

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

2SK4019

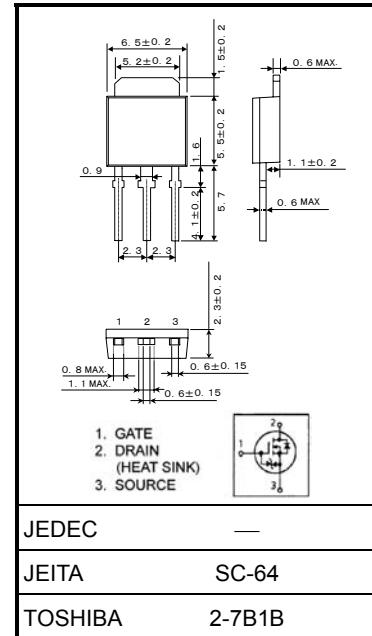
Chopper Regulator, DC/DC Converter and Motor Drive Applications

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 : $V_{th} = 0.8\sim2.0\ V$ ($V_{DS} = 10\ V$, $I_D = 1\ mA$)

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	A
	Pulse (Note 1)	I_{DP}	A
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}	-55~150	$^\circ C$



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	$^\circ C / W$

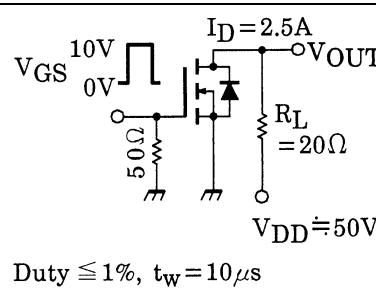
Note 1: Ensure that the channel temperature does not exceed 150°C.

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.

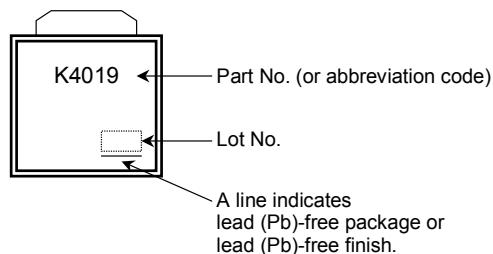
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

