

2SK3538

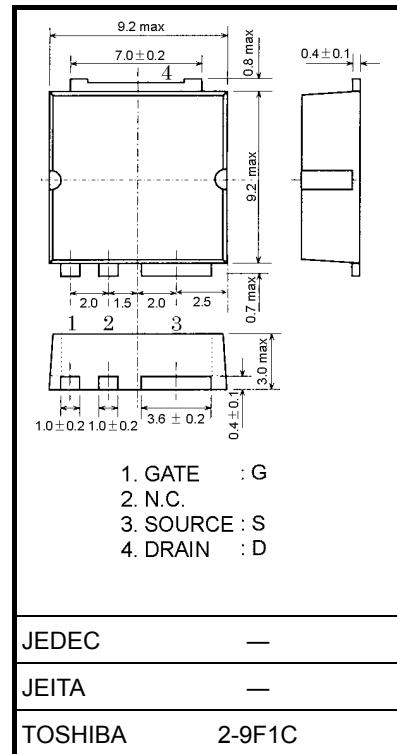
Chopper Regulator, DC-DC Converter and Motor Drive Applications

单位: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 0.75 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.0 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 500 \text{ V}$)
- Enhancement mode: $V_{th} = 2.0$ to 4.0 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	500	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	500	V
Gate-source voltage		V_{GSS}	± 30	V
Drain current	DC (Note 1)	I_D	8	A
	Pulse (Note 1)	I_{DP}	32	A
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	65	W
Single pulse avalanche energy (Note 2)		E_{AS}	312	mJ
Avalanche current		I_{AR}	8	A
Repetitive avalanche energy (Note 3)		E_{AR}	6.5	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$



Weight: 0.74 g (typ.)

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

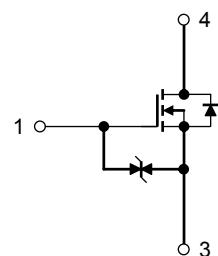
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	1.92	$^\circ\text{C} / \text{W}$

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

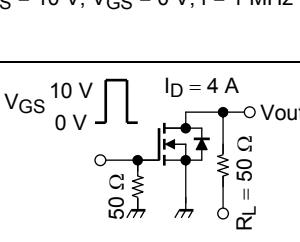
Note 2: $V_{DD} = 90 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 8.3 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 8 \text{ A}$

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

This transistor is an electrostatic-sensitive device.
Handle with care.



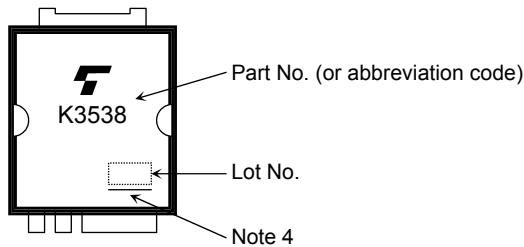
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 25 \text{ V}$, $V_{DS} = 0 \text{ V}$	—	—	± 10	μA	
Gate-source breakdown voltage	$V_{(BR) GSS}$	$I_G = \pm 10 \mu\text{A}$, $V_{DS} = 0 \text{ V}$	± 30	—	—	V	
Drain cut-off current	I_{DSS}	$V_{DS} = 500 \text{ V}$, $V_{GS} = 0 \text{ V}$	—	—	100	μA	
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 \text{ mA}$, $V_{GS} = 0 \text{ V}$	500	—	—	V	
Gate threshold voltage	V_{th}	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$	2.0	—	4.0	V	
Drain-source ON resistance	$R_{DS (\text{ON})}$	$V_{GS} = 10 \text{ V}$, $I_D = 4 \text{ A}$	—	0.75	0.85	Ω	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}$, $I_D = 4 \text{ A}$	3.5	7.0	—	S	
Input capacitance	C_{iss}	$V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	—	1300	—	pF	
Reverse transfer capacitance	C_{rss}		—	130	—		
Output capacitance	C_{oss}		—	400	—		
Switching time	Rise time	t_r	 V_{GS} 10 V 0 V $I_D = 4 \text{ A}$ 50Ω 50Ω $V_{DD} \approx 200 \text{ V}$ V_{out} R_L $Duty \leq 1\%$, $t_w = 10 \mu\text{s}$	—	26	—	ns
	Turn-on time	t_{on}		—	45	—	
	Fall time	t_f		—	40	—	
	Turn-off time	t_{off}		—	140	—	
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 400 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 8 \text{ A}$	—	30	—	nC	
Gate-source charge	Q_{gs}		—	17	—		
Gate-drain ("miller") Charge	Q_{gd}		—	13	—		

