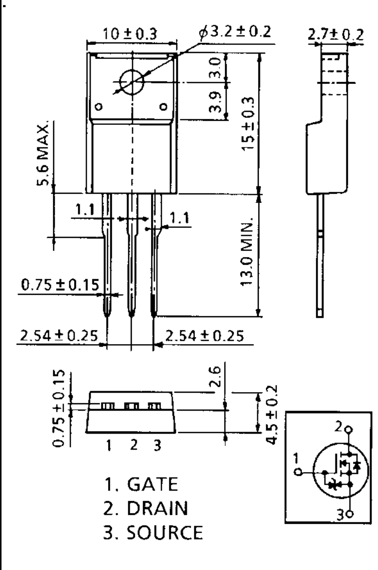
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSII)

2SK3236

Switching Regulator Applications, DC-DC Converter and Motor Drive Applications

Unit: mm



JEDEC	―
JEITA	SC-67
TOSHIBA	2-10R1B

Weight: 1.9 g (typ.)

- 4 V gate drive
- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 13.5 mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 42 S (typ.)
- Low leakage current: I_{DSS} = 100 μA (max) (V_{DS} = 60 V)
- Enhancement-model: V_{th} = 1.3~2.5 V (V_{DS} = 10 V, I_D = 1 mA)

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	35	A
	Pulse (Note 1)	I_{DP}	105	A
Drain power dissipation (Tc = 25°C)		P_D	30	W
Single pulse avalanche energy (Note 2)		E_{AS}	68	mJ
Avalanche current		I_{AR}	35	A
Repetitive avalanche energy (Note 3)		E_{AR}	3.0	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	4.16	°C/W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	°C/W

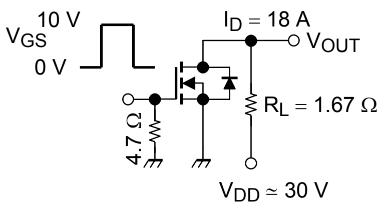
Note 1: Please use devises on condition that the channel temperature is below 150°C.

Note 2: V_{DD} = 50 V, T_{ch} = 25°C, L = 40 μH, R_G = 25 Ω, I_{AR} = 35 A

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

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

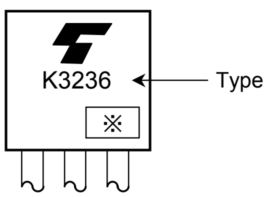
Electrical Characteristics (Ta = 25°C)

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	1.3	—	2.5	V
Drain-source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 4 V, I_D = 18 A	—	22	36	mΩ
			V_{GS} = 10 V, I_D = 18 A	—	13.5	20	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 18 A	21	42	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	2300	—	pF
Reverse transfer capacitance		C_{rss}		—	220	—	
Output capacitance		C_{oss}		—	370	—	
Switching time	Rise time	t_r	 Duty ≦ 1%, t_w = 10 μs	—	9	—	ns
	Turn-ON time	t_{on}		—	23	—	
	Fall time	t_f		—	20	—	
	Turn-OFF time	t_{off}		—	100	—	
Total gate charge (gate-source plus gate-drain)		Q_g	V_{DD} ≃ 48 V, V_{GS} = 10 V, I_D = 35 A	—	52	—	nC
Gate-source charge		Q_{gs}		—	37	—	
Gate-drain ("miller") charge		Q_{gd}		—	15	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	35	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	105	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 35 A, V_{GS} = 0 V	—	—	−1.7	V
Reverse recovery time	t_{rr}	I_{DR} = 35 A, V_{GS} = 0 V, dI_{DR}/dt = 50 A/μs	—	60	—	ns
Reverse recovery charge	Q_{rr}		—	81	—	nC

