

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

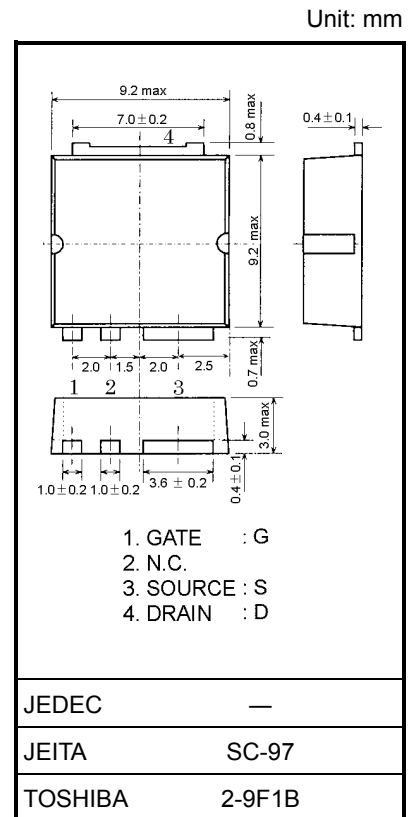
2SK3538

Switching Regulator, DC-DC Converter Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 75 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 7.0 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \text{ }\mu\text{A}$ ($V_{DS} = 500 \text{ V}$)
- Enhancement-mode: $V_{th} = 2.0 \text{ to } 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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
	Pulse (Note 1)	I_{DP}	32
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.)

Thermal Characteristics

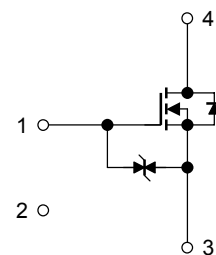
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	1.92	$^\circ\text{C/W}$

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

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

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

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



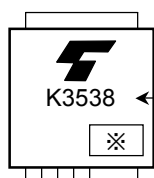
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 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}	$V_{DS} = 500 \text{ V}, V_S = 0 \text{ V}$	—	—	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		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 4 \text{ A}$	—	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	<p>$V_{GS} = 10 \text{ V}$ 0 V $I_D = 4 \text{ A}$ V_{OUT} 50 pF 50Ω $R_L = 50 \Omega$ $V_{DD} \approx 200 \text{ V}$ Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$</p>	—	26	—	pF
	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 Diode 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