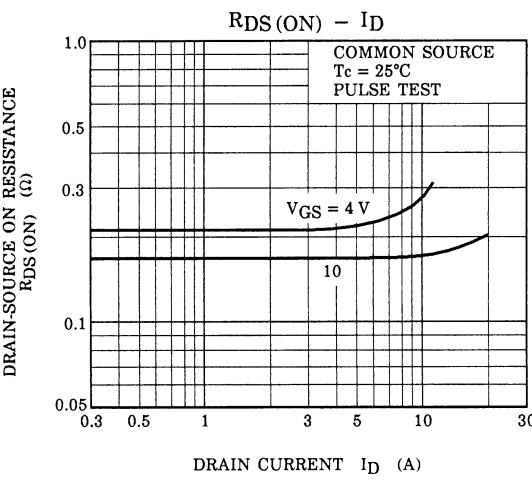
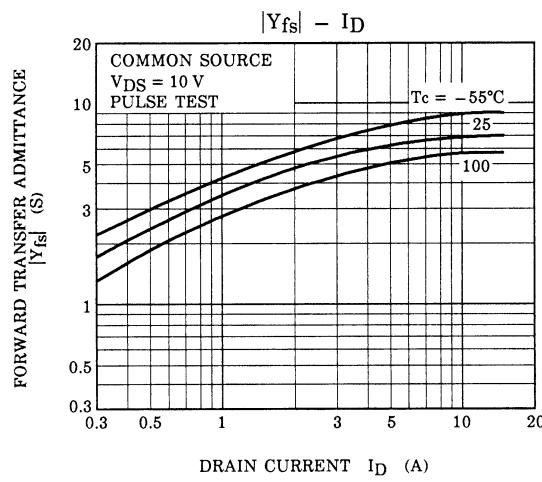
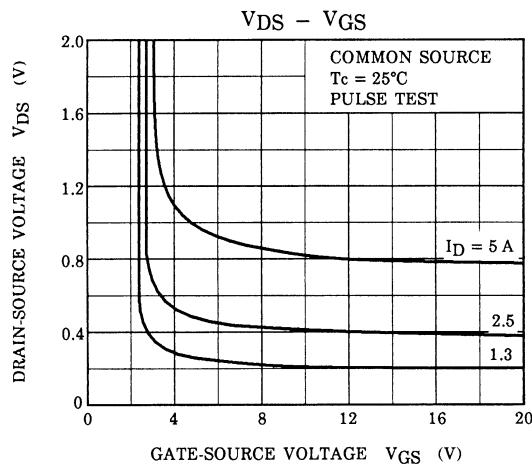
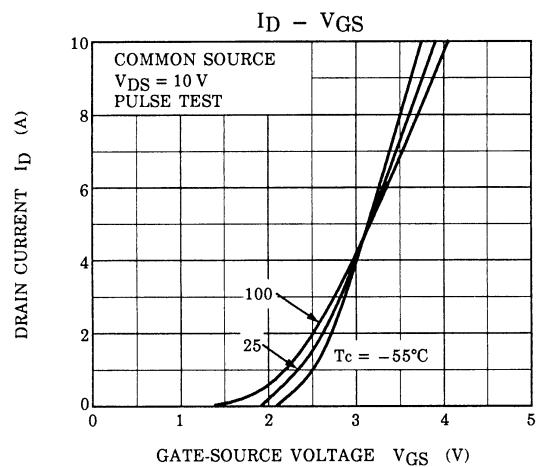
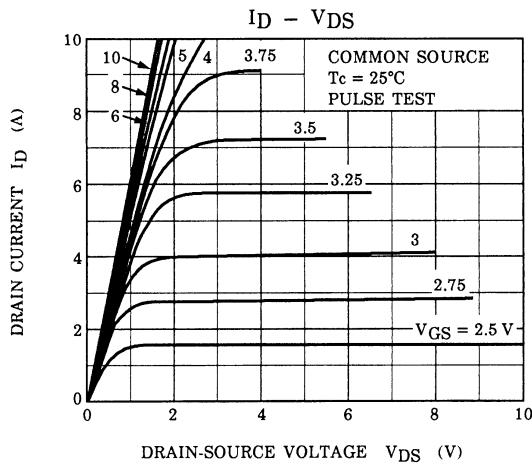
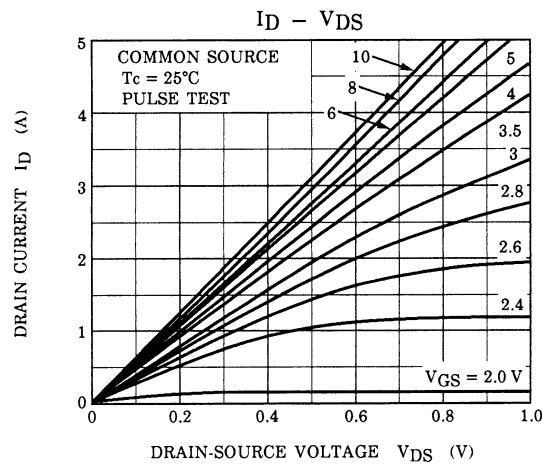
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0\text{ V}$	—	—	± 10	μA	
Drain cutoff current	I_{DSS}	$V_{DS} = 100\text{ V}$, $V_{GS} = 0\text{ V}$	—	—	100	μA	
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$	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	$R_{DS}(\text{ON})$	$V_{GS} = 4\text{ V}$, $I_D = 2.5\text{ A}$	—	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	 V_{GS} 10V 0V $I_D = 2.5\text{ A}$ $R_L = 20\Omega$ $V_{DD} = 50\text{ V}$ Duty $\leq 1\%$, $t_W = 10\mu\text{s}$	—	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	$V_{DD} = 80\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$	—	22	—	nC	
Gate-source charge	Q_{gs}		—	15	—		
Gate-drain ("Miller" charge)	Q_{gd}		—	7	—		

