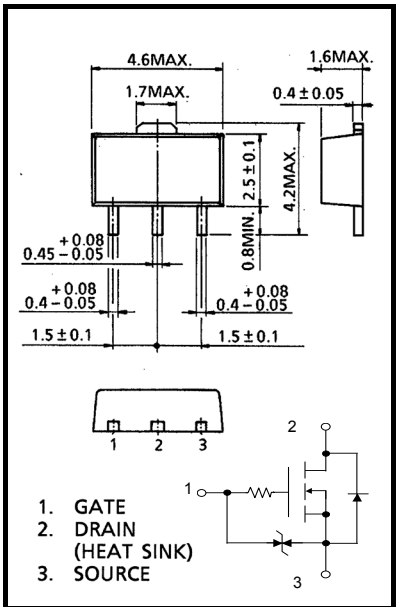
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (L^2−π−MOSV)

2SK3658

DC−DC Converter, Relay Drive and Motor Drive Applications

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

Unit: mm



JEDEC	—
JEITA	SC-62
TOSHIBA	2-5K1B

Weight: 0.05 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	60	V
Drain−gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	60	V
Gate−source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	2	A
	Pulse (Note 1)	I_{DP}	6	
Drain power dissipation (Tc = 25°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)

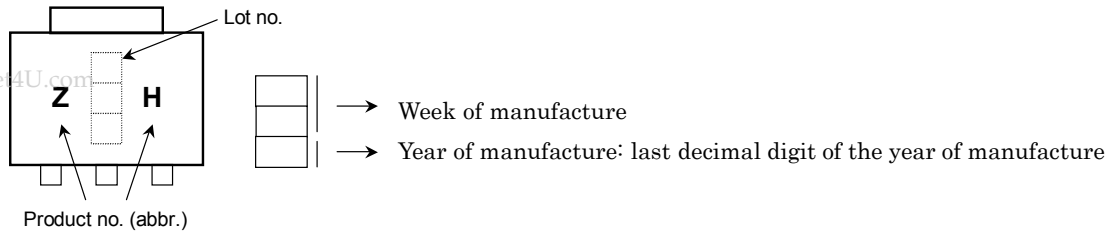
Note 3: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

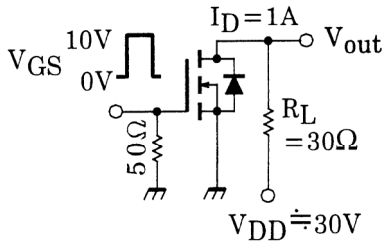
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	250	°C / W

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

Marking



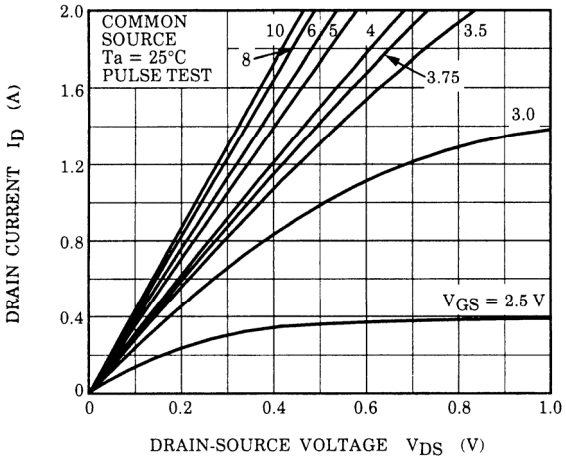
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut−off current		I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V	—	—	100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	60	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	0.8	—	2.0	V
Drain−source ON resistance		$R_{DS\ (ON)}$	VGS = 4 V, ID = 1 A	—	0.33	0.44	Ω
			VGS = 10 V, ID = 1 A	—	0.23	0.30	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 1 A	1.0	2.0	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	140	—	pF
Reverse transfer capacitance		C_{rss}		—	20	—	
Output capacitance		C_{oss}		—	65	—	
Switching time	Rise time	t_r		—	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} ≈ 48 V, V_{GS} = 10 V, I_D = 2 A	—	5.0	—	nC
Gate−source charge		Q_{gs}		—	3.6	—	
Gate−drain (“miller”) Charge		Q_{gd}		—	1.4	—	

