

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

2SK1381

Relay Drive, Motor Drive and DC-DC Converter Applications

- 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 : $IDSS = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement mode : $V_{th} = 0.8 \text{ to } 2.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $ID = 1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

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 to 150	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

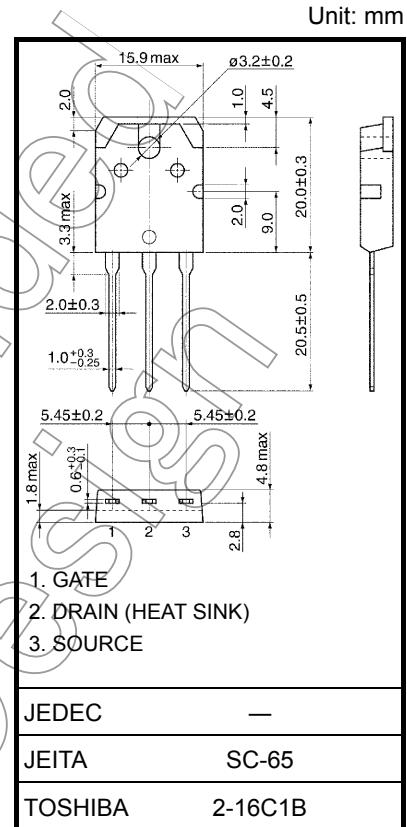
Thermal Characteristics

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.

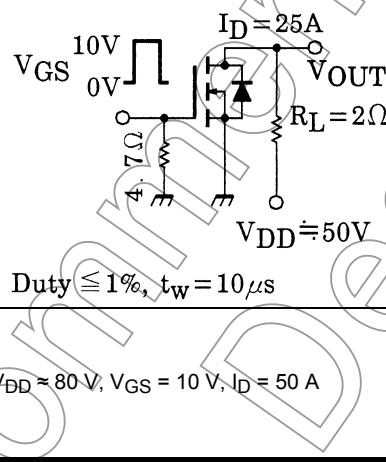
This transistor is an electrostatic-sensitive device.

Please handle with caution.



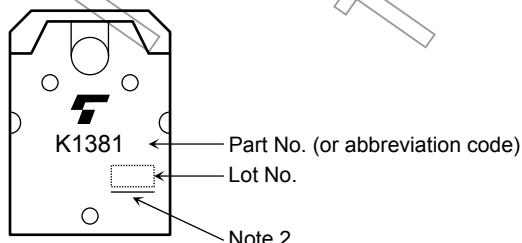
Electrical Characteristics ($T_a = 25^\circ C$)

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

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

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}	$I_{DR} = 50 A, V_{GS} = 0 V$	—	—	-1.3	V
Reverse recovery time	t_{rr}	$I_{DR} = 50 A, V_{GS} = 0 V$ $dI_{DR} / dt = 50 A / \mu s$	—	280	—	ns
Reverse recovered charge	Q_{rr}		—	0.56	—	μC

