

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

2SK3845

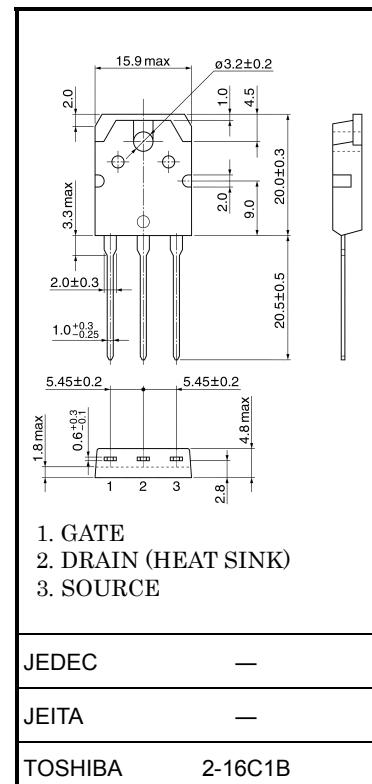
Switching Regulator, DC-DC Converter Applications and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance: $R_{DS(ON)} = 4.7 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 88 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 60 \text{ V}$)
- Enhancement model: $V_{th} = 2.0$ to 4.0 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}	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	70	A
	Pulse (Note 1)	I_{DP}	280	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	125	W
Single pulse avalanche energy (Note 2)		E_{AS}	328	mJ
Avalanche current		I_{AR}	70	A
Repetitive avalanche energy (Note 3)		E_{AR}	12.5	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$



Weight: 4.6 g (typ.)

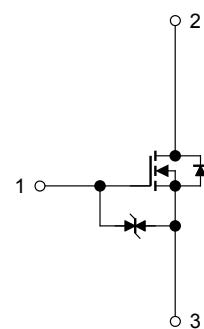
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th}(\text{ch-c})$	1.0	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th}(\text{ch-a})$	50	$^\circ\text{C/W}$

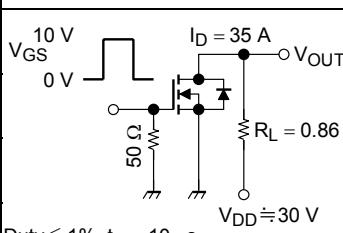
Note 1: Ensure that the channel temperature does not exceed 150°C .Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 91 \mu\text{H}$, $R_G = 25 \Omega$, $I_{AR} = 70 \text{ A}$

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

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



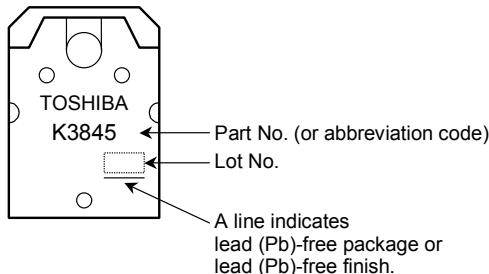
Electrical Characteristics (Ta = 25°C)