← Type

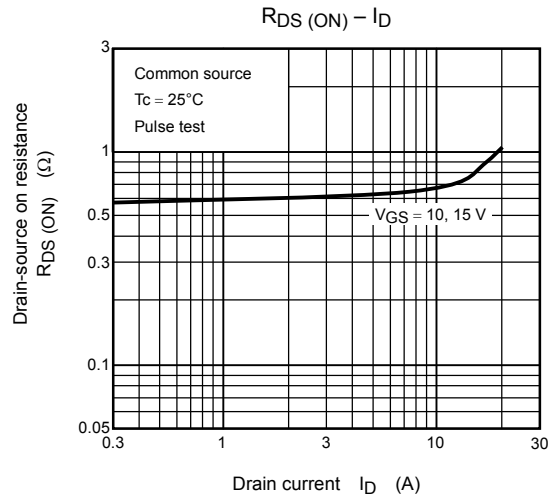
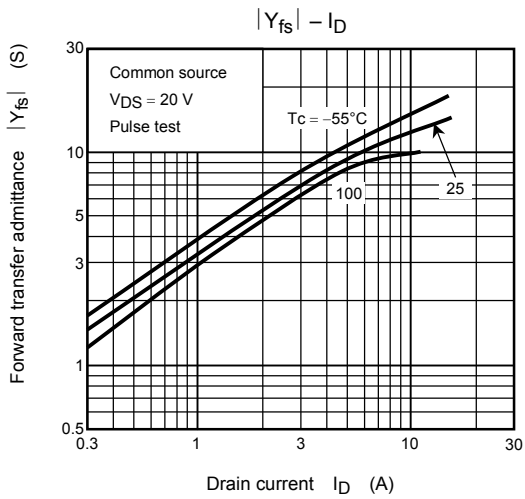
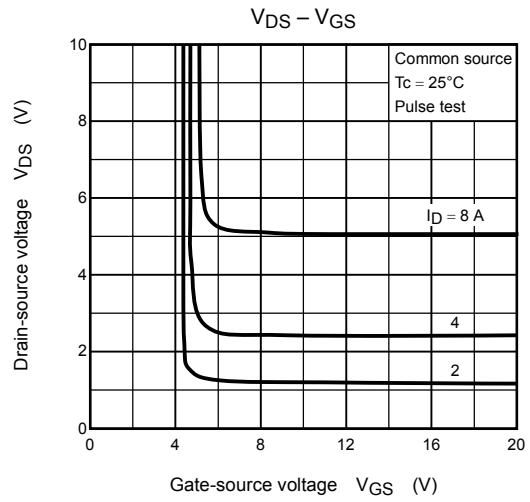
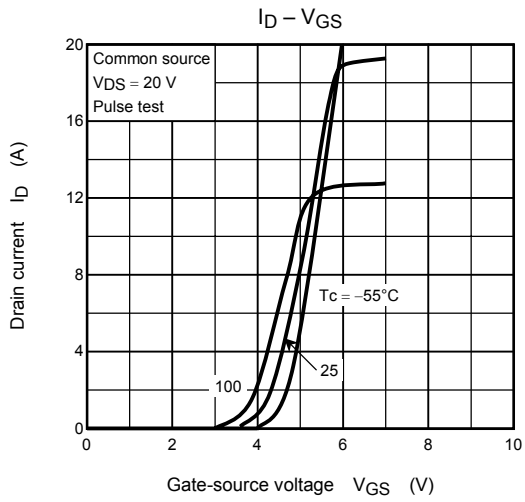
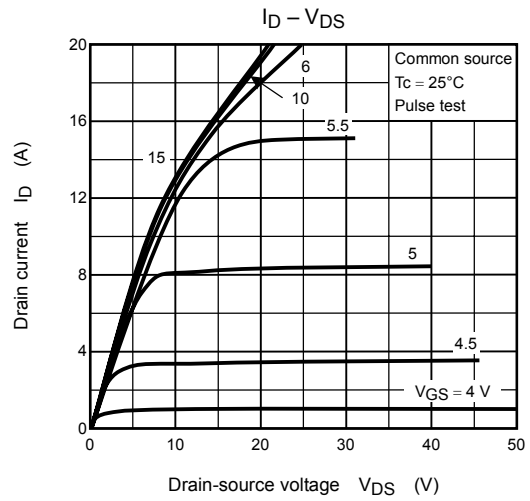
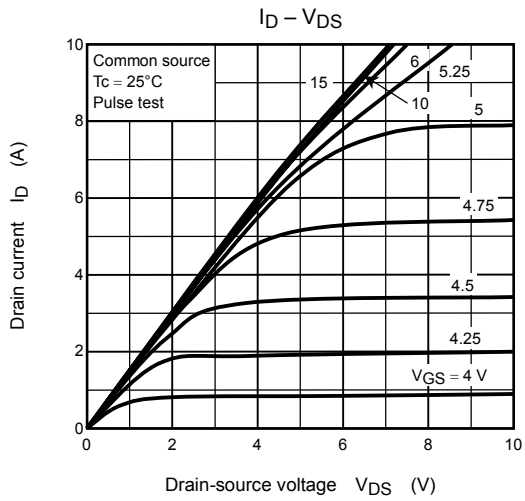
