

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L²-π-MOSIII)

2SK1381

Relay Drive, Motor Drive and DC-DC Converter Applications

Unit: mm

- 4-V gate drive
- Low drain-source ON resistance : $R_{DS(ON)} = 25 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 33 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement mode : $V_{th} = 0.8 \sim 2.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Maximum Ratings (Ta = 25°C)

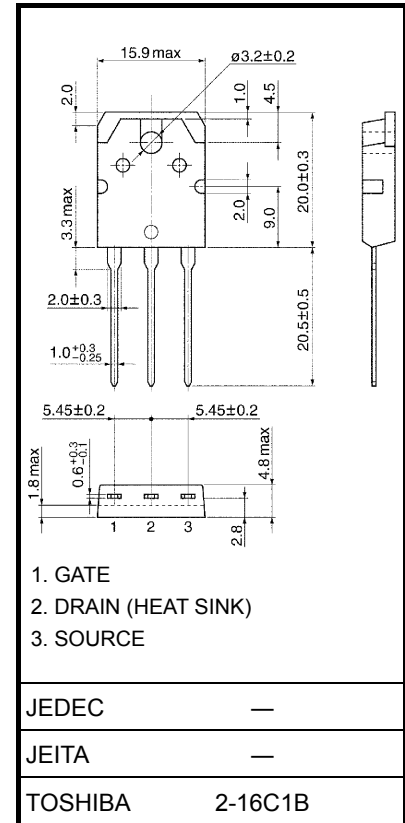
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	100	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	A
	Pulse (Note 1)	I_{DP}	
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	150	W
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	$-55 \sim 150$	$^\circ\text{C}$

Thermal Characteristics

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

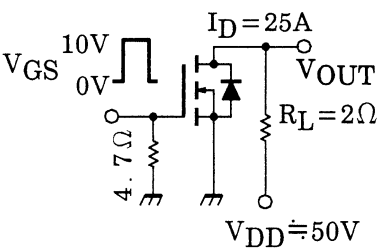
Note 1: Ensure that the channel temperature does not exceed 150°C.

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



Weight: 4.6 g (typ.)

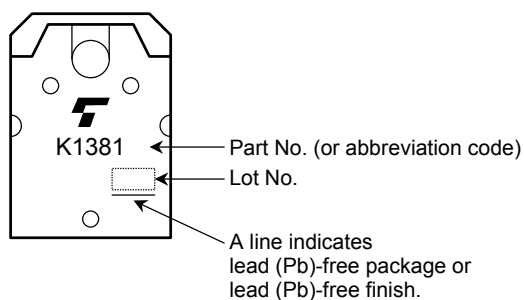
Electrical Characteristics (Ta = 25°C)