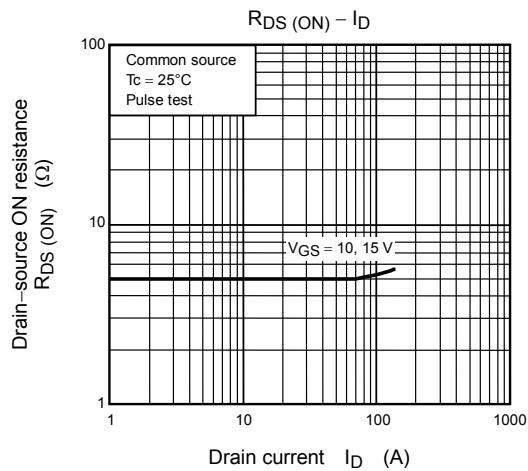
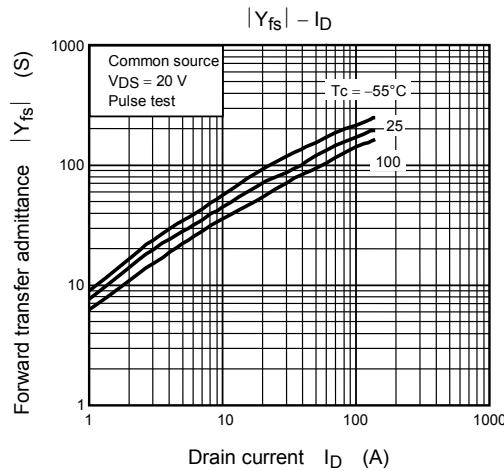
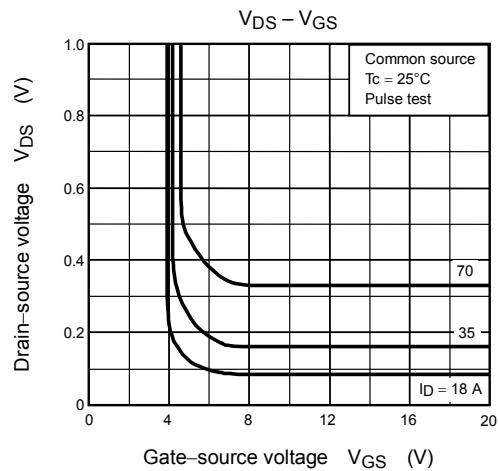
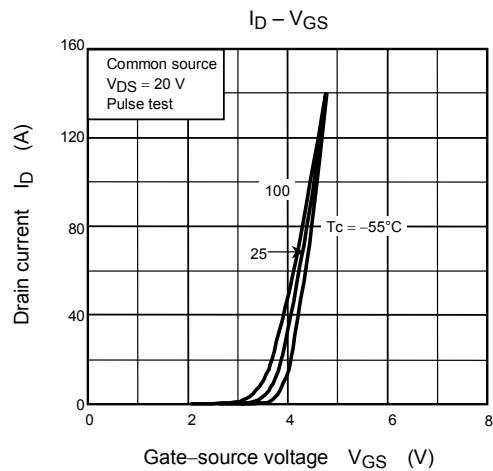
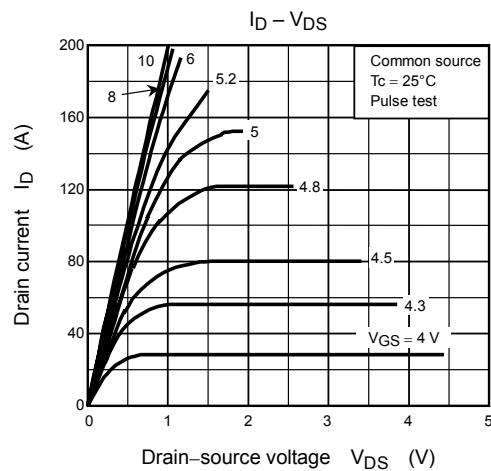
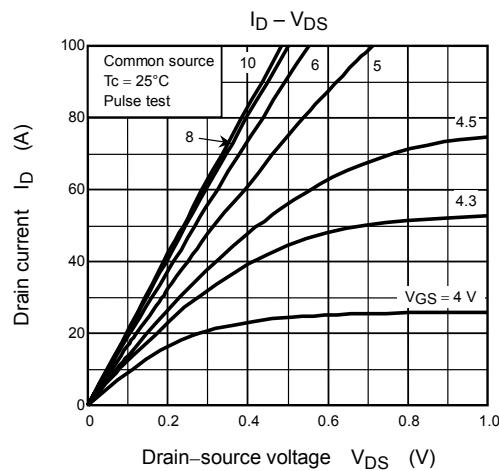
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA	
Drain cut-OFF current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V	—	—	100	μA	
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	60	—	—	V	
	V _{(BR) DSX}	I _D = 10 mA, V _{GS} = -20 V	35	—	—		
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	2.0	—	4.0	V	
Drain-source ON resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 35 A	—	4.7	5.8	mΩ	
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 35 A	44	88	—	S	
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	12400	—	pF	
Reverse transfer capacitance	C _{rss}		—	410	—		
Output capacitance	C _{oss}		—	1100	—		
Switching time	Rise time	t _r		—	17	—	ns
	Turn-ON time	t _{on}		—	44	—	
	Fall time	t _f		—	24	—	
	Turn-OFF time	t _{off}		—	149	—	
Total gate charge (gate-source plus gate-drain)	Q _g	V _{DD} ≈ 48 V, V _{GS} = 10 V, I _D = 70 A	—	196	—	nC	
Gate-source charge	Q _{gs}		—	148	—		
Gate-drain ("miller") charge	Q _{gd}		—	48	—		