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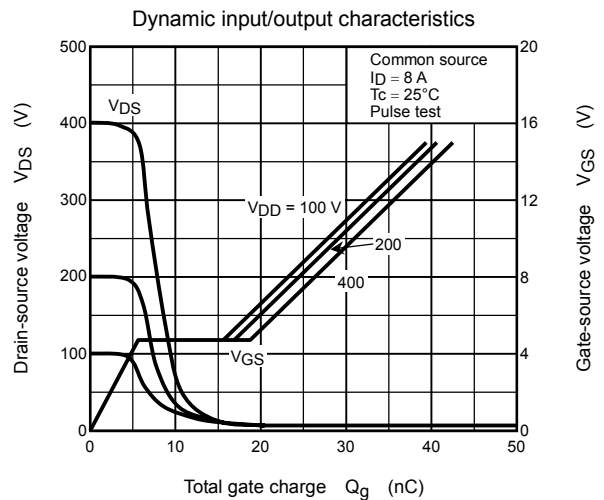
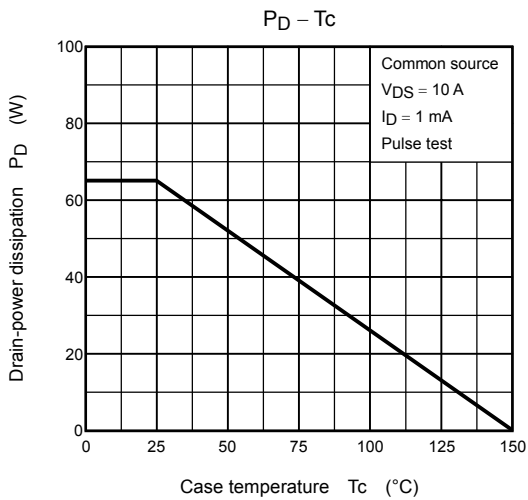
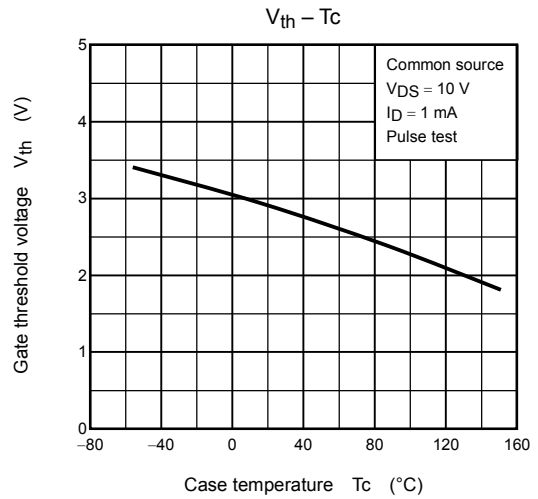
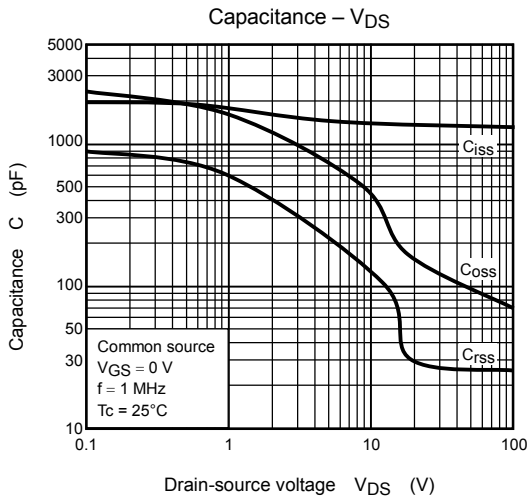
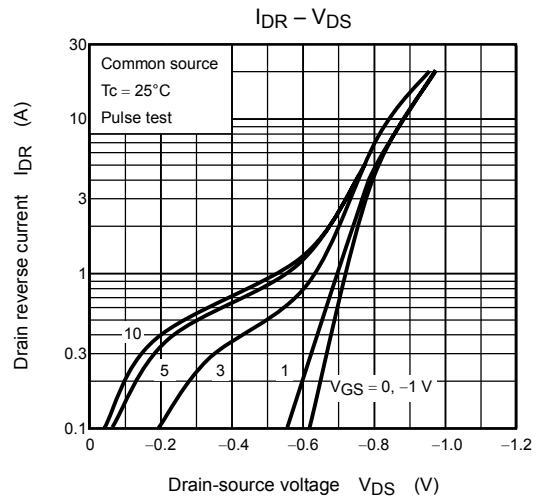
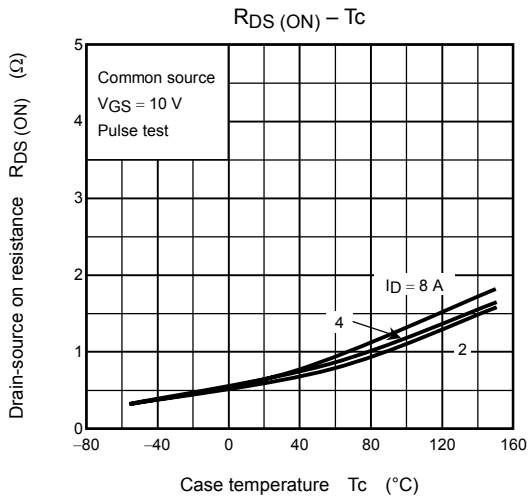