Marking

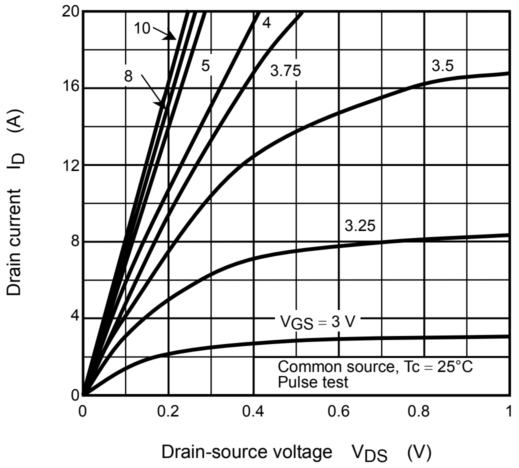


※ Lot Number

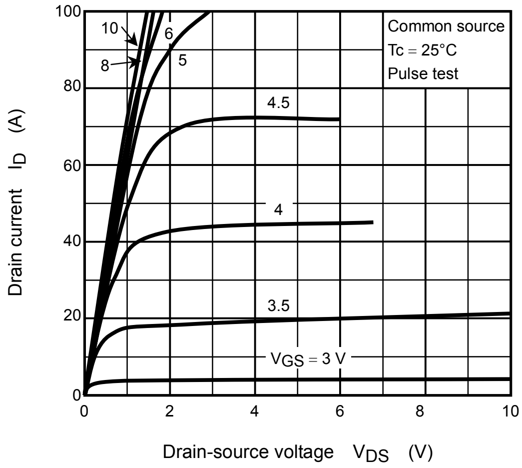
Month (starting from alphabet A)

Year (last number of the christian era)