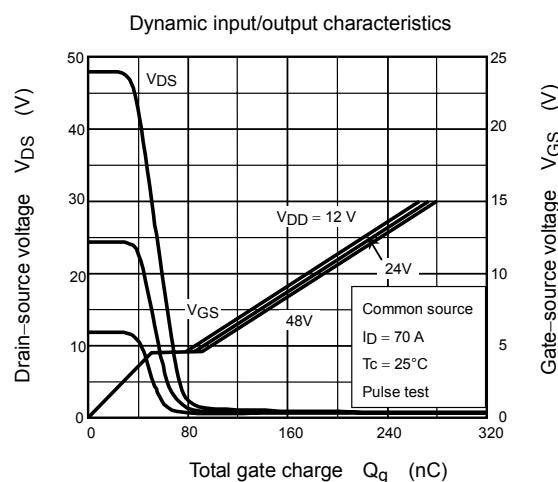
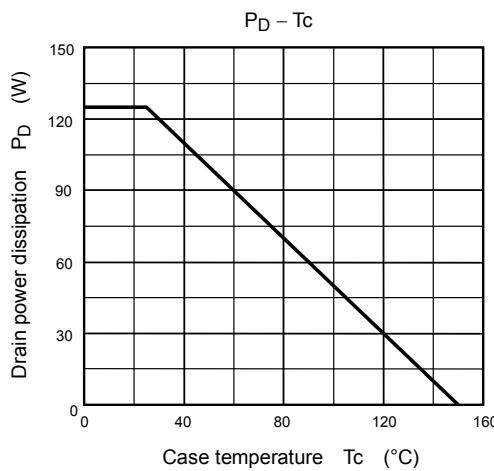
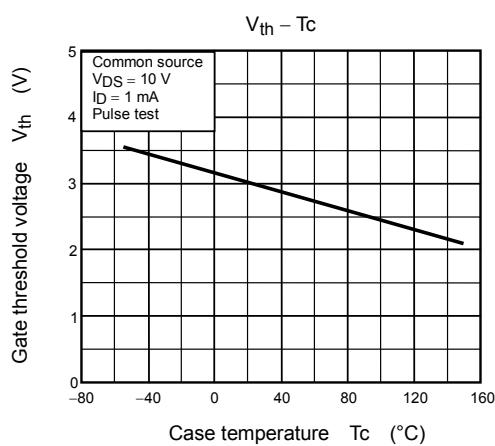
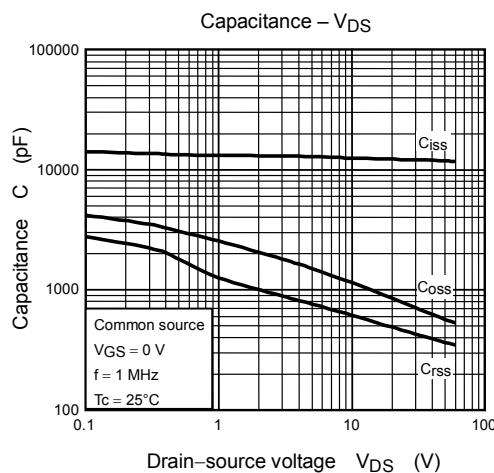
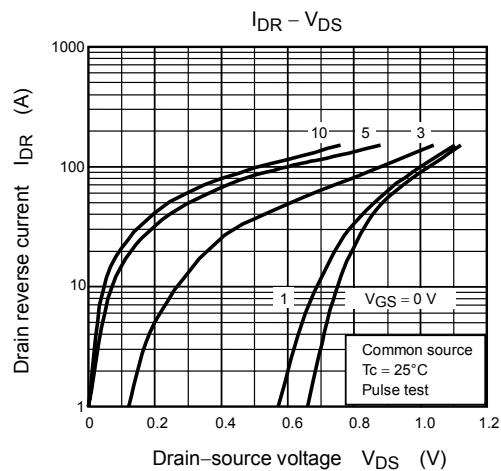
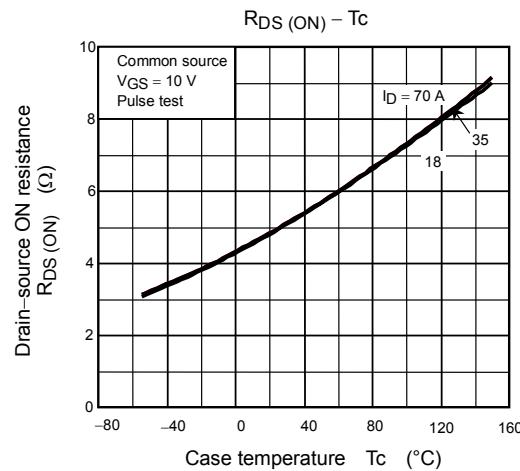
Source-Drain Ratings and Characteristics (Ta = 25°C)

