

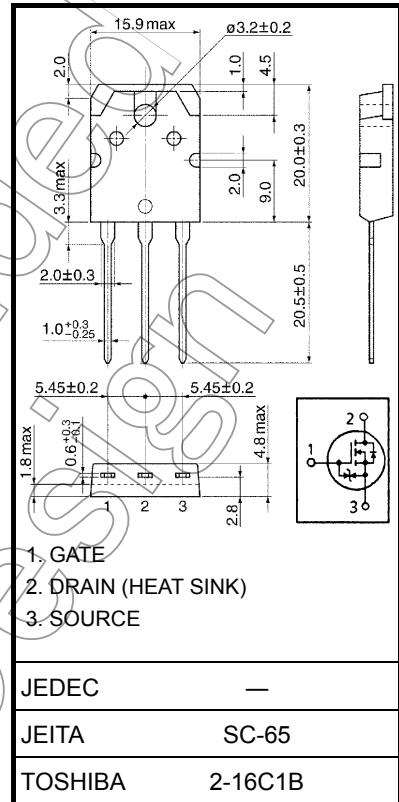
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π -MOSV)

2SK2398

DC-DC Converter and Motor Drive Applications

- Low drain-source ON-resistance : $R_{DS(ON)} = 22 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 27 \text{ S}$ (typ.)
- Low leakage current : $Id_{SS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 60 \text{ V}$)
- Enhancement mode : $V_{th} = 1.5$ to 3.0 V ($V_{DS} = 10 \text{ V}$, $Id = 1 \text{ mA}$)

Unit: mm



Weight: 4.6 g (typ.)

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	60	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	60	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	45
	Pulse (Note 1)	I_{DP}	180
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	100	W
Single pulse avalanche energy (Note 2)	E_{AS}	246	mJ
Avalanche current	I_{AR}	45	A
Repetitive avalanche energy (Note 3)	E_{AR}	10	mJ
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	$R_{th}(\text{ch-c})$	1.25	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C} / \text{W}$

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

Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 165 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = 45 \text{ A}$

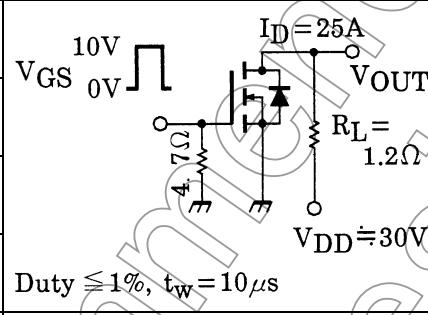
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

Electrical Characteristics (Ta = 25°C)

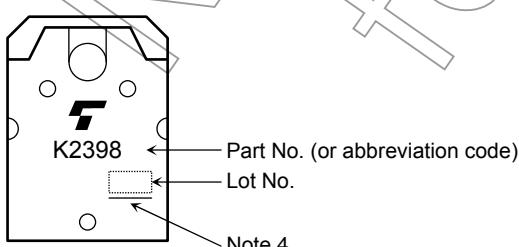
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	µA
Drain cut-off current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V	—	—	100	µA
Drain-source breakdown voltage	V (BR) DSS	I _D = 10 mA, V _{GS} = 0 V	60	—	—	V
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.5	—	3.0	V
Drain-source ON resistance	R _{DSS} (ON)	V _{GS} = 10 V, I _D = 25 A	—	22	30	mΩ
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 25 A	15	27	—	S
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	1800	—	—	pF
Reverse transfer capacitance	C _{rss}		350	—	—	
Output capacitance	C _{oss}		900	—	—	
Switching time	Rise time	t _r	—	20	—	ns
	Turn-on time	t _{on}	—	30	—	
	Fall time	t _f	—	40	—	
	Turn-off time	t _{off}	—	130	—	
Total gate charge (Gate-source plus gate-drain)	Q _g	V _{DD} ≈ 48 V, V _{GS} = 10 V, I _D = 45 A	—	60	—	nC
Gate-source charge	Q _{gs}		—	40	—	
Gate-drain ("miller") charge	Q _{gd}		—	20	—	



