

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

2SK3658

DC-DC Converter, Relay Drive and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 0.23 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 2.0 S$ (typ.)
- Low leakage current : $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 60 V$)
- Enhancement-mode : $V_{th} = 0.8$ to $2.0 V$ ($V_{DS} = 10 V, I_D = 1 mA$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	60	V
Drain-gate voltage ($R_{GS} = 20 k\Omega$)	V_{DGR}	60	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	2
	Pulse (Note 1)	I_{DP}	6
Drain power dissipation ($T_c = 25^\circ C$)	P_D	0.5	W
Drain power dissipation (Note 2)	P_D	1.5	W
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55 to 150	°C

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

Note 2: Mounted on ceramic substrate (25.4 mm × 25.4 mm × 0.8 mm)

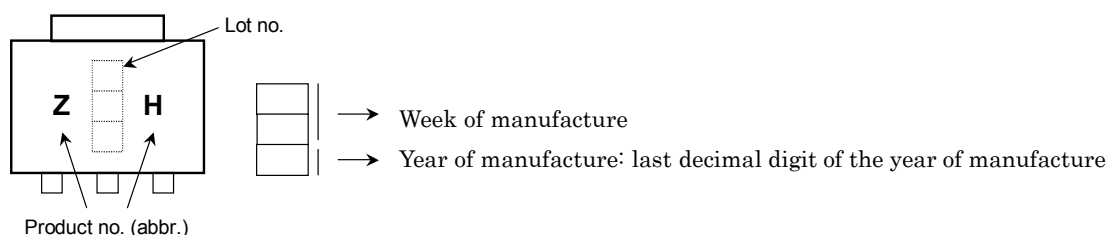
Note 3: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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

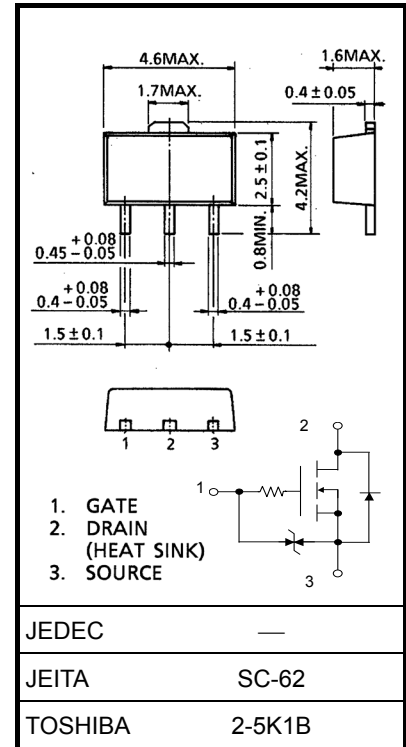
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	250	°C / W