Marking

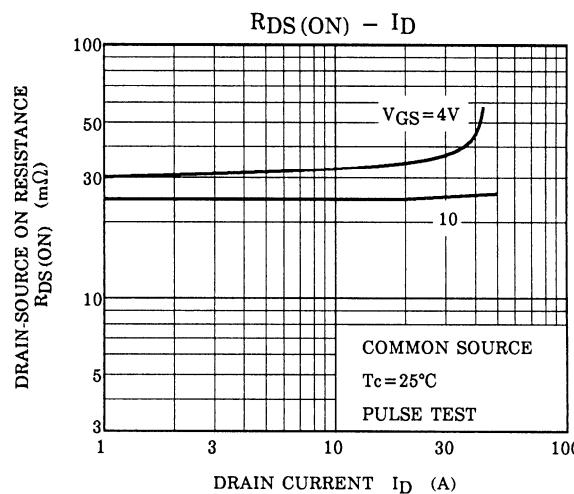
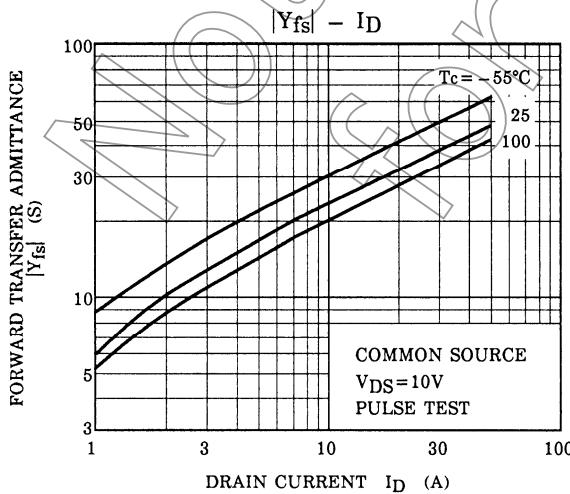
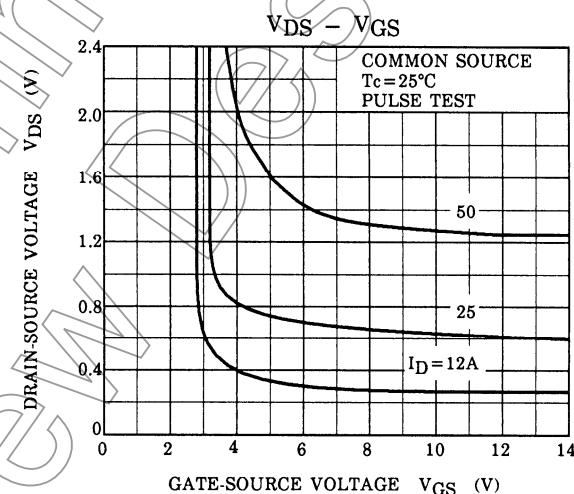
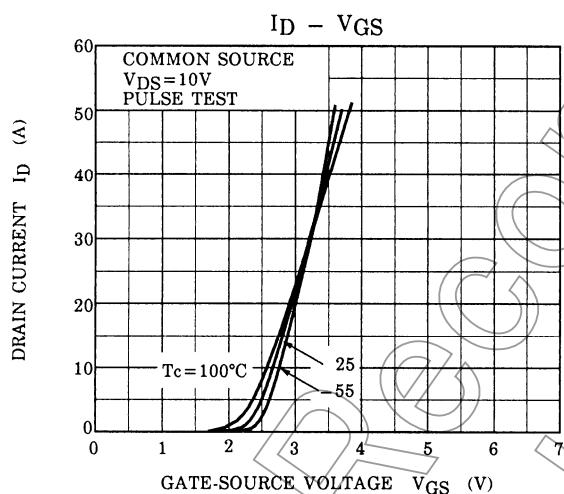
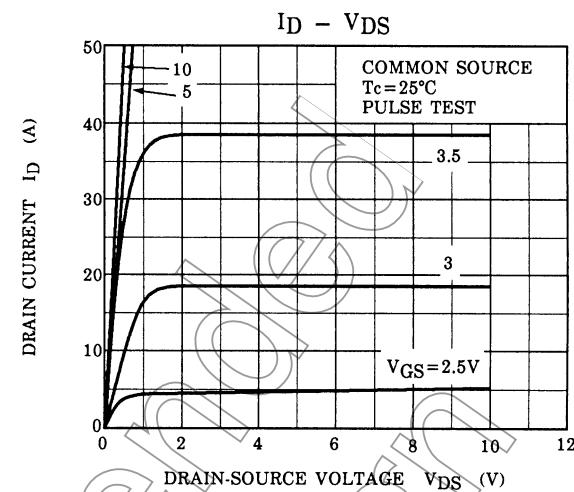
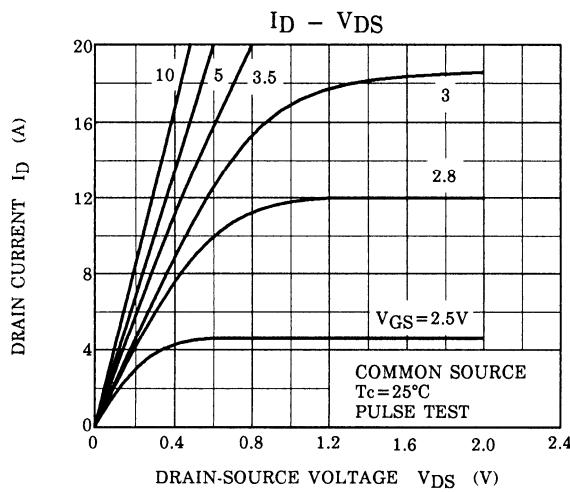