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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	45	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	180	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 45 A, V _{GS} = 0 V	—	—	-1.8	V
Reverse recovery time	t _{rr}	I _{DR} = 45 A, V _{GS} = 0 V dI _{DR} / dt = 50 A / µs	—	60	—	ns
Reverse recovery charge	Q _{rr}		—	51	—	µC

Marking

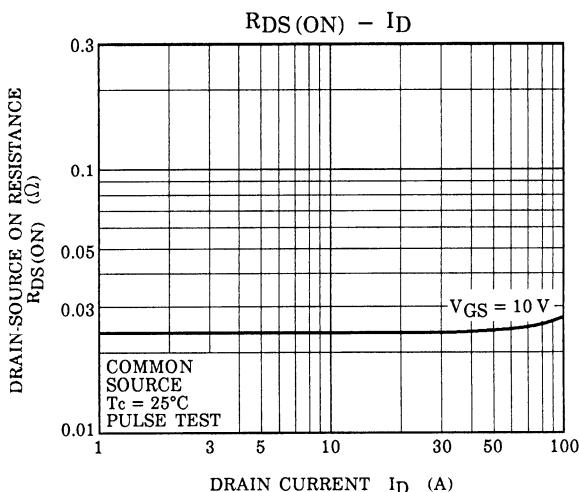
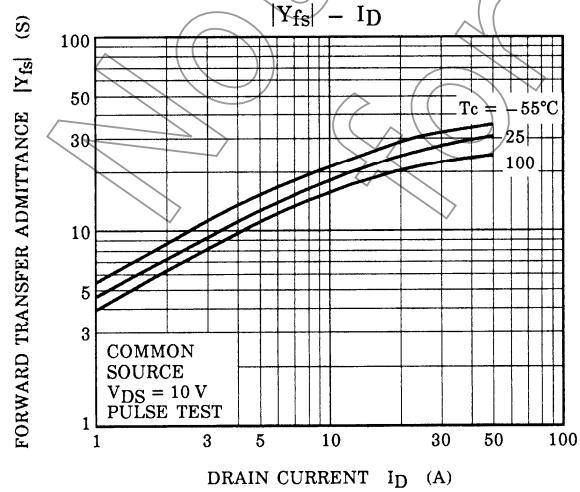
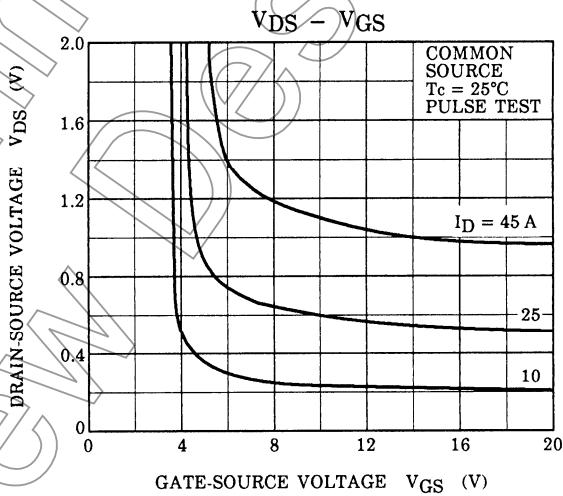
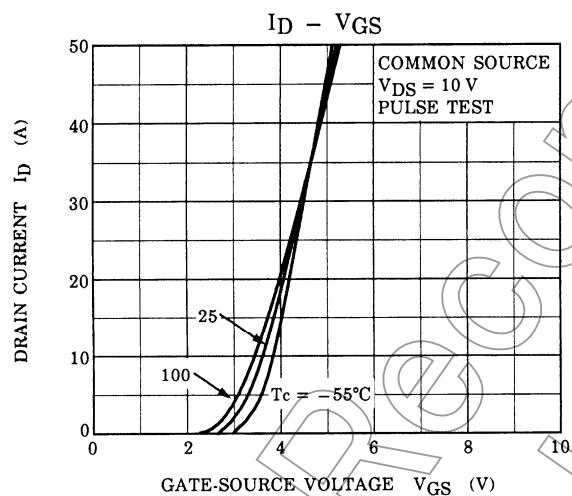
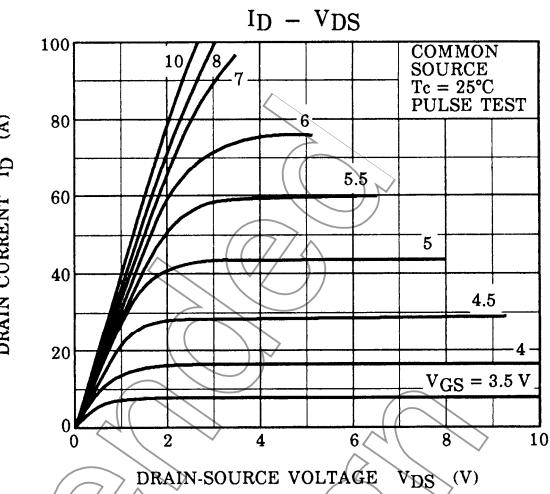
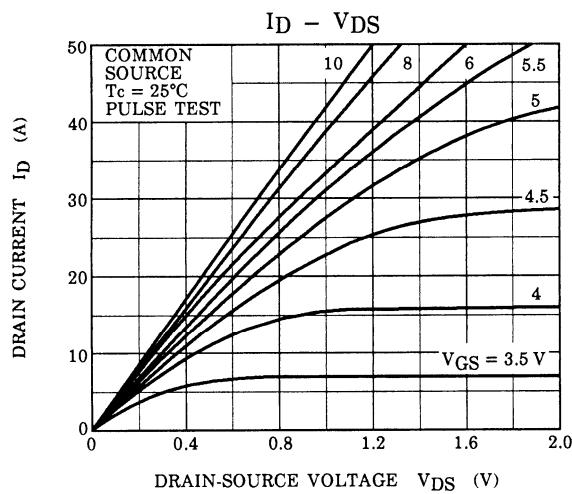


