

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L<sup>2</sup>-π-MOSIII)

## 2SK1381

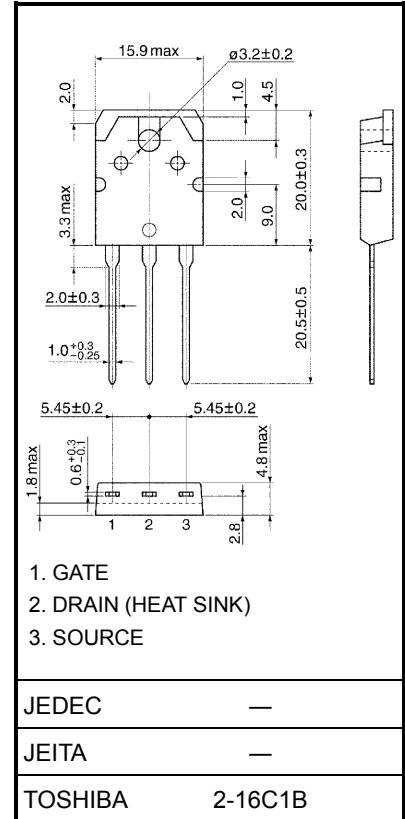
Relay Drive, Motor Drive and DC-DC Converter Applications

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	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	50
	Pulse (Note 1)	$I_{DP}$	200
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	150	W
Channel temperature	$T_{ch}$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C



Weight: 4.6 g (typ.)

### Thermal Characteristics

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

Note 1: Please use devices on condition that the channel temperature is below 150°C.

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

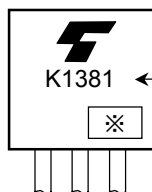
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 50$	nA
Drain cut-off current		$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	$\mu\text{A}$
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 $\Omega$
			$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$	—	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	$t_r$	<p><math>I_D = 25\text{ A}</math> <math>V_{OUT}</math> <math>R_L = 2\ \Omega</math> <math>V_{DD} = 50\text{ V}</math> Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	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	$t_{rr}$	$I_{DR} = 50\text{ A}, V_{GS} = 0\text{ V}$	—	280	—	ns
Reverse recovered charge	$Q_{rr}$	$di_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	0.56	—	$\mu\text{C}$