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

Marking

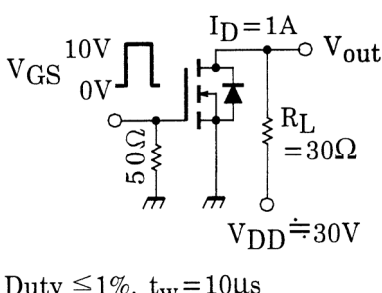


Unit: mm



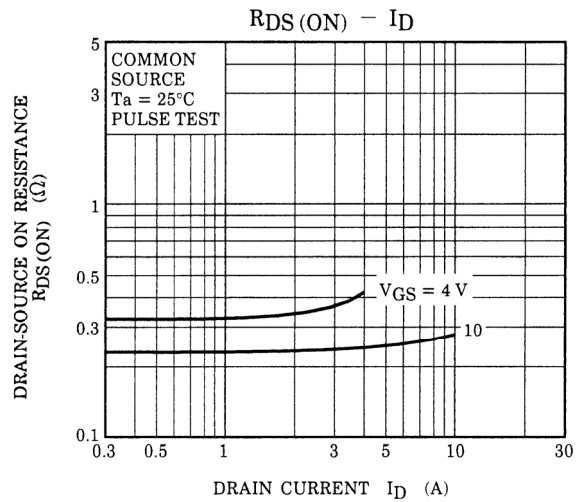
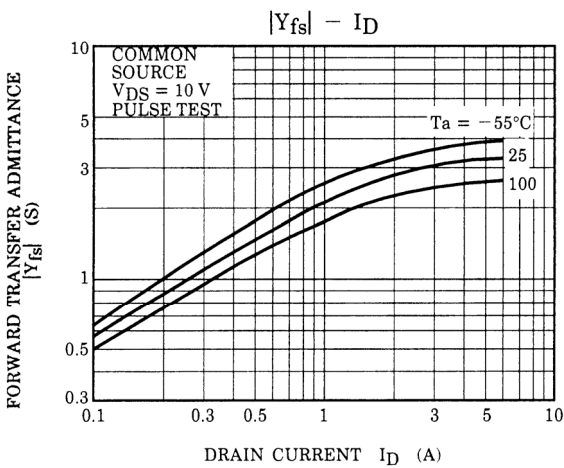
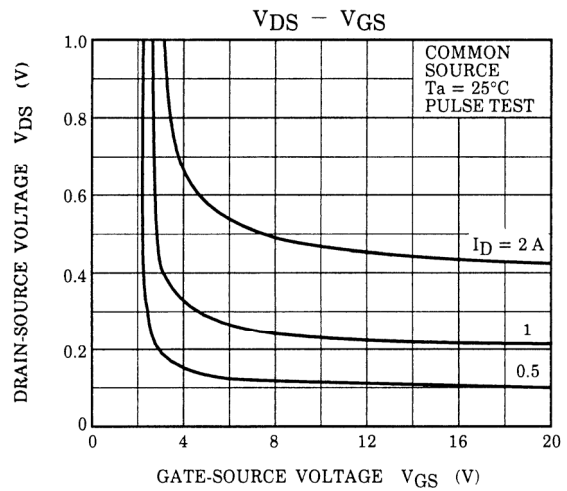
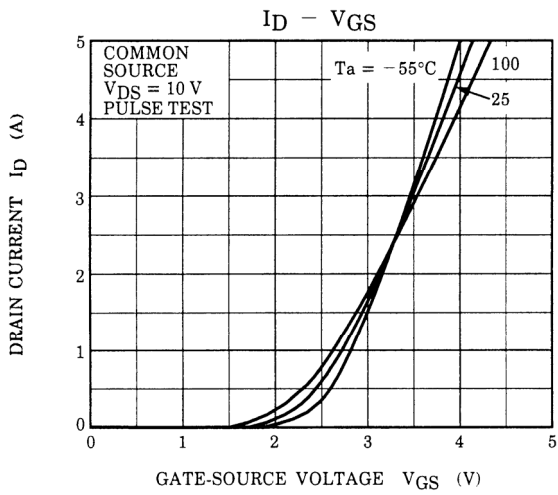
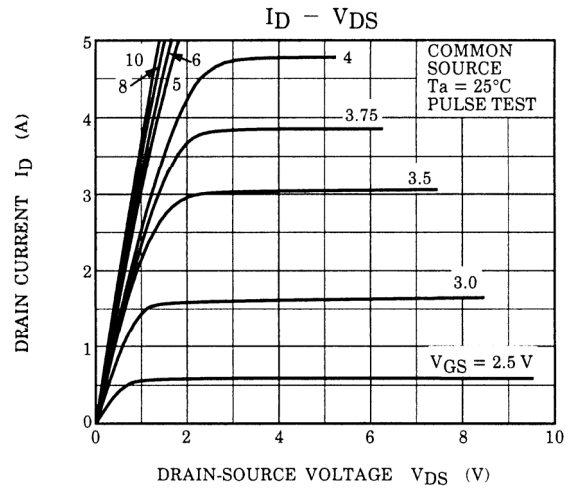
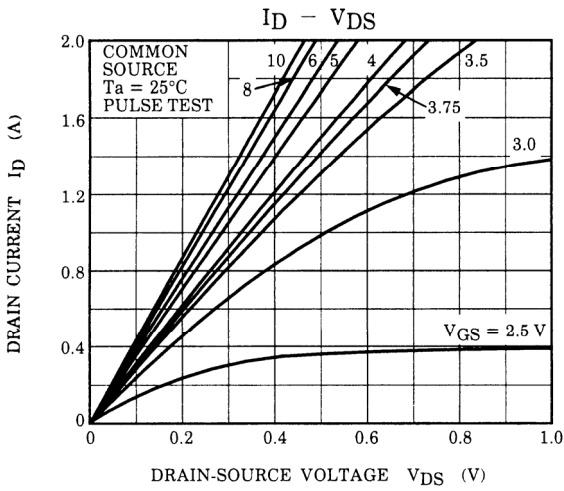
Weight: 0.05 g (typ.)