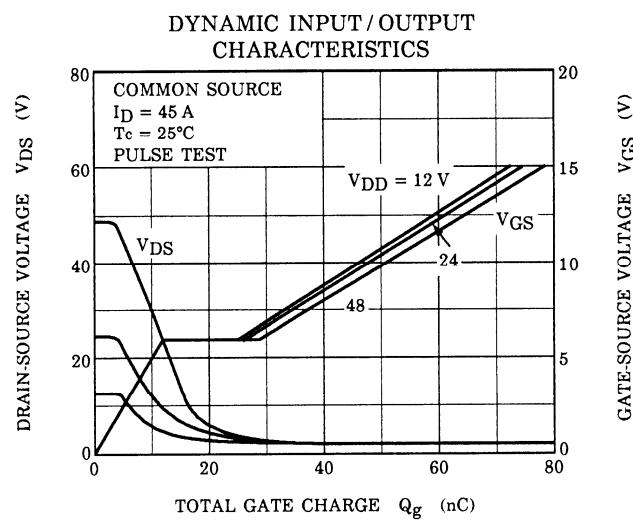
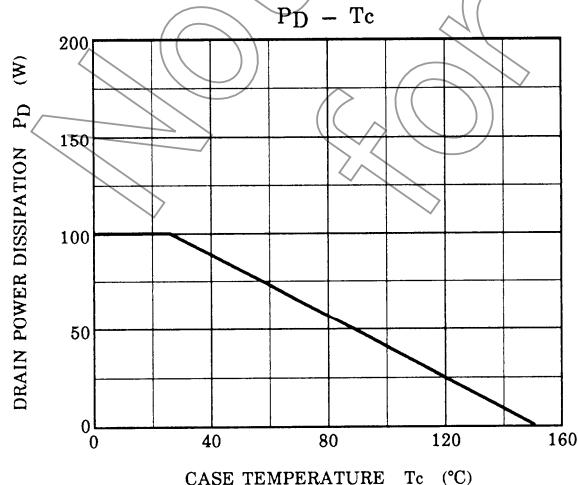
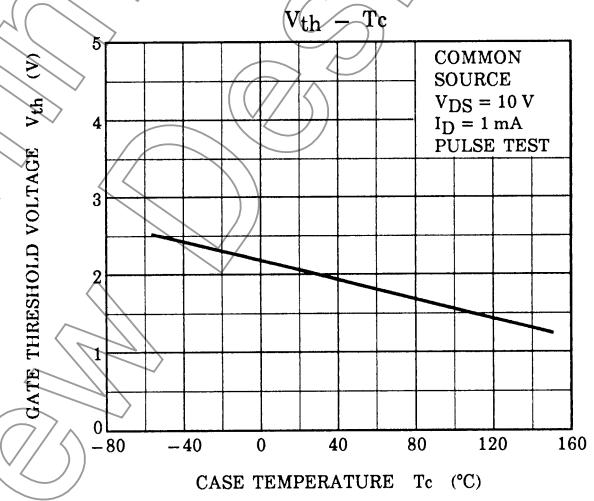
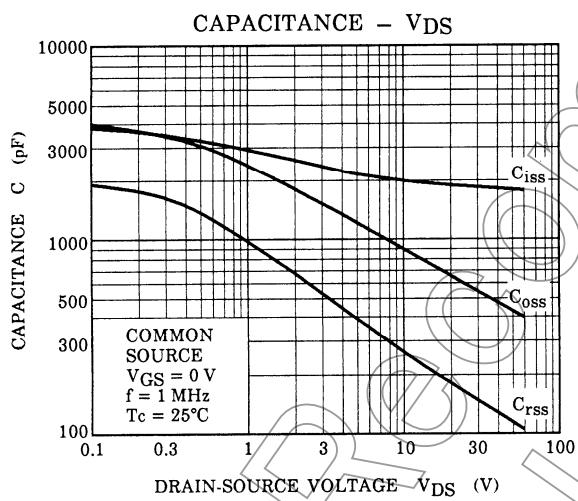
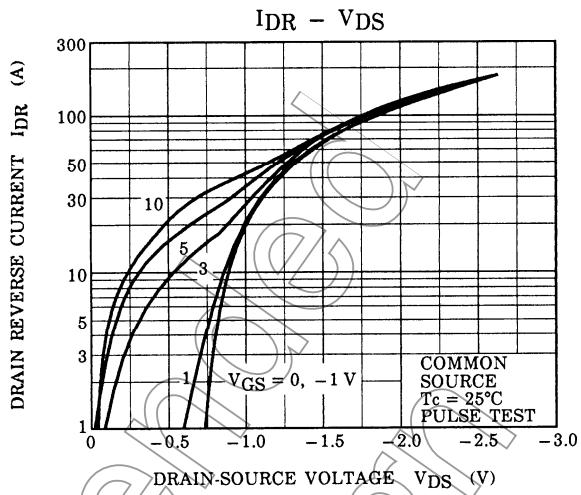
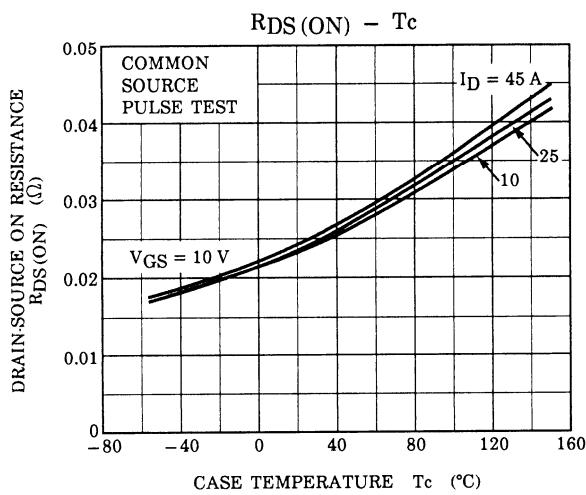
Note 4: A line under a Lot No. identifies the indication of product Labels.

