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

2SK3443

Switching Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 50 mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 9 S (typ.)
- Low leakage current: I_{DSS} = 100 μA (V_{DS} = 150 V)
- Enhancement-mode: V_{th} = 3.0 to 5.0 V (V_{DS} = 10 V, I_D = 1 mA)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	150	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	150	V
Gate-source voltage		V_{GSS}	±30	V
Drain current	DC (Note 1)	I_D	30	A
	Pulse (Note 1)	I_{DP}	120	
Drain power dissipation (Tc = 25°C)		P_D	125	W
Single pulse avalanche energy (Note 2)		E_{AS}	468	mJ
Avalanche current		I_{AR}	30	A
Repetitive avalanche energy (Note 3)		E_{AR}	12.5	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch\text{-}c)}$	1.00	°C/W

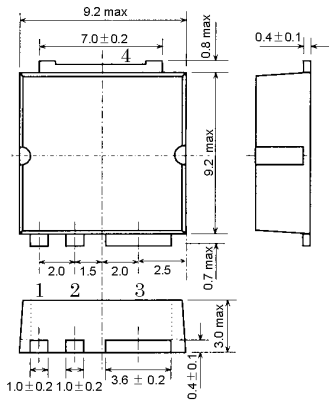
Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2 V_{DD} = 50 V, T_{ch} = 25°C (initial), L = 773 μH, R_G = 25 Ω, I_{AR} = 30 A

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

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

Unit: mm

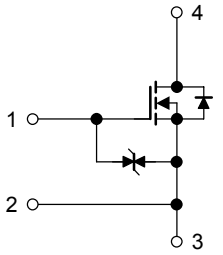


JEDEC	—
JEITA	SC-97
TOSHIBA	2-9F1B

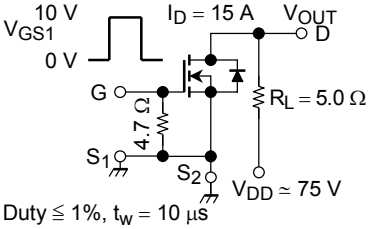
Weight: 0.74 g (typ.)

Circuit Configuration

Notice:
Please use the S1 pin for gate input signal return. Make sure that the main current flows into S2 pin.



Electrical Characteristics (Note 4) (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±25 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut-off current		I_{DSS}	V_{DS} = 150 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	150	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	3.0	—	5.0	V
Drain-source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 15 A	—	50	55	mΩ
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 15 A	4.5	9	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	2030	—	pF
Reverse transfer capacitance		C_{rss}		—	340	—	
Output capacitance		C_{oss}		—	1200	—	
Switching time	Rise time	t_r		—	20	—	ns
	Turn-on time	t_{on}		—	40	—	
	Fall time	t_f		—	10	—	
	Turn-off time	t_{off}		—	40	—	
Total gate charge (gate-source plus gate-drain)		Q_g	V_{DD} ≃ 120 V, V_{GS} = 10 V, I_D = 30 A	—	45	—	nC
Gate-source charge		Q_{gs}		—	21	—	
Gate-drain (“miller”) charge		Q_{gd}		—	24	—	

Note 4: Please connect the S1 pin and S2 pin, and then ground the connected pin.
(However, while switching times are measured, please don’t connect and ground it.)

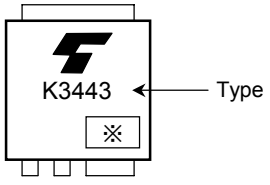
Source-Drain Diode Ratings and Characteristics (Note 5) (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1, Note 5)	$I_{DR}1$	—	—	—	30	A
Pulse drain reverse current (Note 1, Note 5)	$I_{DRP}1$	—	—	—	120	A
Continuous drain reverse current (Note 1, Note 5)	$I_{DR}2$	—	—	—	1	A
Pulse drain reverse current (Note 1, Note 5)	$I_{DRP}2$	—	—	—	4	A
Forward voltage (diode)	V_{DS2F}	I_{DR1} = 30 A, V_{GS} = 0 V	—	—	−1.5	V
Reverse recovery time	t_{rr}	I_{DR} = 30 A, V_{GS} = 0 V, dI_{DR}/dt = 100 A/μs	—	250	—	ns
Reverse recovery charge	Q_{rr}		—	1.75	—	μC

Note 5: drain, flowing current value between the S1 pin, open the S2 pin

Unless otherwise specified, please connect the S1 and S2 pins, and then ground the connected pin.