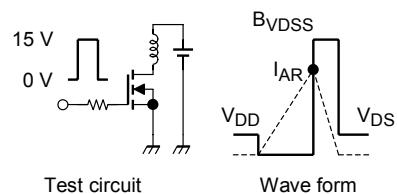
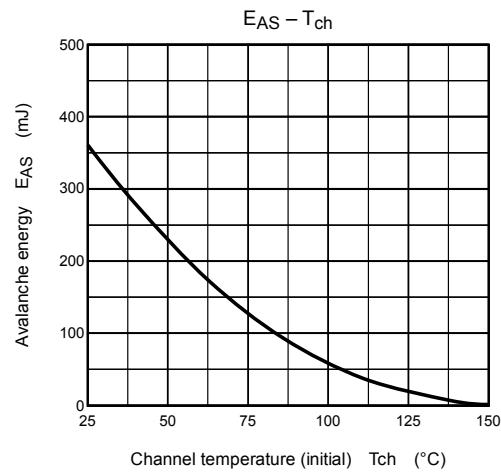
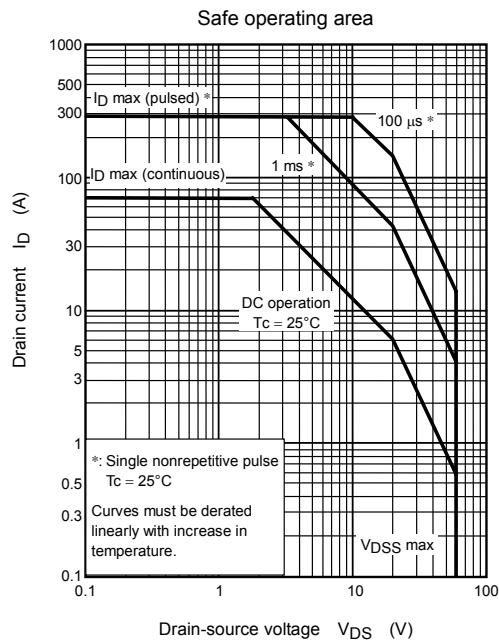
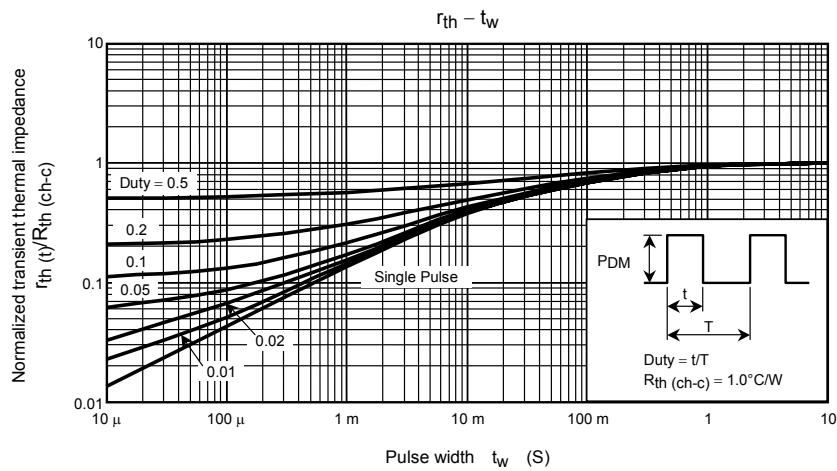
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	70	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	280	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 70 A, V _{GS} = 0 V	—	—	-1.5	V
Reverse recovery time	t _{rr}	I _{DR} = 70 A, V _{GS} = 0 V, dI _{DR} /dt = 50 A/μs	—	70	—	ns
Reverse recovery charge	Q _{rr}		—	77	—	nC

Marking









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

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