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	8	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	32	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 8\text{ A}$, $V_{GS} = 0\text{ V}$	—	—	-1.7	V
Reverse recovery time	t_{rr}	$I_{DR} = 8\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR} / dt = 100\text{ A} / \mu\text{s}$	—	1200	—	ns
Reverse recovery charge	Q_{rr}		—	10	—	μC

Marking

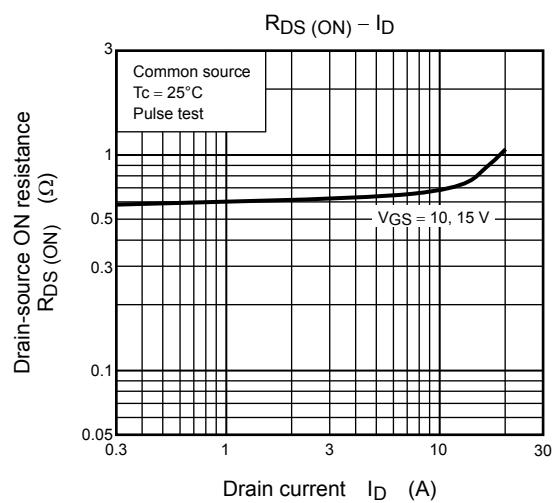
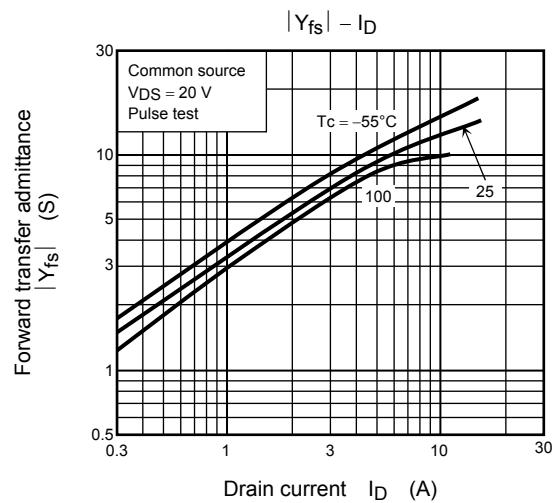
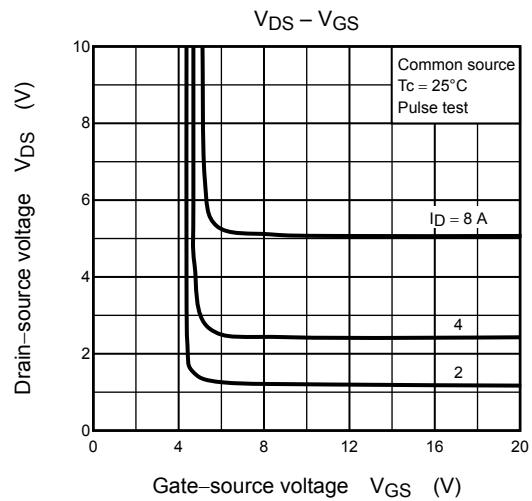
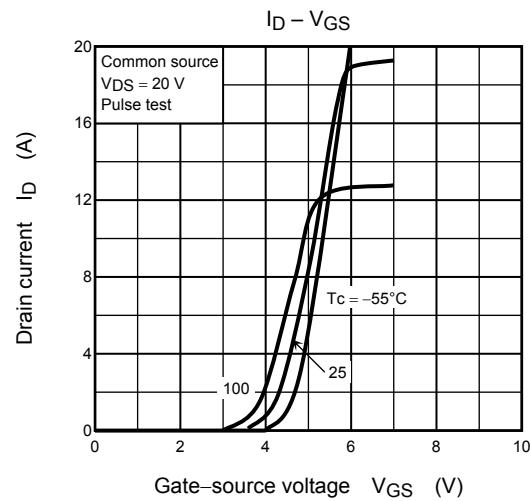
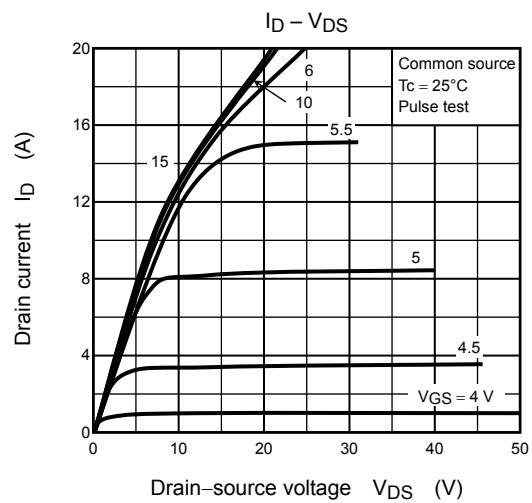
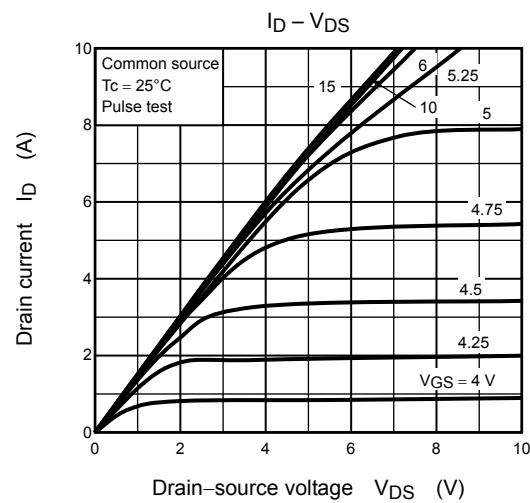