## Marking

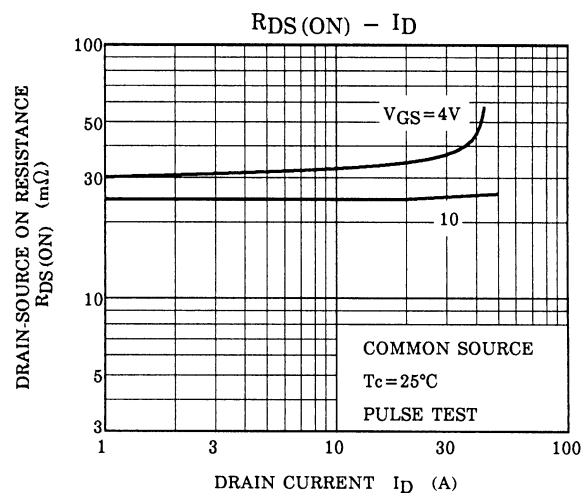
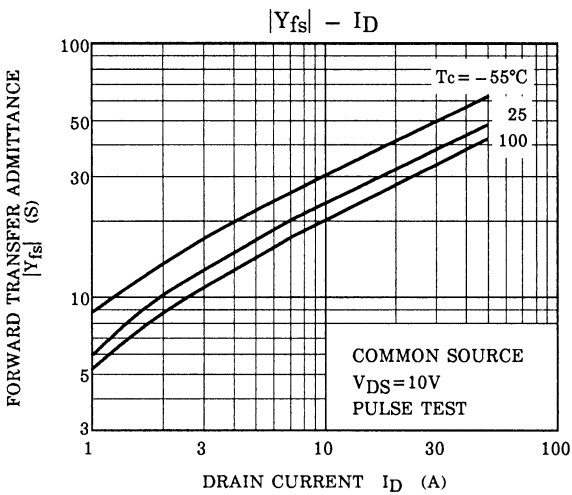
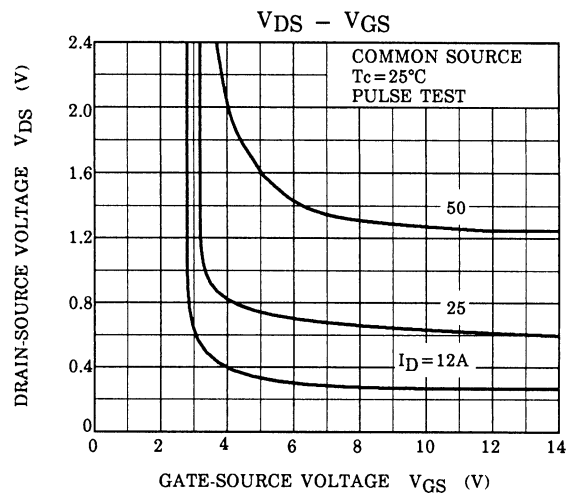
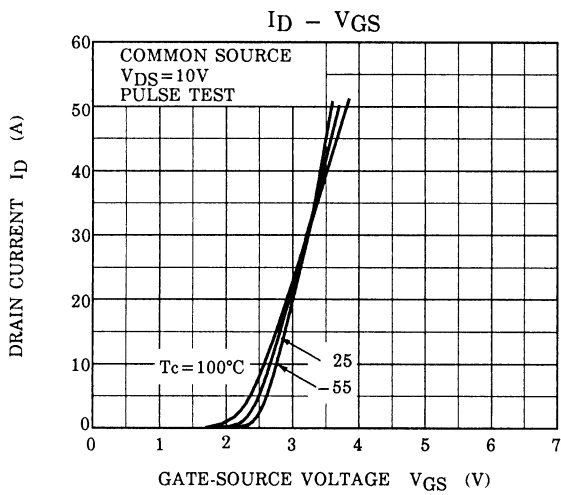
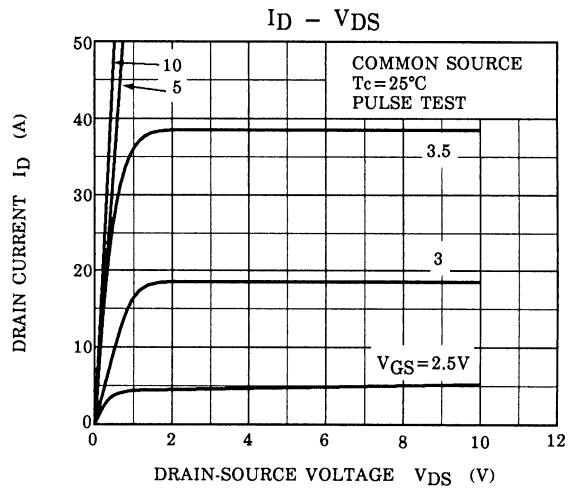
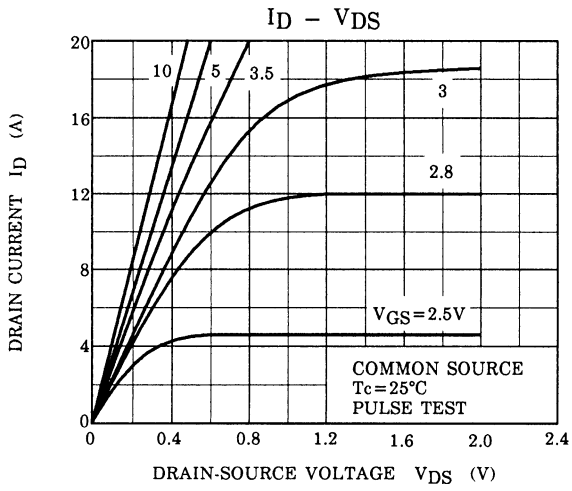