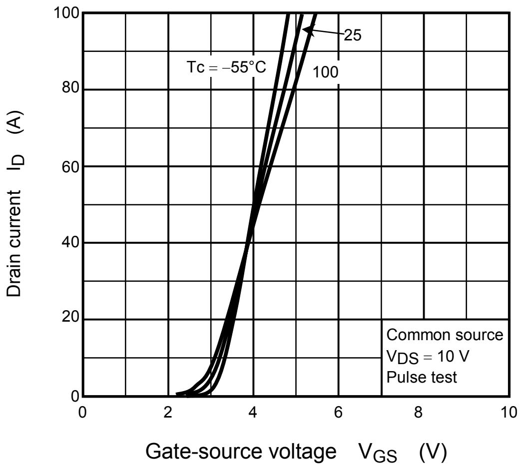
$I_D - V_{DS}$



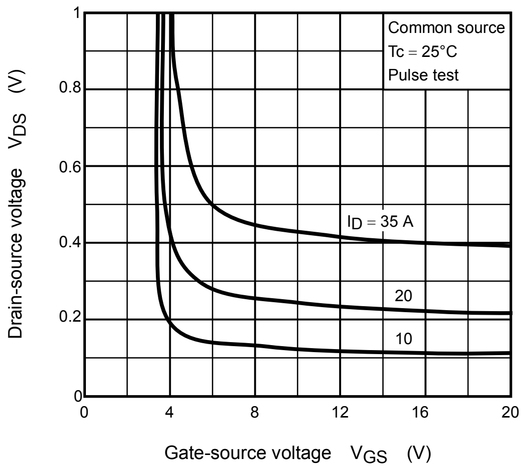
$I_D - V_{DS}$



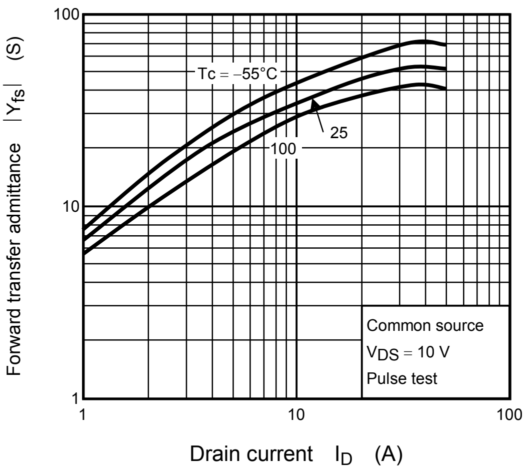
$I_D - V_{GS}$



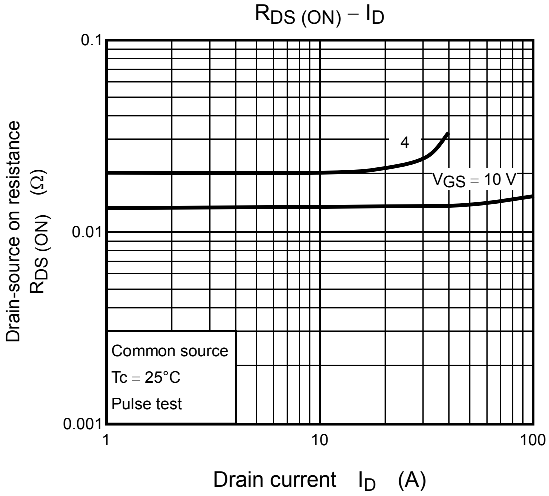
$V_{DS} - V_{GS}$



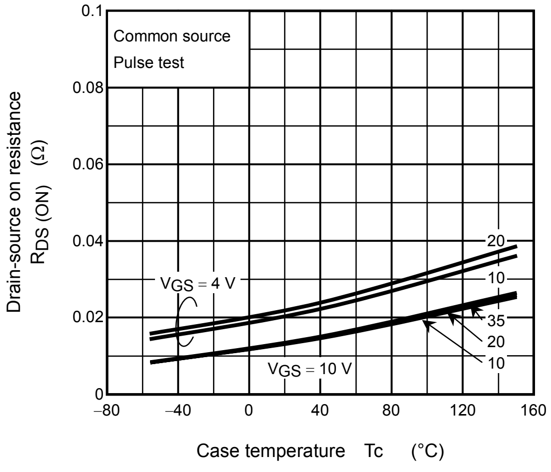
$|Y_{fs}| - I_D$



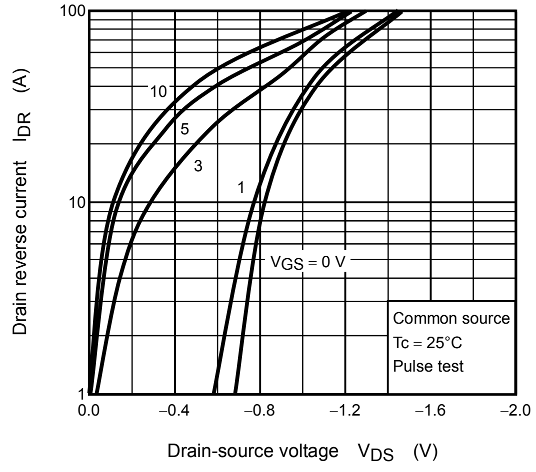
$R_{DS\ (ON)} - I_D$



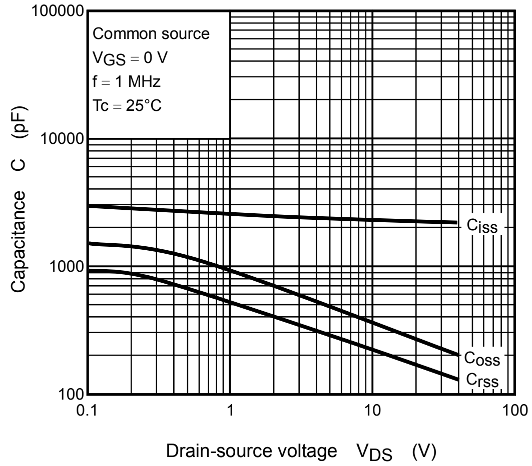
$R_{DS\,(ON)}$ – Tc



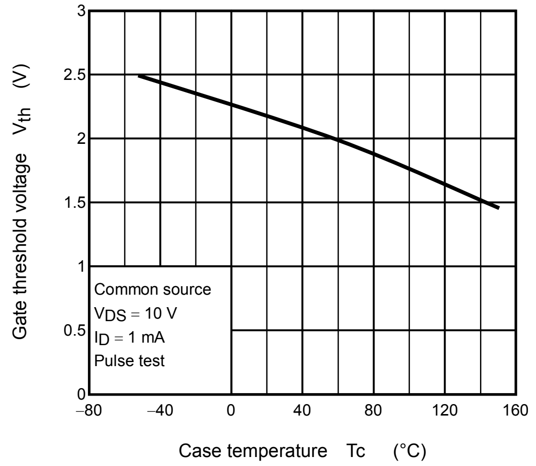
I_{DR} – V_{DS}