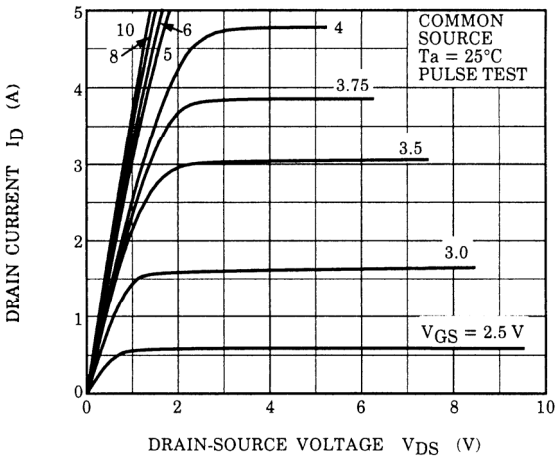
Source−Drain Ratings and Characteristics (Ta = 25°C)

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 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse recovery time	t_{rr}	I_{DR} = 2 A, V_{GS} = 0 V dI_{DR} / dt = 50 A / μs	—	100	—	ns
Reverse recovery charge	Q_{rr}		—	40	—	nC

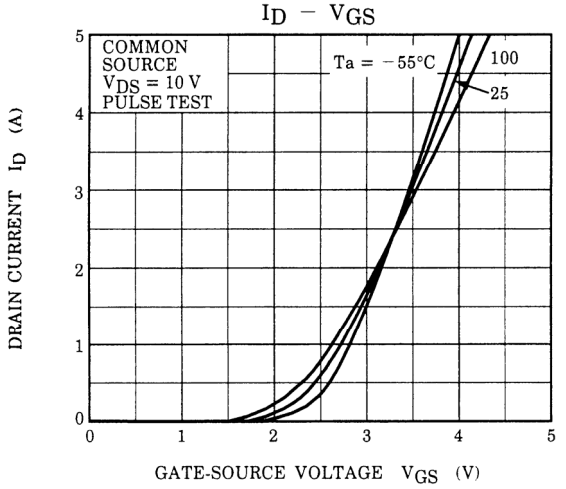