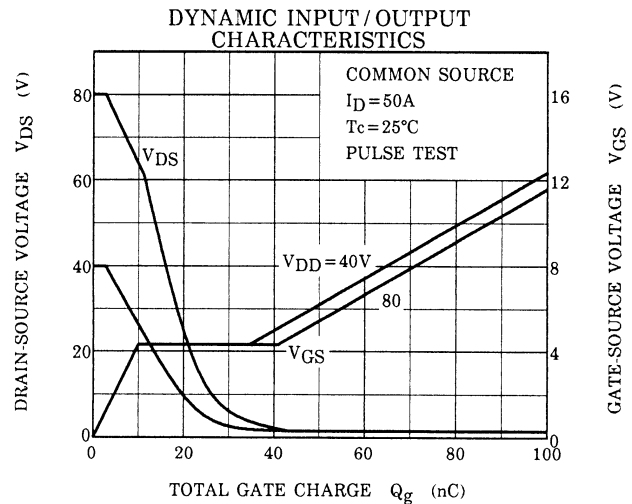
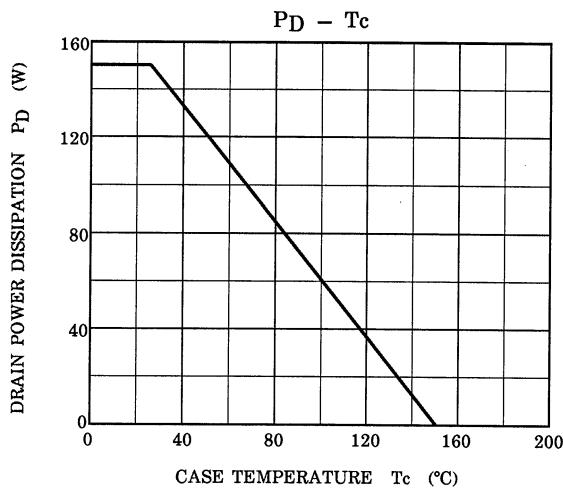
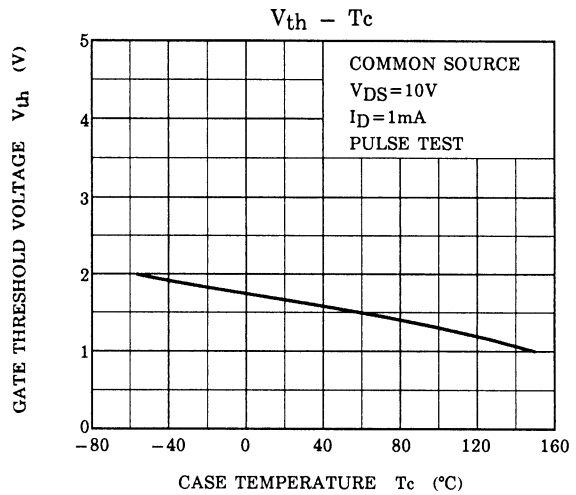
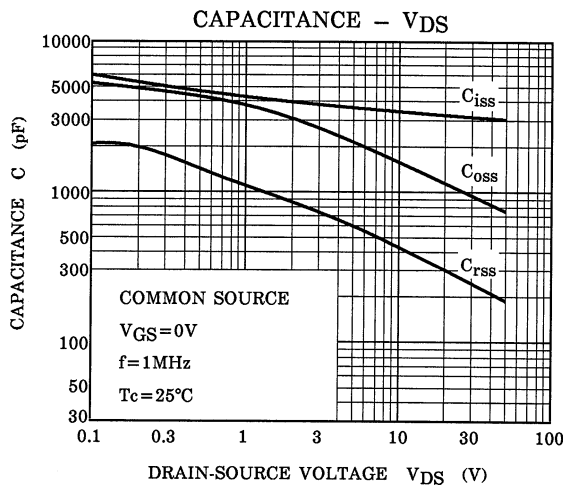
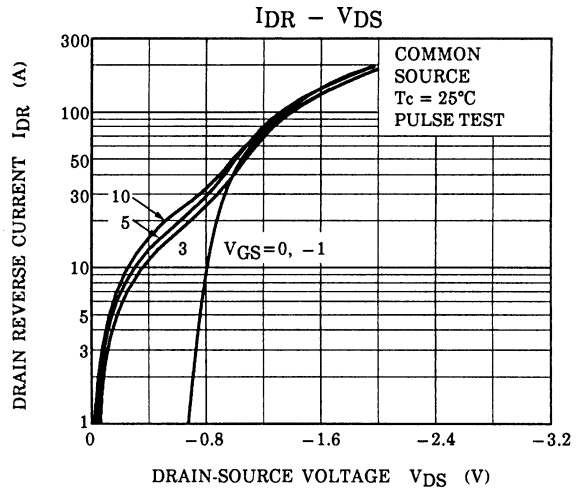
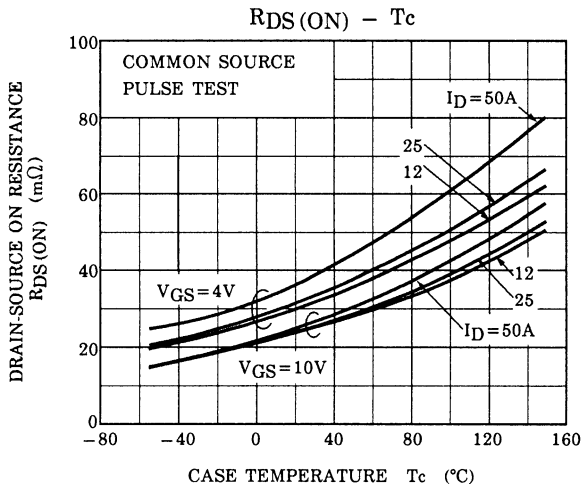