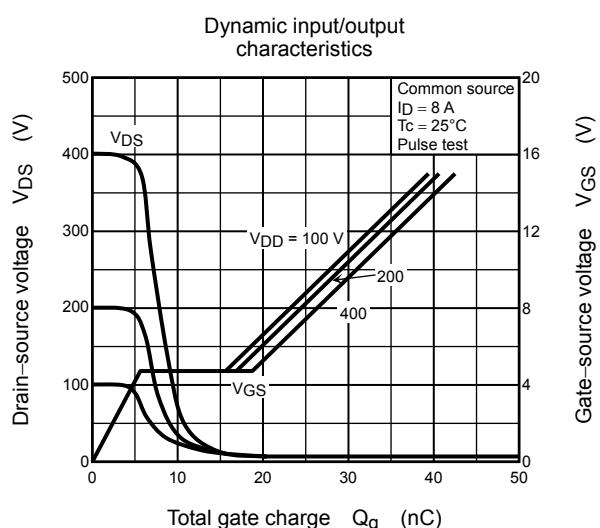
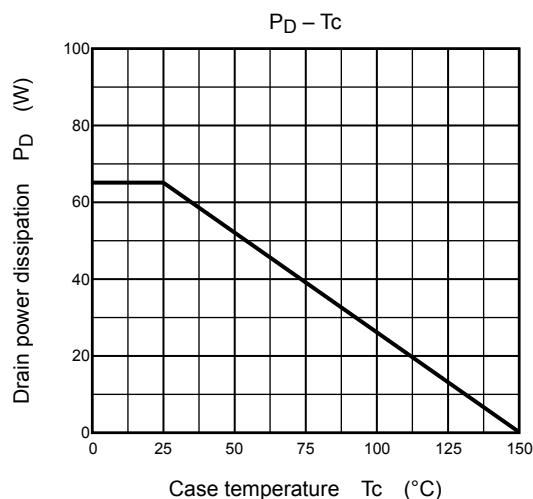
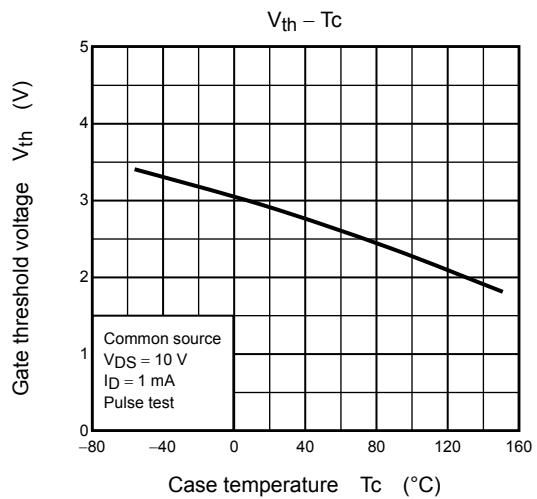
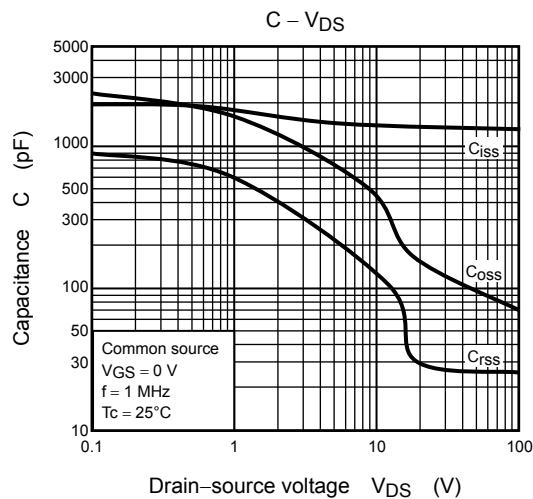