$I_D - V_{DS}$



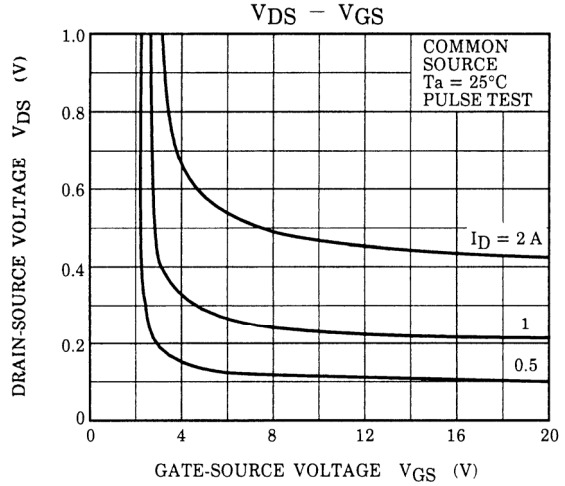
$I_D - V_{DS}$



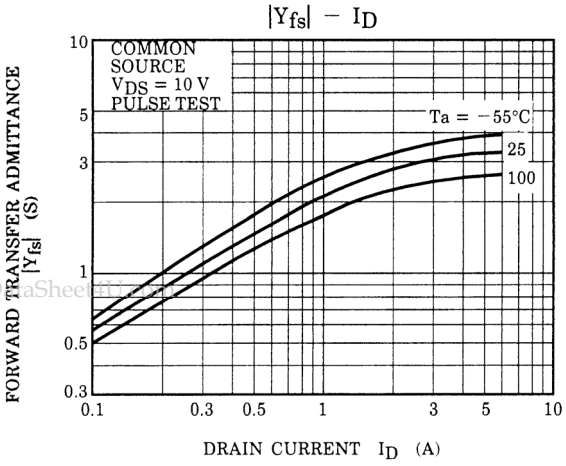
$I_D - V_{GS}$



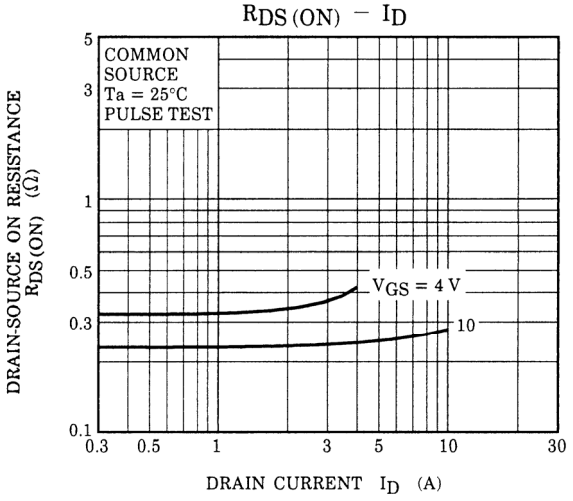
$V_{DS} - V_{GS}$



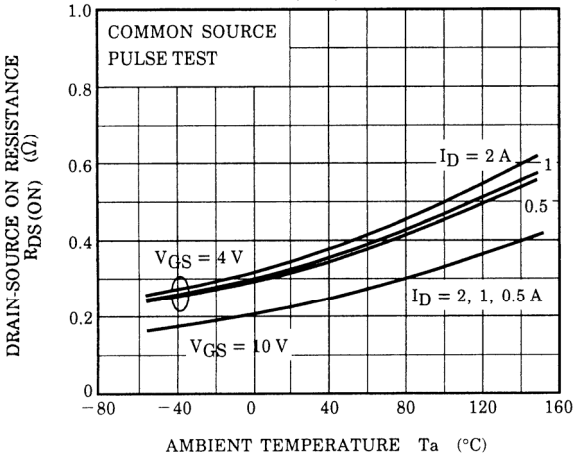
$|Y_{fs}| - I_D$



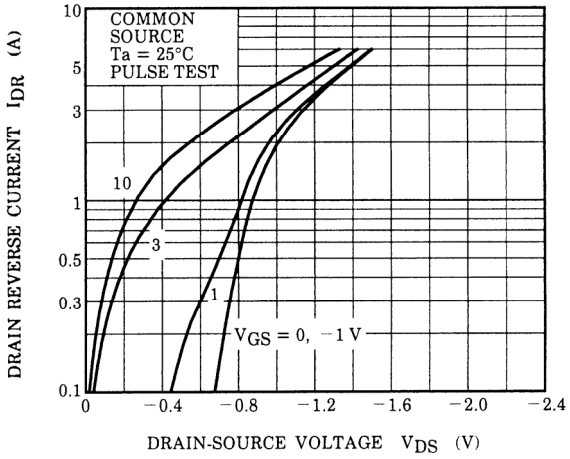
$R_{DS\,(ON)} - I_D$



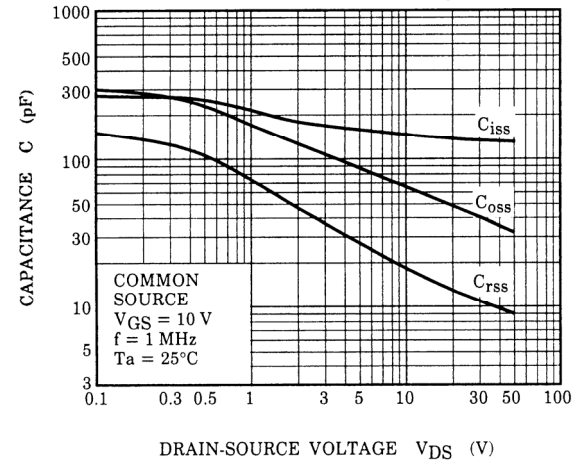