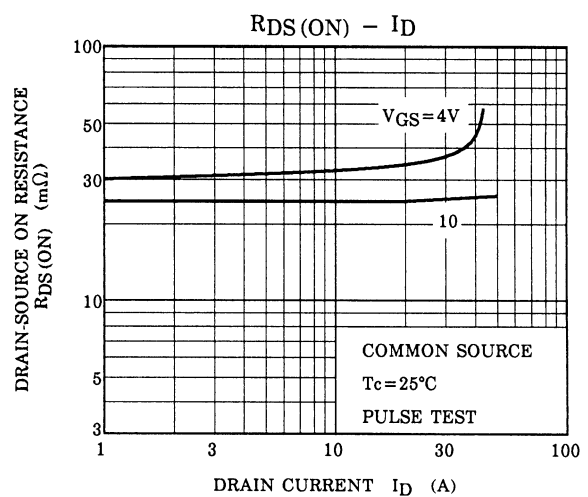
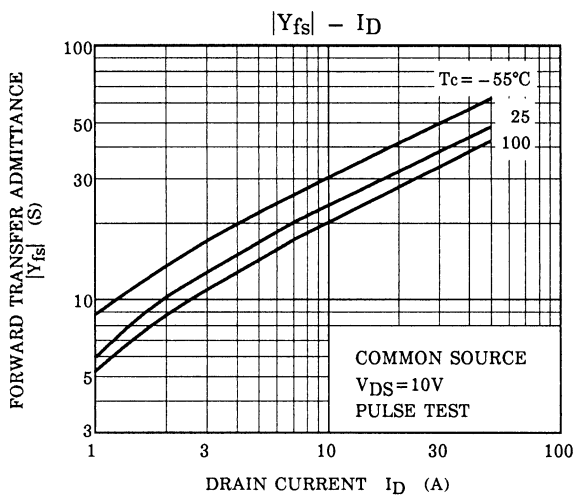
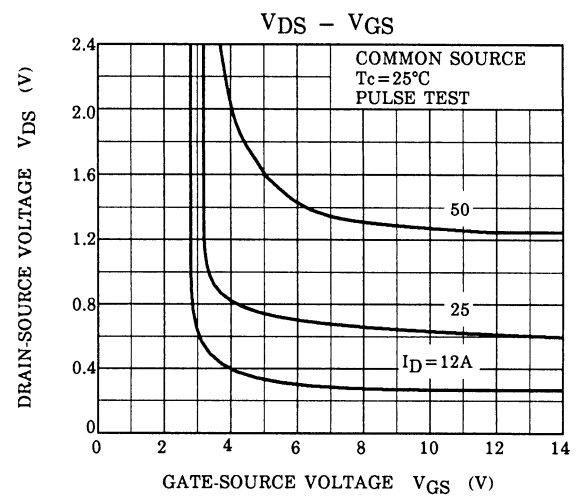
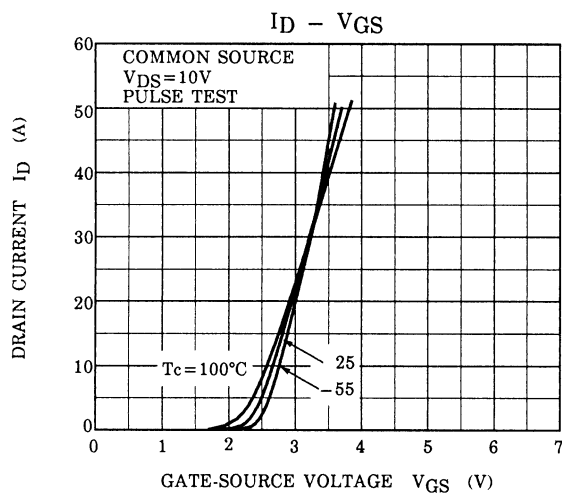
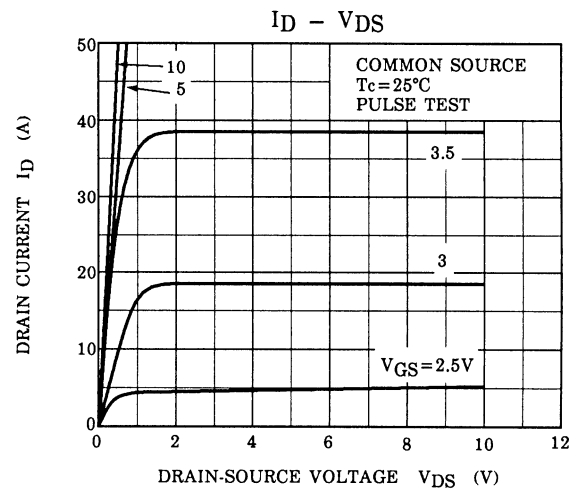
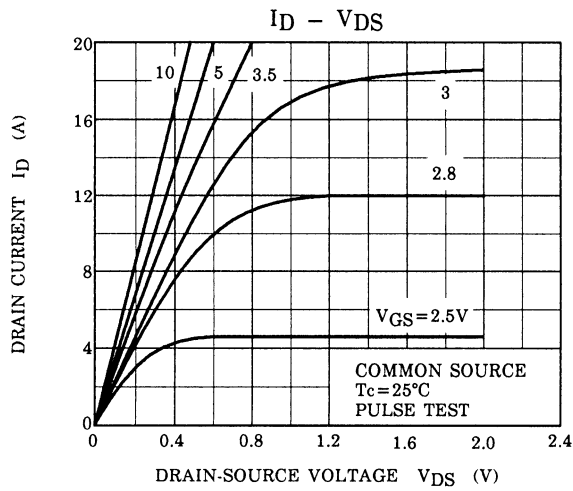
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 50	nA
Drain cut-off current		I_{DSS}	$V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	100	—	—	V
Gate threshold voltage		V_{th}	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	0.8	—	2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 4 \text{ V}, I_D = 25 \text{ A}$	—	31	46	m Ω
			$V_{GS} = 10 \text{ V}, I_D = 25 \text{ A}$	—	25	32	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 25 \text{ A}$	20	33	—	S
Input capacitance		C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	3700	—	pF
Reverse transfer capacitance		C_{rss}		—	580	—	
Output capacitance		C_{oss}		—	1500	—	
Switching time	Rise time	t_r	 $I_D = 25 \text{ A}$ $V_{GS} \text{ 10V 0V}$ 4.7Ω $R_L = 2\Omega$ V_{OUT} $V_{DD} = 50 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$	—	16	—	ns
	Turn-on time	t_{on}		—	46	—	
	Fall time	t_f		—	60	—	
	Turn-off time	t_{off}		—	185	—	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} \approx 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 50 \text{ A}$	—	88	—	nC
Gate-source charge		Q_{gs}		—	62	—	
Gate-drain ("miller") charge		Q_{gd}		—	26	—	