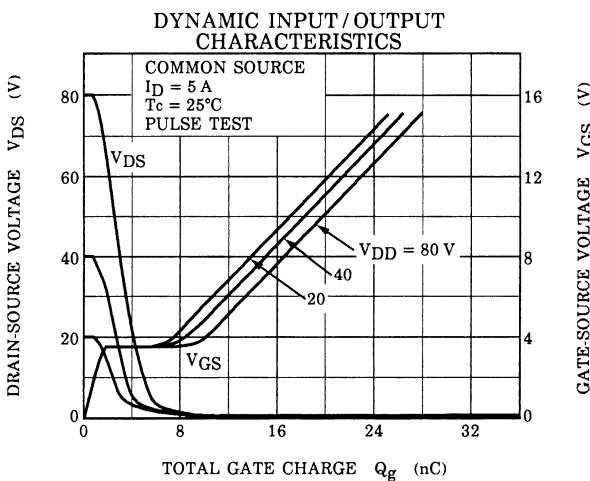
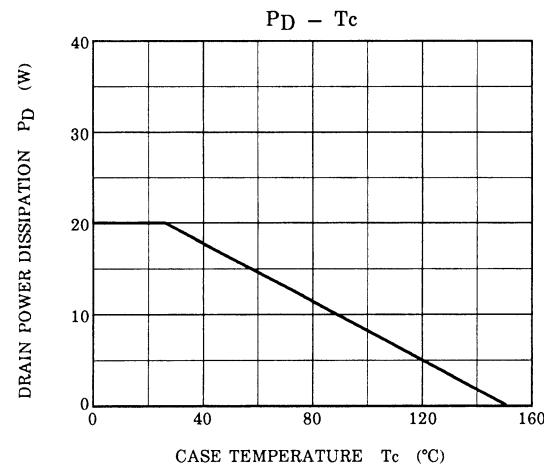
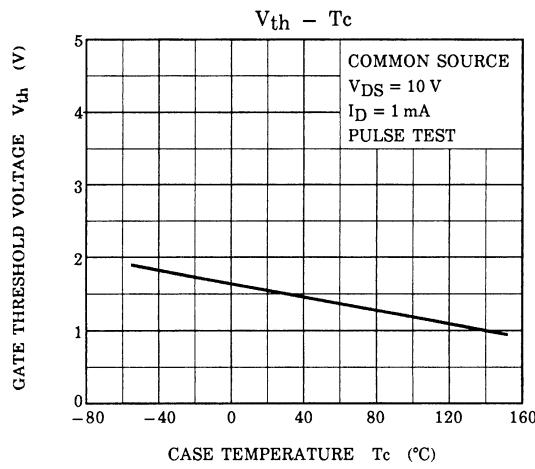
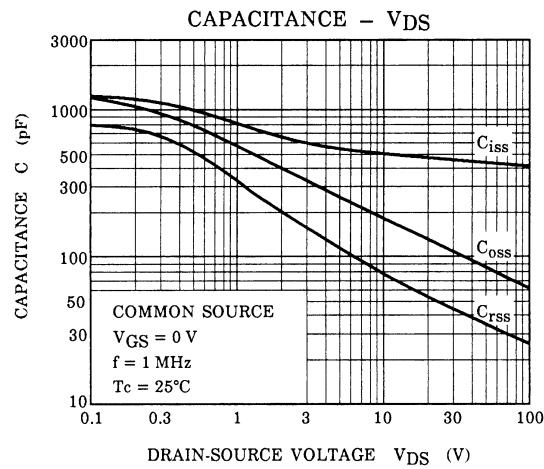
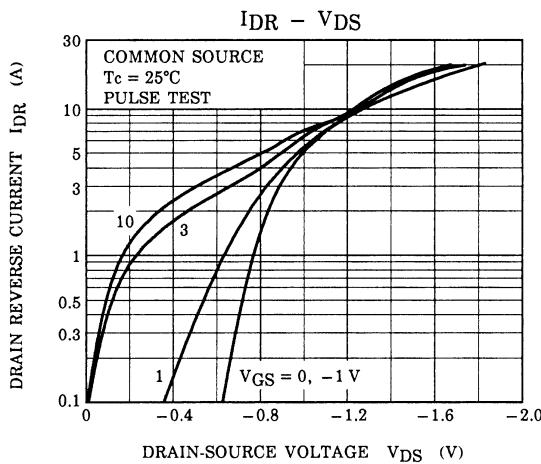
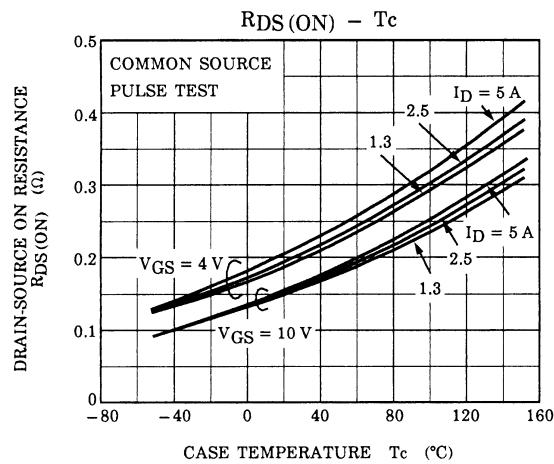
Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