Marking

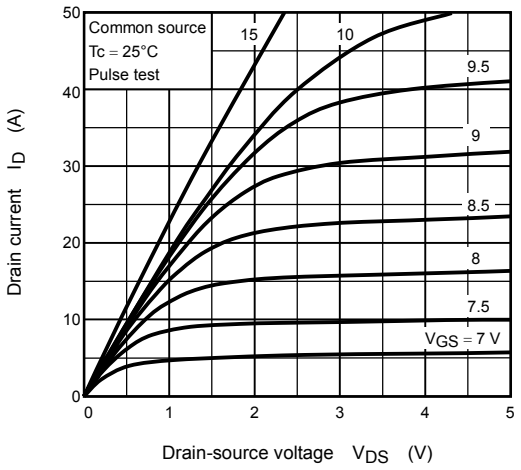


※ Lot Number

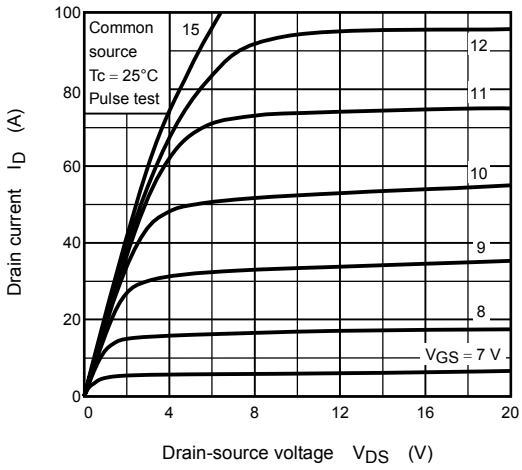
Month (starting from alphabet A)

Year (last number of the christian era)

