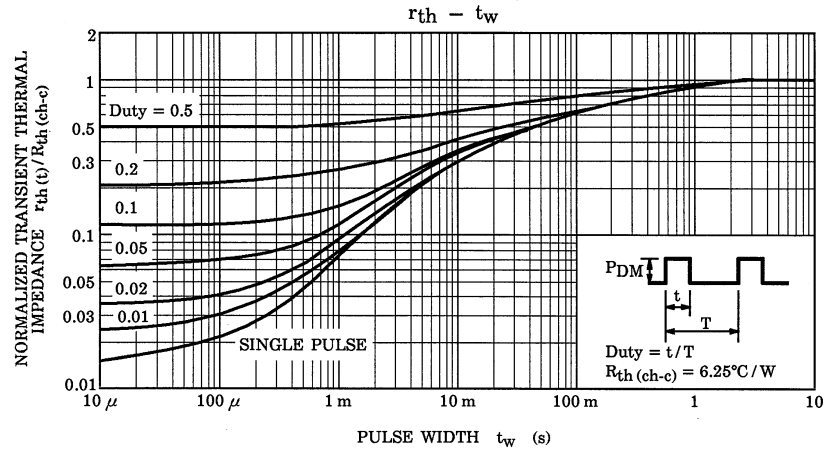
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	20	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	−1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}, dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$	—	160	—	ns
Reverse recovery charge	Q_{rr}		—	0.28	—	μC

Marking









$$R_G = 25 \, \Omega$$

$$V_{DD} = 25 \, V, L = 11.6 \, mH$$

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

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