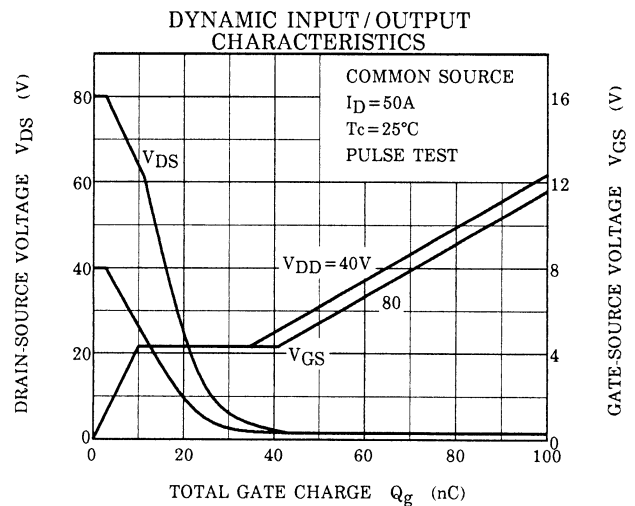
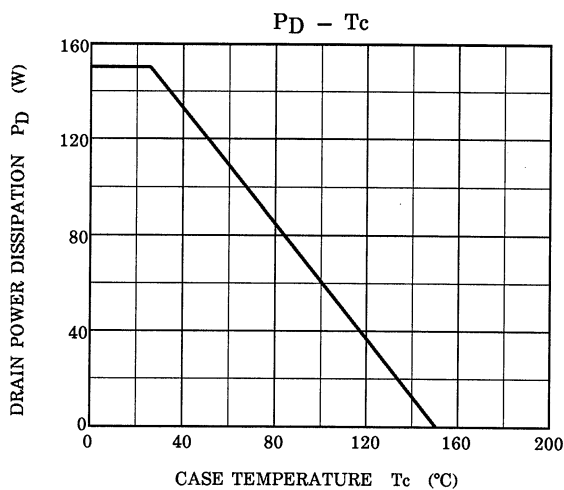
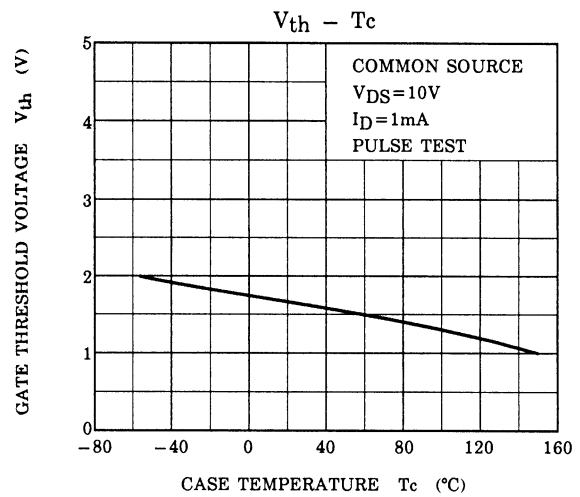
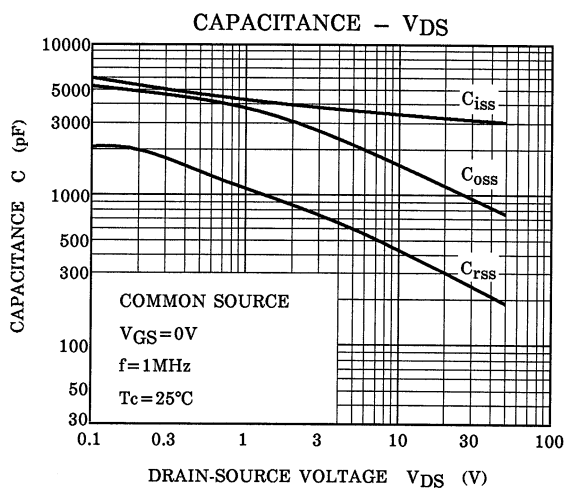
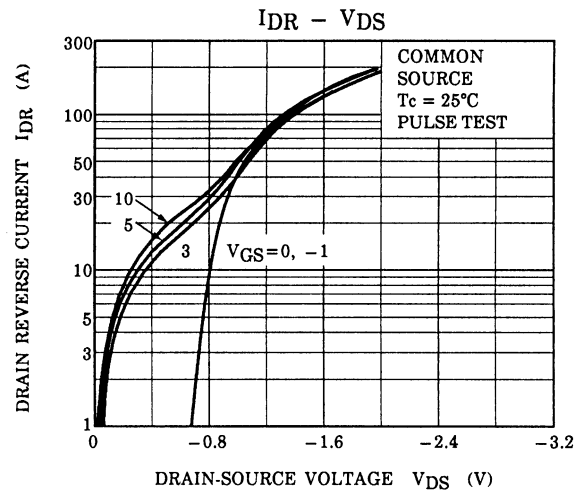
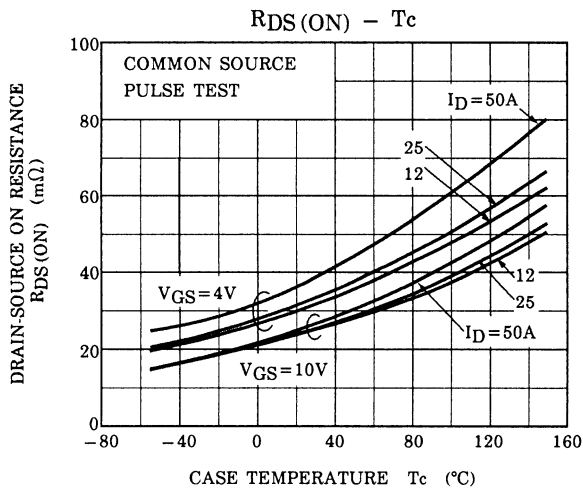
Source-Drain Ratings and Characteristics (Ta = 25°C)