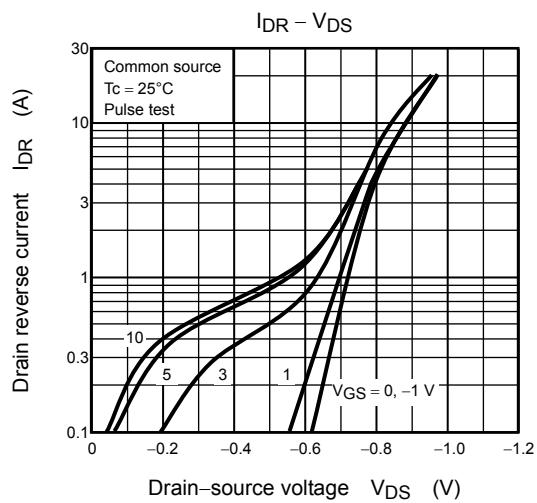
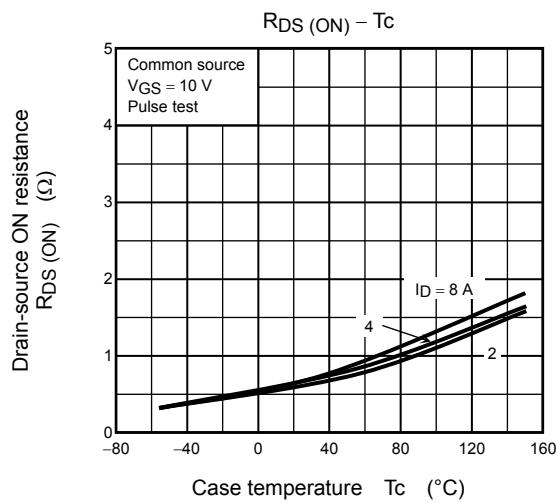
Note 4: A line under a Lot No. identifies the indication of product Labels.