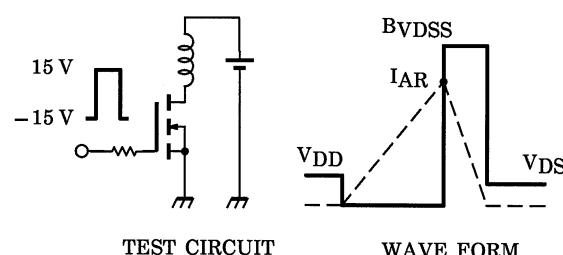
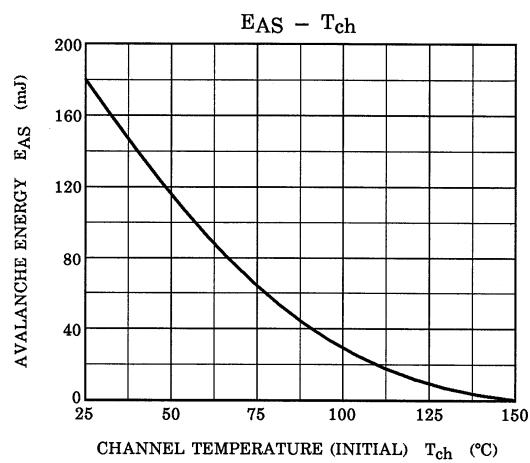
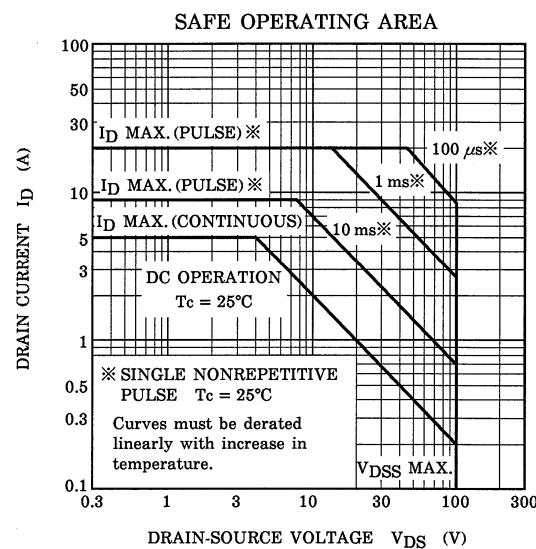
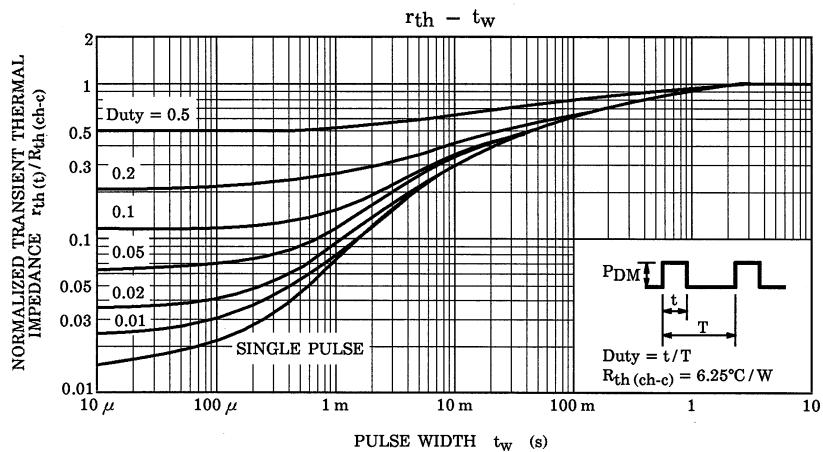
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	5	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	20	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 5\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 5\text{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

Marking









$$RG = 25 \Omega \quad EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - VDD} \right)$$

$$VDD = 25 \text{ V}, L = 11.6 \text{ mH}$$

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