$R_{DS\,(ON)}$ – Ta



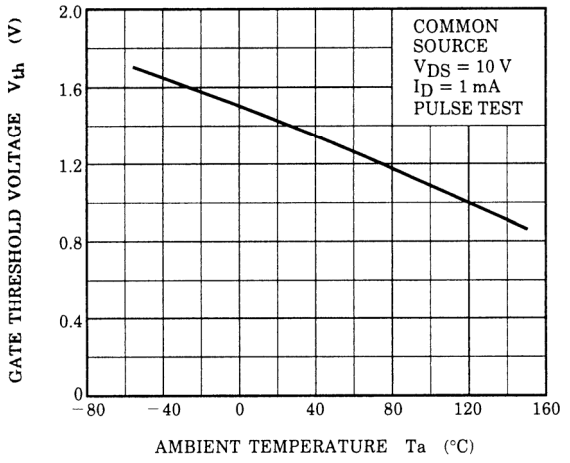
I_{DR} – V_{DS}



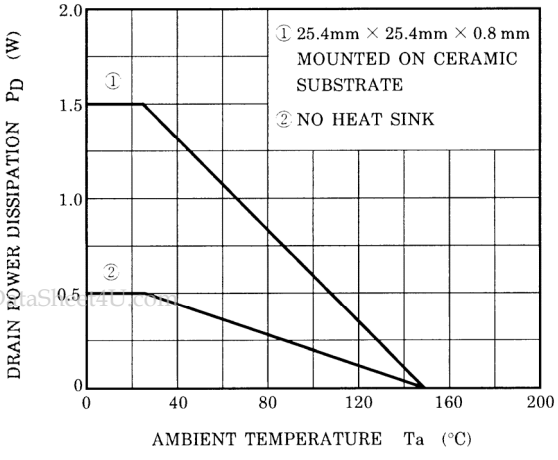
CAPACITANCE – V_{DS}



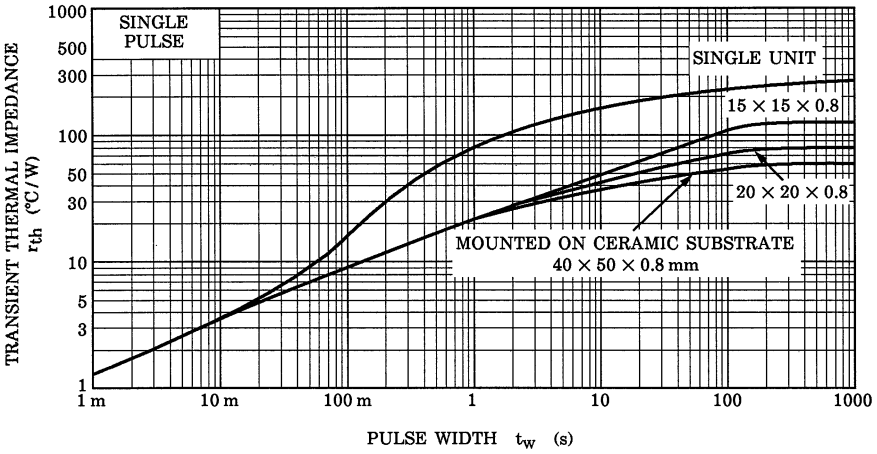
V_{th} – Ta



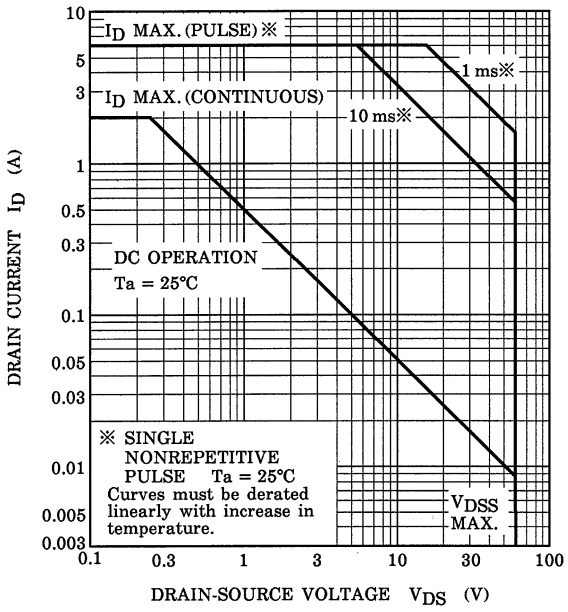
P_D – Ta



$r_{th} - t_w$



SAFE OPERATING AREA



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