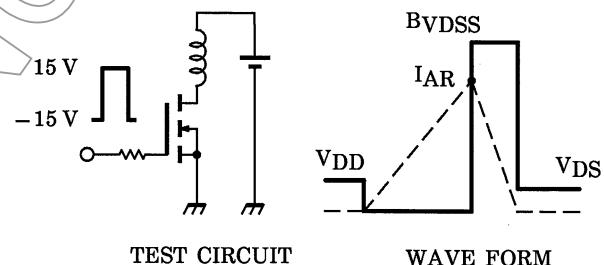
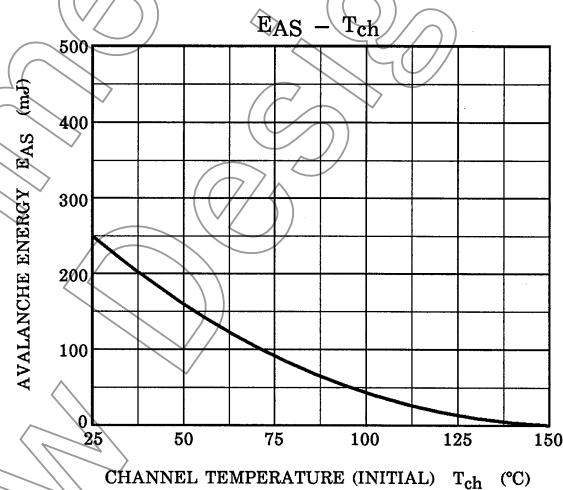
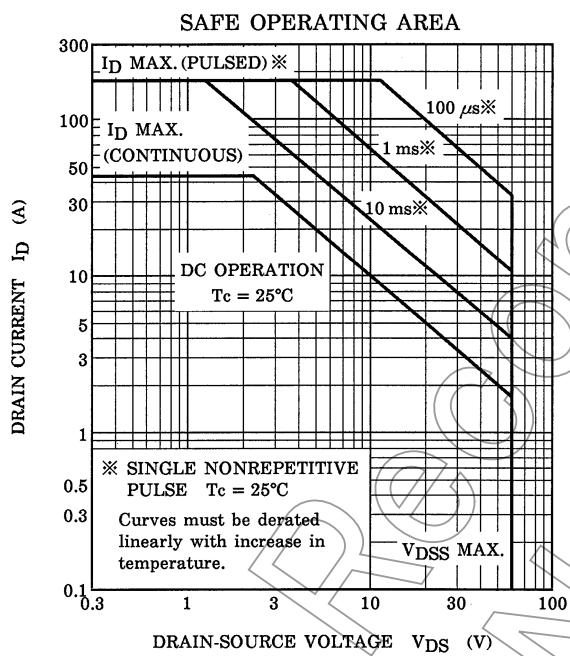
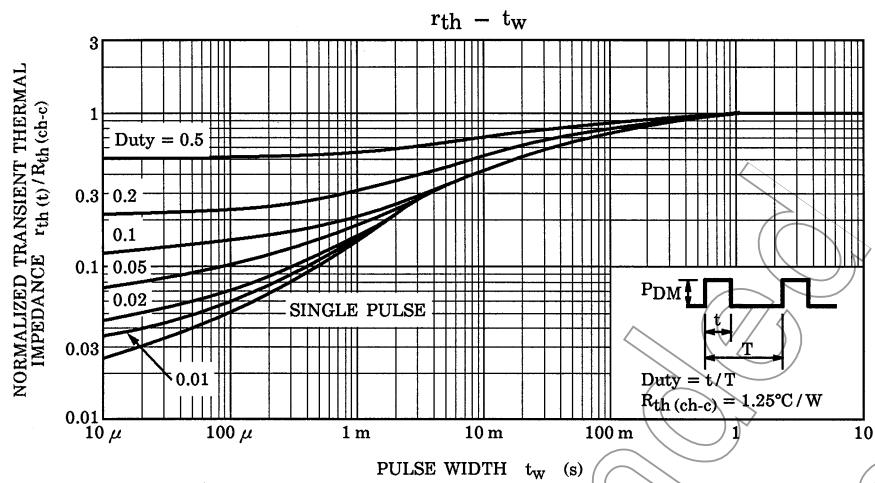
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$R_G = 25 \Omega$
 $V_{DD} = 25 \text{ V}, L = 165 \mu\text{H}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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