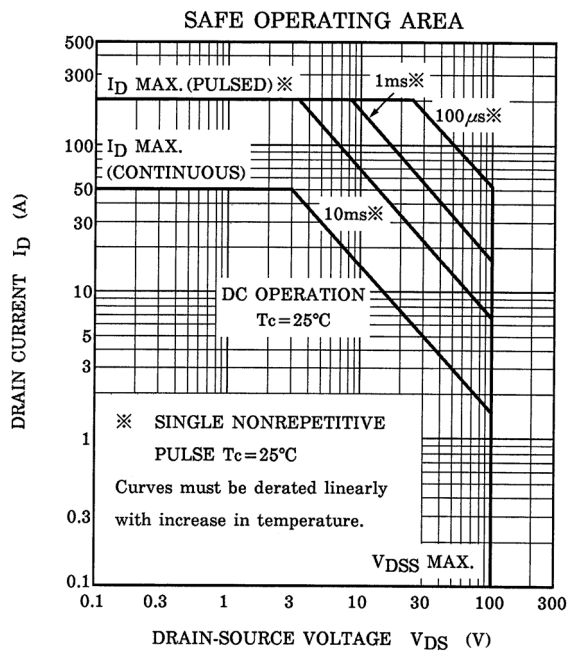
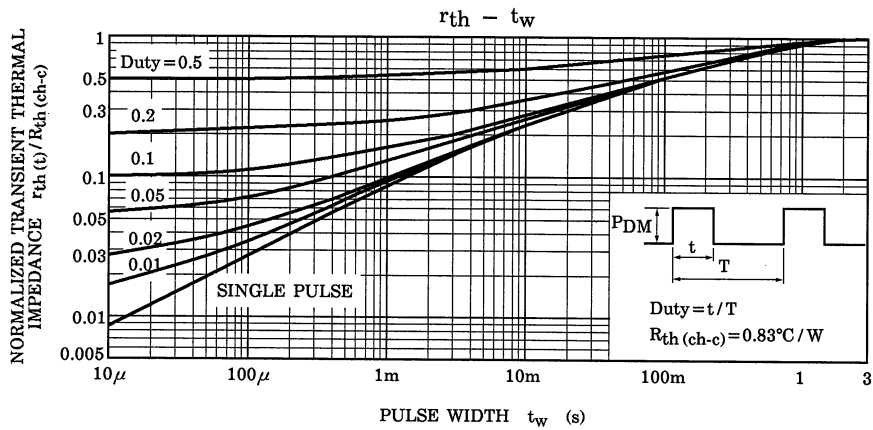
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	50	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	200	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 50 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.6	V
Reverse recovery time	t_{rr}	$I_{DR} = 50 \text{ A}, V_{GS} = 0 \text{ V}$ $dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$	—	280	—	ns
Reverse recovered charge	Q_{rr}		—	0.56	—	μC

Marking









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