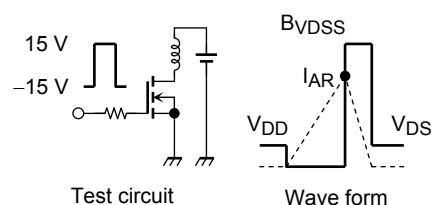
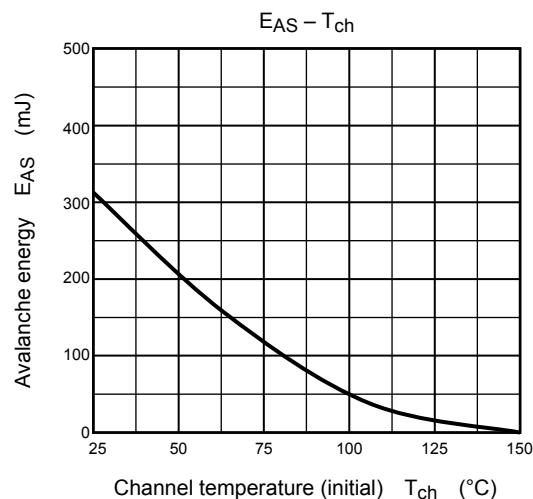
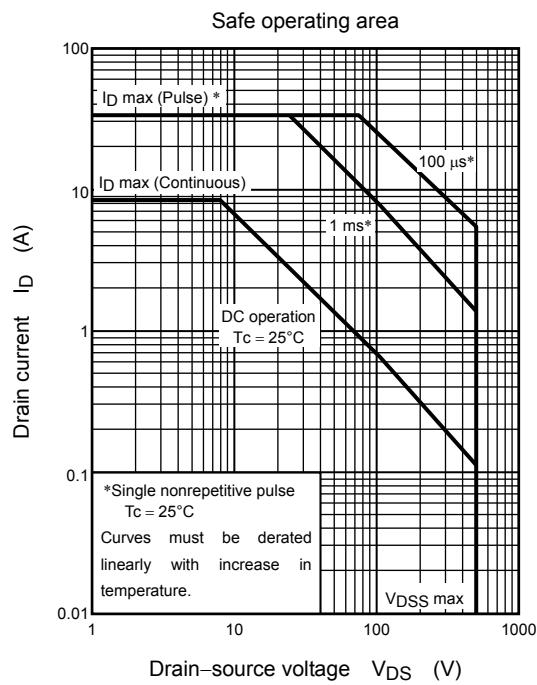
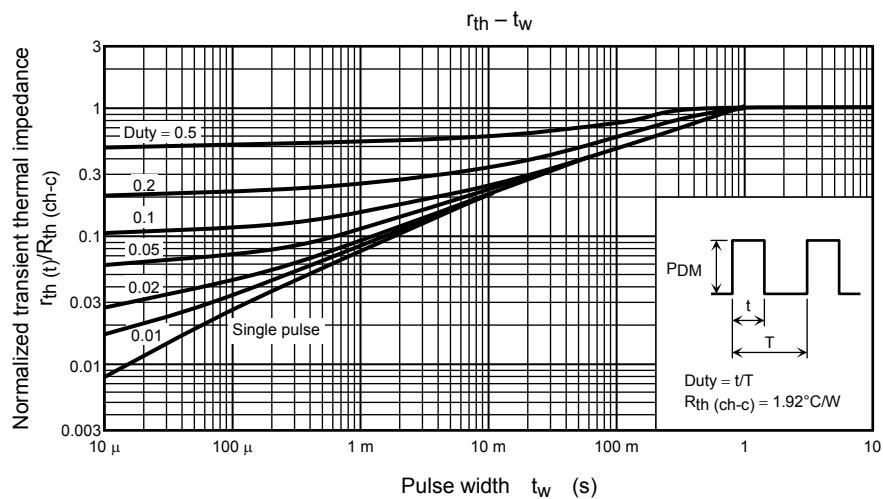
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 8.3 \text{ mH}$$

$$EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BV_{DSS}}{BV_{DSS} - V_{DD}} \right)$$

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