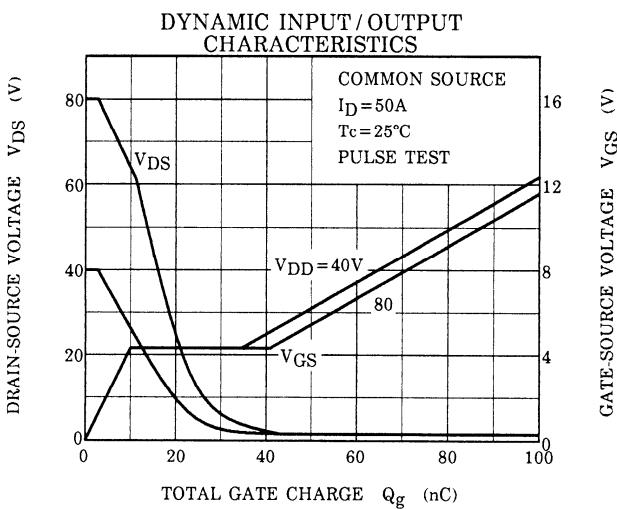
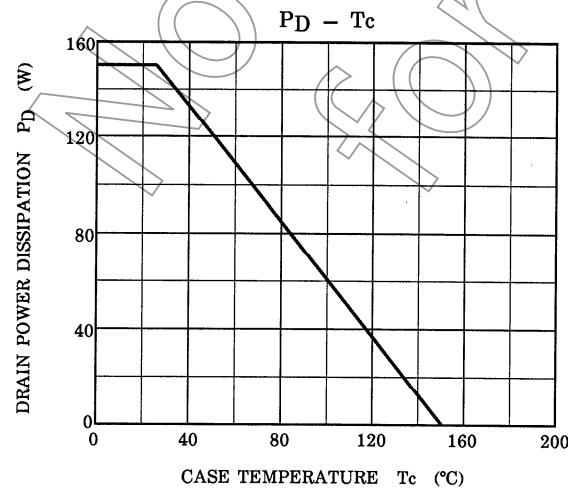
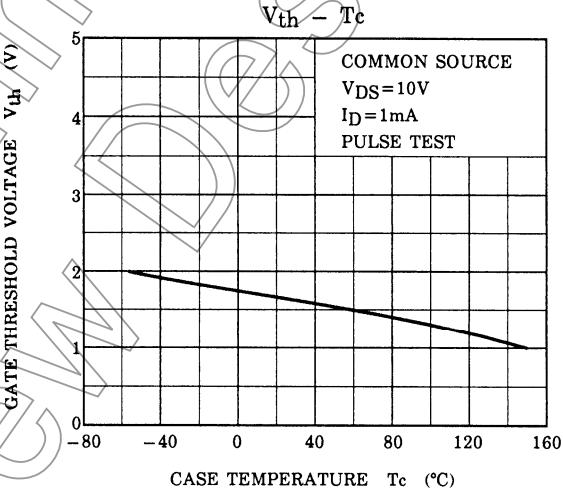
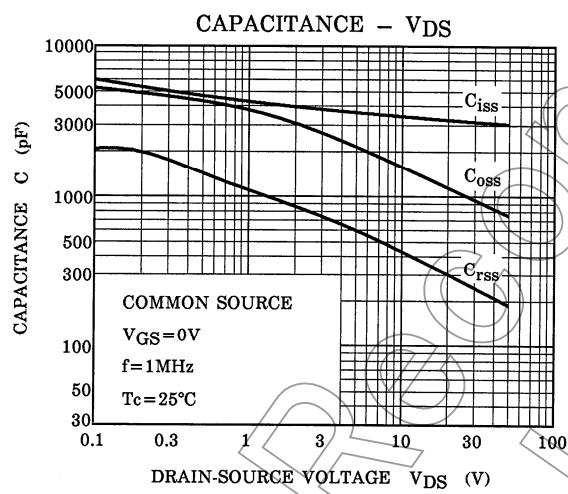
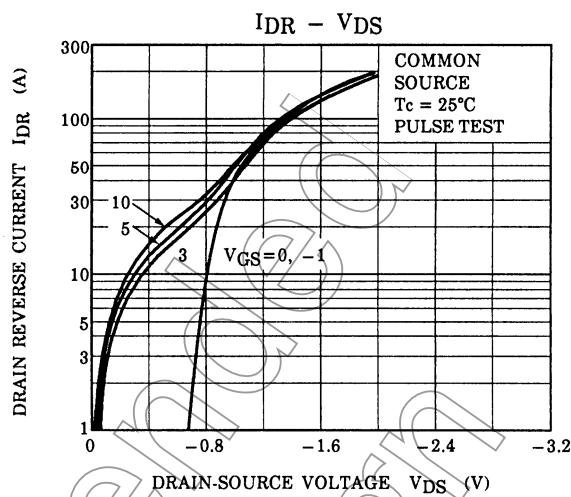
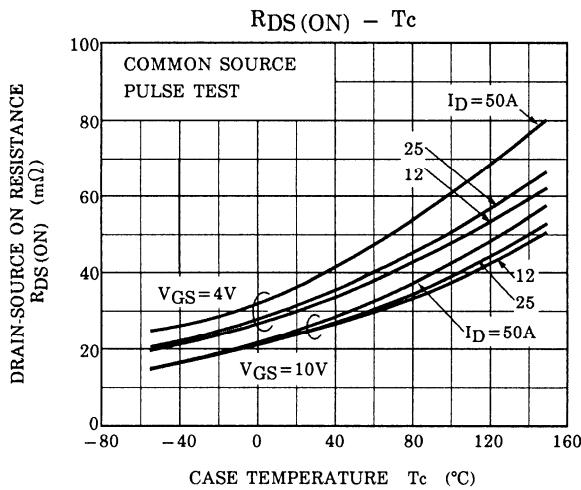
Note 2: A line under a Lot No. identifies the indication of product Labels.