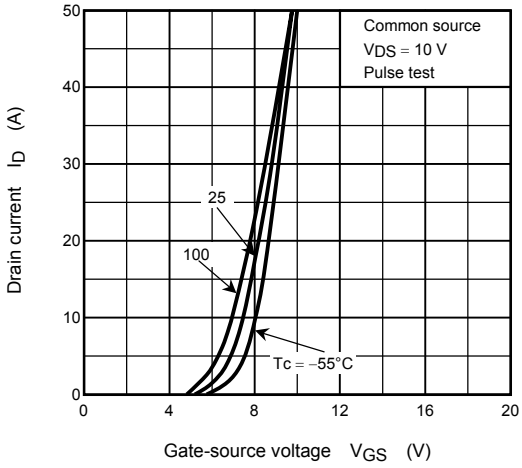
$I_D - V_{DS}$



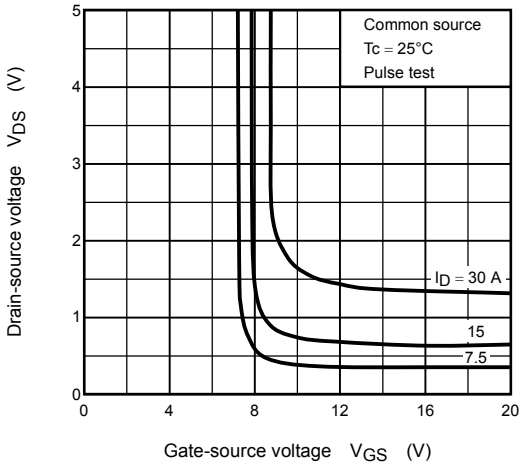
$I_D - V_{DS}$



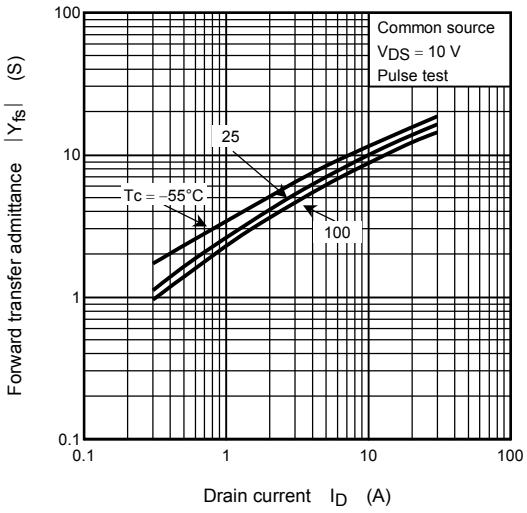
$I_D - V_{GS}$



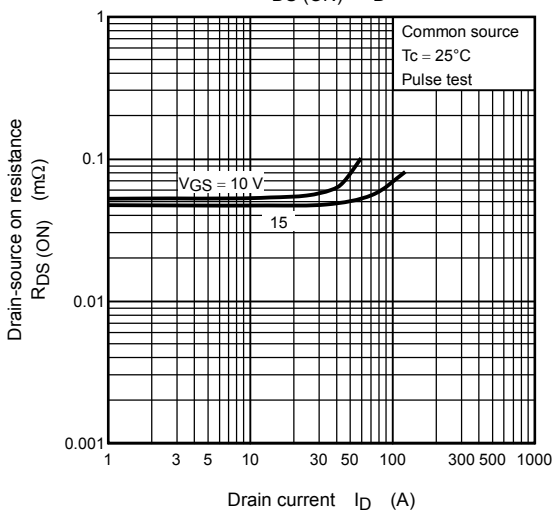
$V_{DS} - V_{GS}$



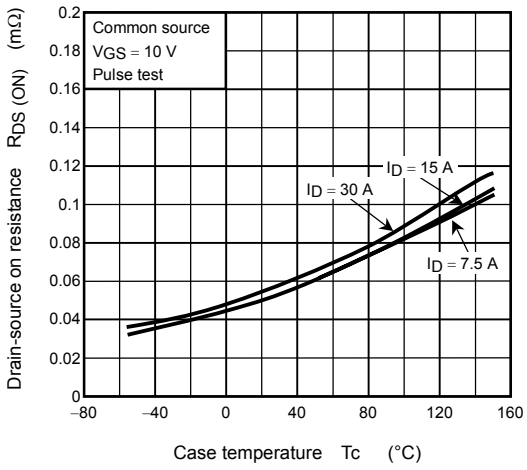
$|Y_{fs}| - I_D$



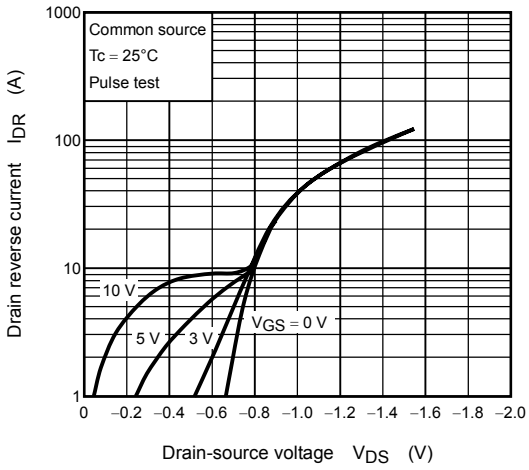
$R_{DS\ (ON)} - I_D$



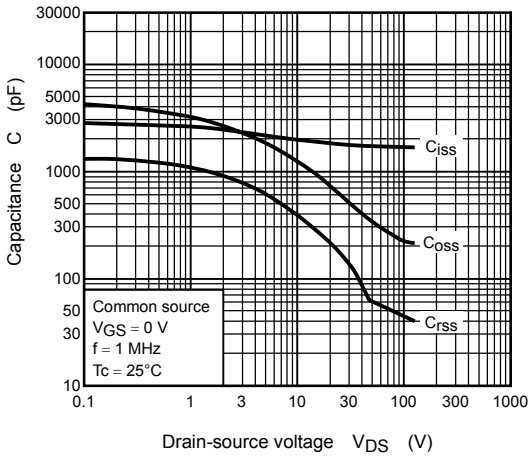
$R_{DS\ (ON)}$ – Tc



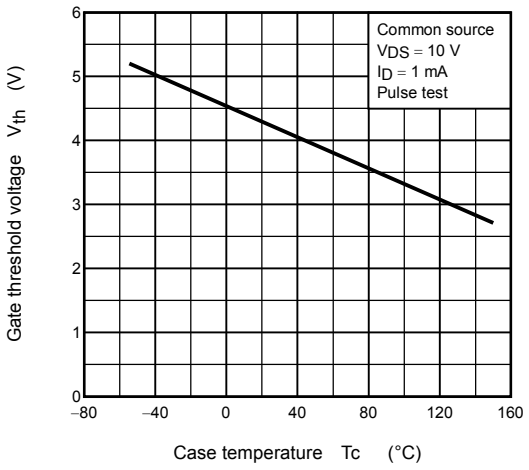
I_{DR} – V_{DS}



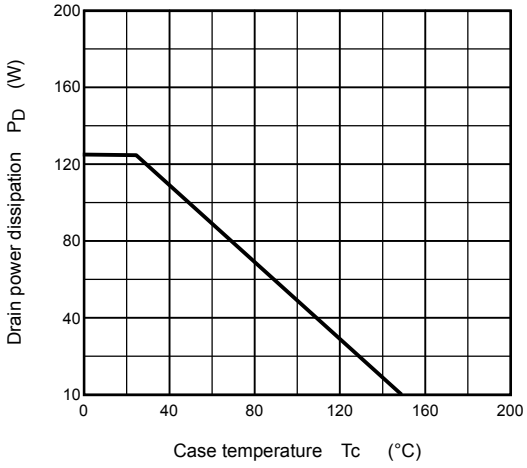