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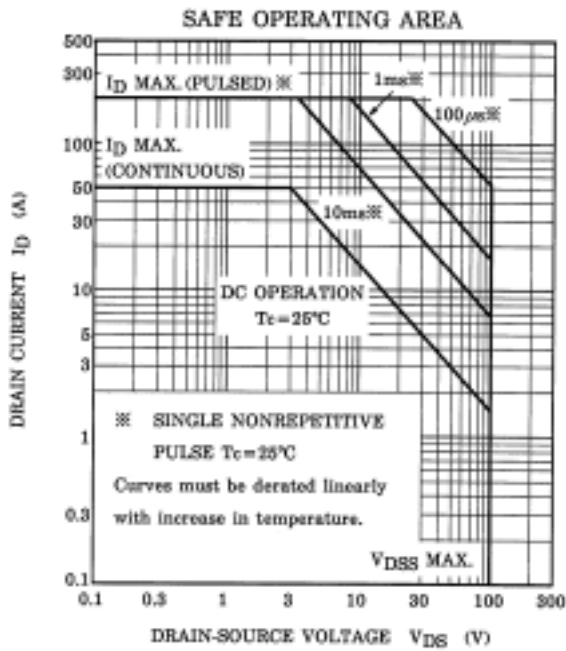
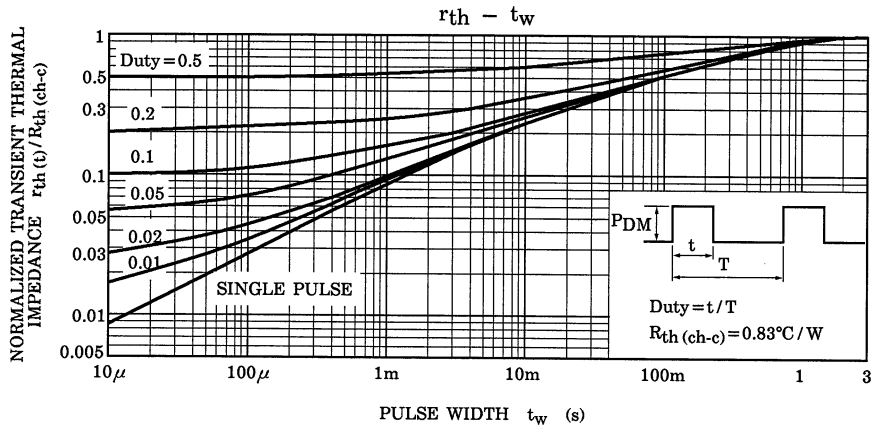
※ Lot Number

Month (starting from alphabet A)

Year (last number of the christian era)







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