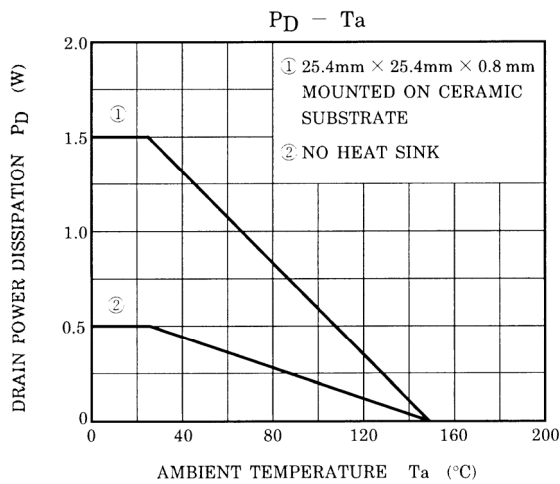
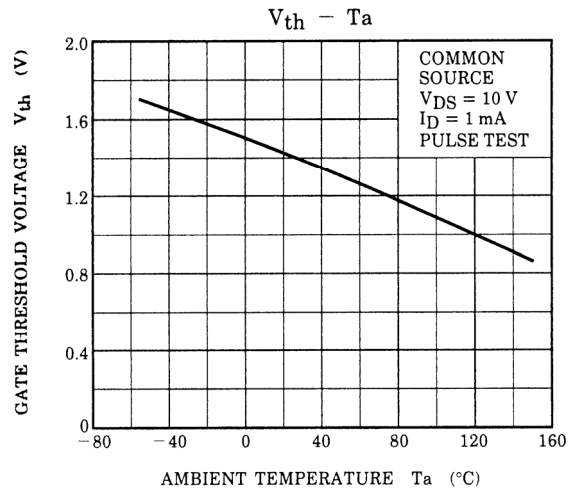
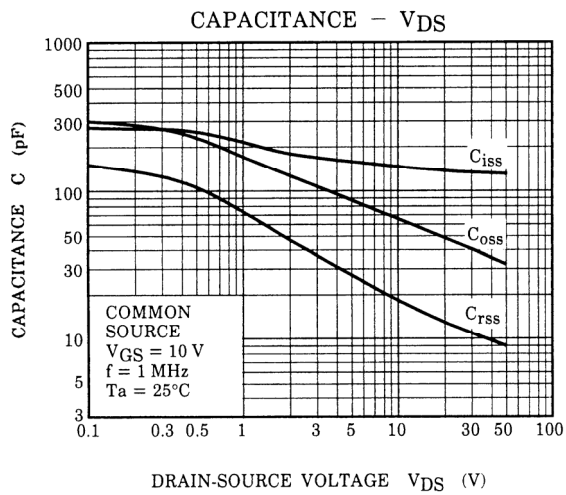
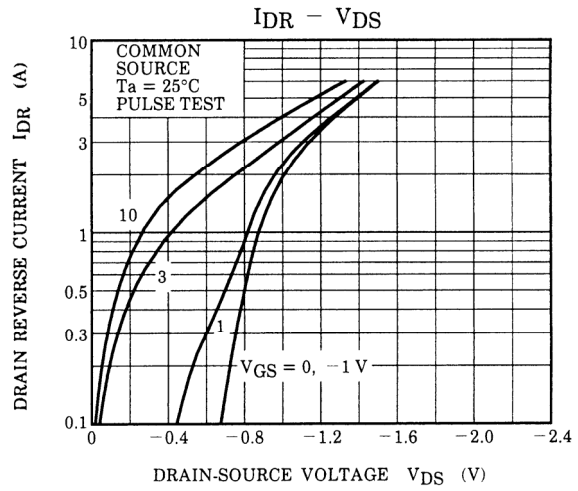
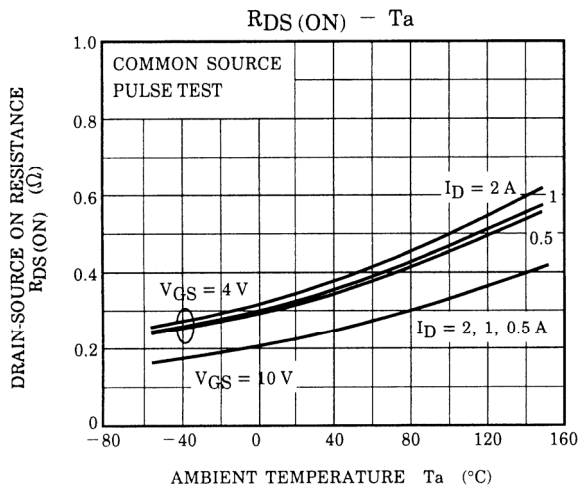
Electrical Characteristics (Ta = 25°C)