Capacitance – V_{DS}



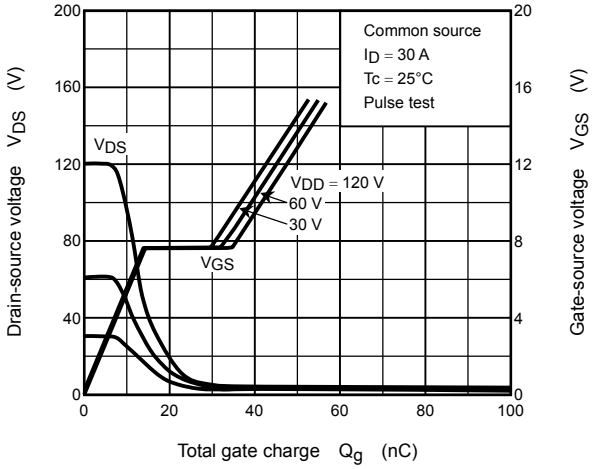
V_{th} – Tc



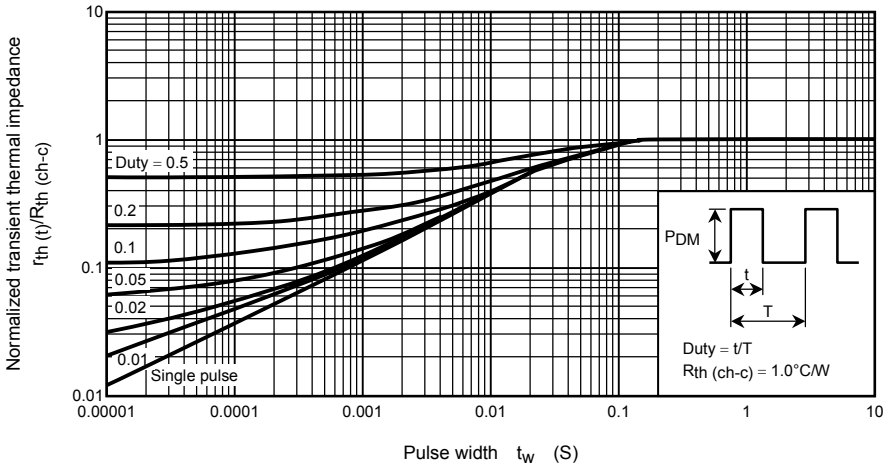
P_D – Tc



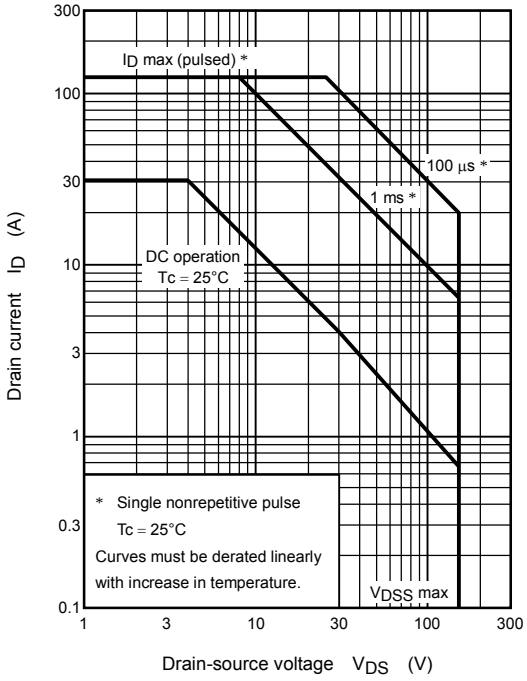
Dynamic input/output characteristics



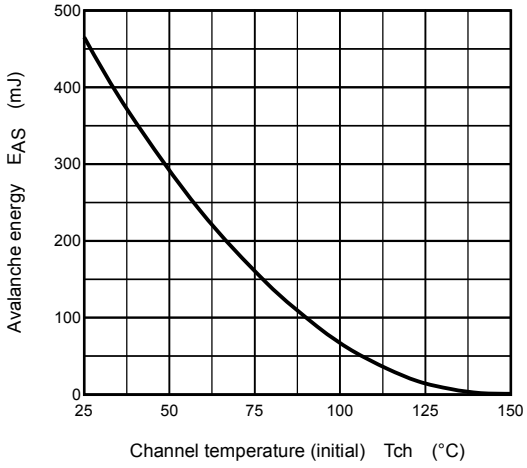
$r_{th} - t_w$

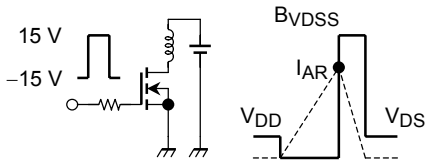


Safe operating area



$E_{AS} - T_{ch}$





Test circuit Wave form

$R_G = 25\ \Omega$
$V_{DD} = 50$ V, L = 773 μH

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

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