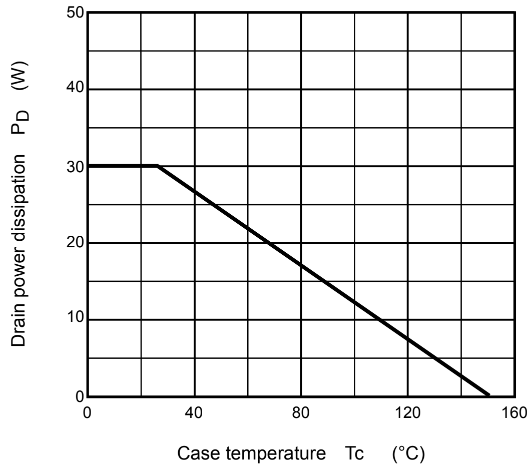
Capacitance – V_{DS}



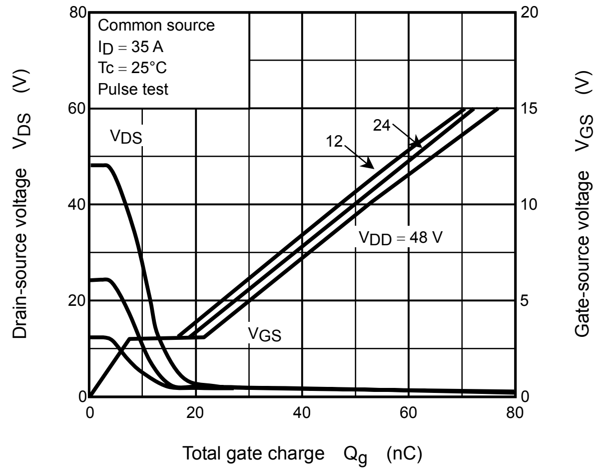
V_{th} – Tc

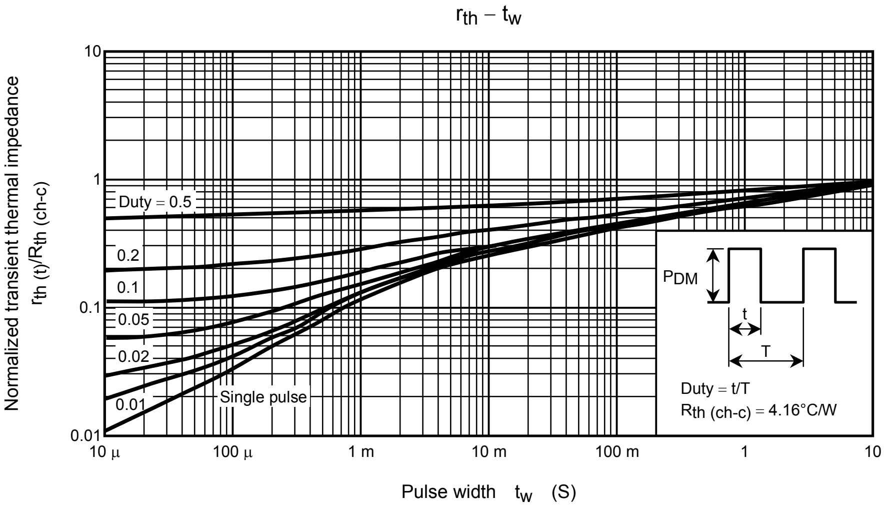


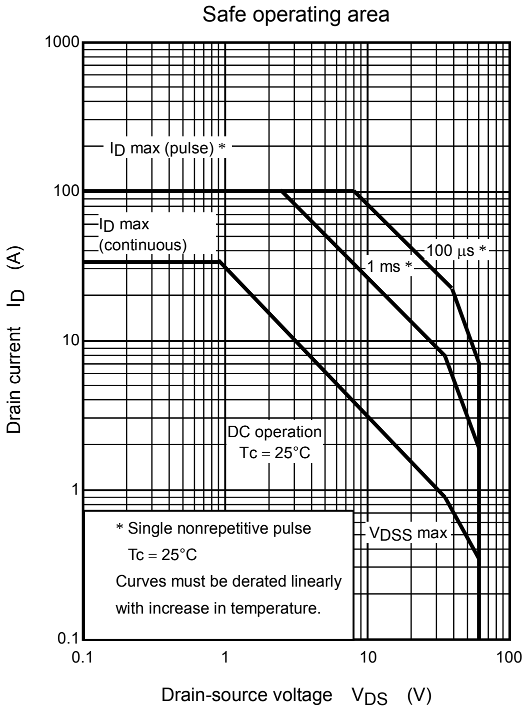
P_D – Tc

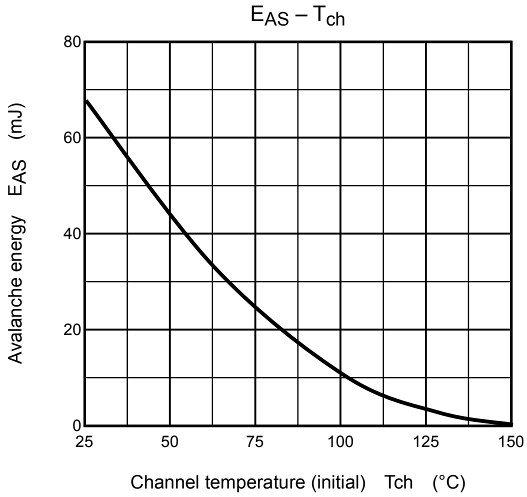


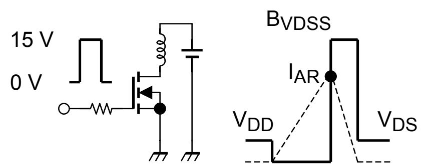
Dynamic input/output characteristics











Test circuit Wave form

$R_G = 25\ \Omega$
$V_{DD} = 50$ V, L = 40 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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