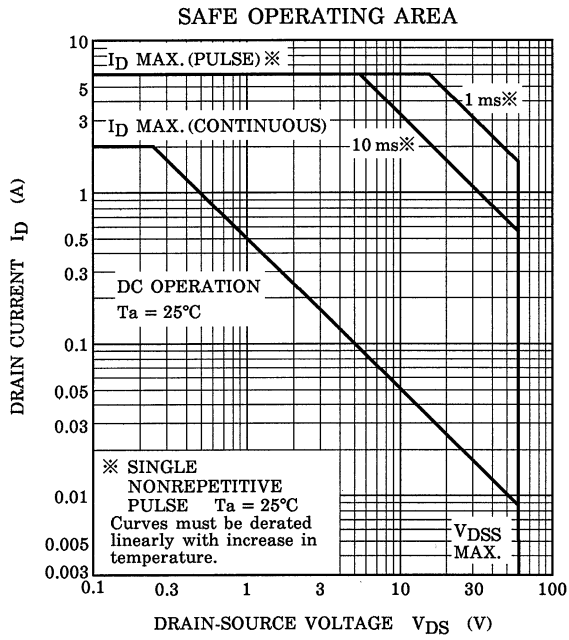
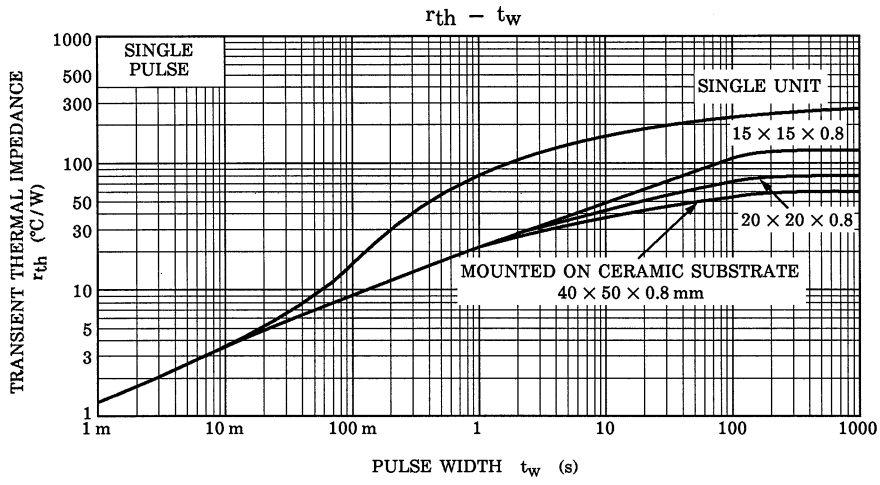
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	60	—	—	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		$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 1\text{ A}$	—	0.33	0.44	Ω
			$V_{GS} = 10\text{ V}, I_D = 1\text{ A}$	—	0.23	0.30	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 1\text{ A}$	1.0	2.0	—	S
Input capacitance		C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	140	—	pF
Reverse transfer capacitance		C_{rss}		—	20	—	
Output capacitance		C_{oss}		—	65	—	
Switching time	Rise time	t_r	 <p>$I_D = 1\text{ A}$ $V_{GS} = 10\text{ V}, 0\text{ V}$ 50Ω $R_L = 30\Omega$ $V_{DD} \approx 30\text{ V}$ V_{out} Duty $\leq 1\%$, $t_w = 10\mu\text{s}$</p>	—	140	—	ns
	Turn-on time	t_{on}		—	210	—	
	Fall time	t_f		—	470	—	
	Turn-off time	t_{off}		—	1600	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 2\text{ A}$	—	5.0	—	nC
Gate-source charge		Q_{gs}		—	3.6	—	
Gate-drain ("miller") Charge		Q_{gd}		—	1.4	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	2	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	6	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 2\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = 2\text{ A}, V_{GS} = 0\text{ V}$	—	100	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	40	—	nC







RESTRICTIONS ON PRODUCT USE

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