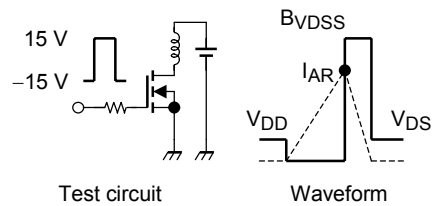
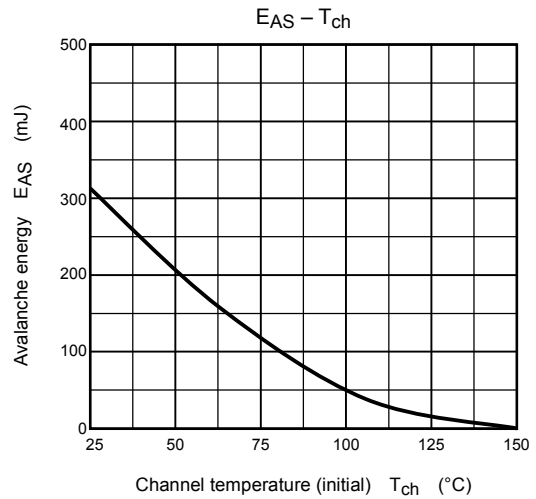
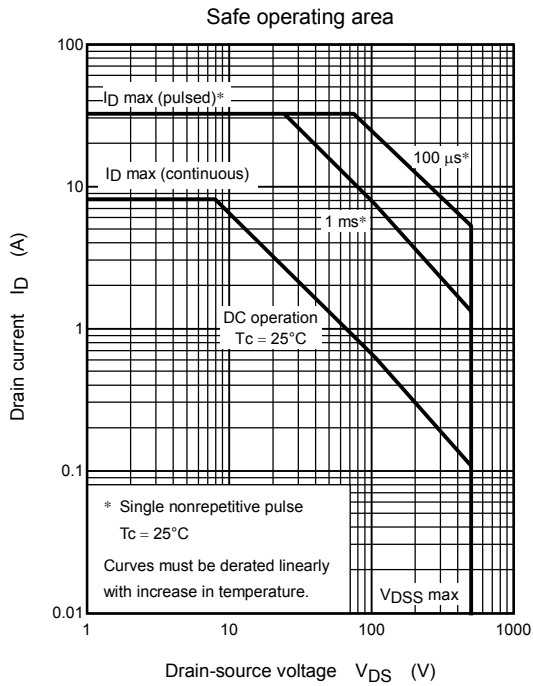
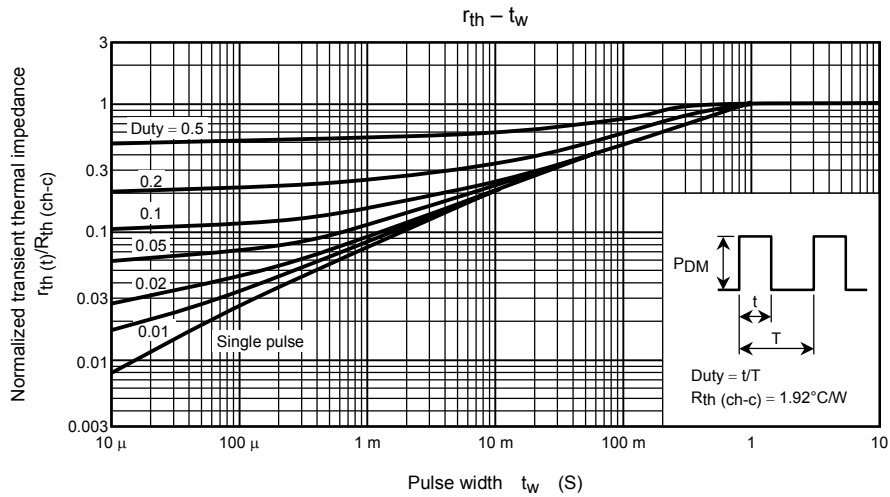
Month (starting from alphabet A)



Year (last number of the christian era)







$$R_G = 25 \Omega$$

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

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

RESTRICTIONS ON PRODUCT USE

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