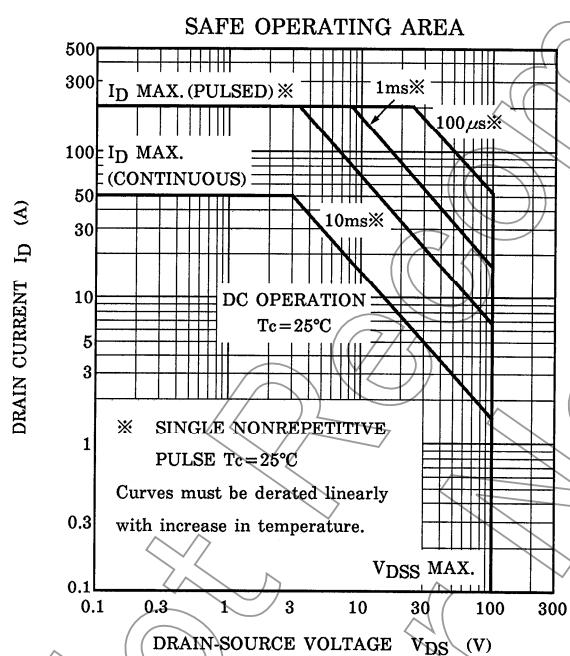
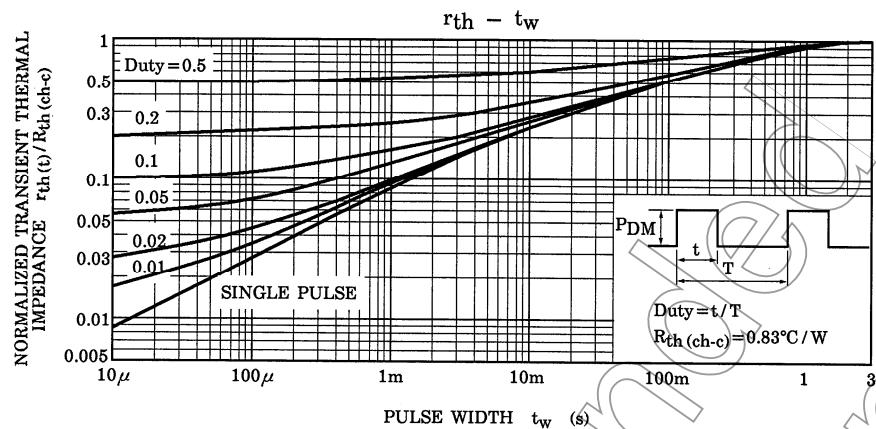
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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