

# TTK2698

This material is for a technological examination material to aim at the product introduction. The change in the content of the characteristic might be accompanied at the final specification process. The latest specification will be able to be gotten in the brokerage department when the product of an equipment is designed and to get the confirmation.

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

## TTK2698

## Switching Regulator Applications

- Low drain-source ON-resistance:  $R_{DS(ON)} = 0.36$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 8.0$  S (typ.)
- Low leakage current:  $I_{DSS} = 10$   $\mu$ A ( $V_{DS} = 500$  V)
- Enhancement mode:  $V_{th} = 1.5$  to  $3.0$  V ( $V_{DS} = 10$  V,  $I_D = 1$  mA)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	500	V
Gate-source voltage		$V_{GSS}$	$\pm 30$	V
Drain current	DC (Note 1)	$I_D$	15	A
	Pulse ( $t = 1$ ms) (Note 1)	$I_{DP}$	60	
Drain power dissipation ( $T_c = 25^\circ\text{C}$ )		$P_D$	210	W
Single pulse avalanche energy (Note 2)		$E_{AS}$	(360)	mJ
Avalanche current		$I_{AR}$	15	A
Repetitive avalanche energy (Note 3)		$E_{AR}$	(21)	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	$-55$ to $150$	$^\circ\text{C}$

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	$R_{th(ch-c)}$	0.466	$^\circ\text{C/W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	50	$^\circ\text{C/W}$

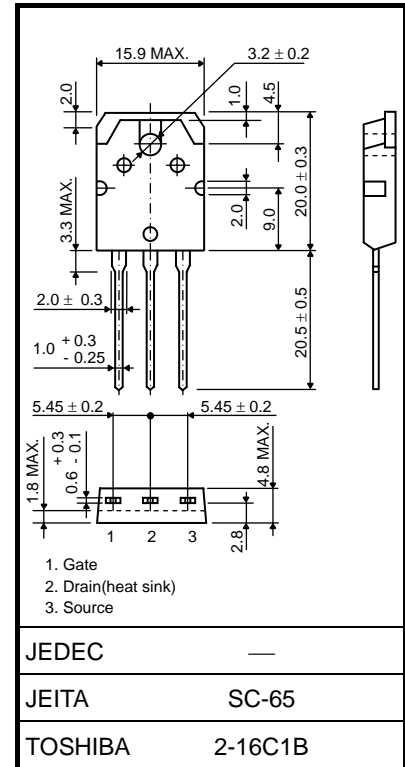
Note 1: Ensure that the channel temperature does not exceed  $150$  .

Note 2:  $V_{DD} = 90$  V,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 2.72$  mH,  $R_G = 25$   $\Omega$ ,  $I_{AR} = 15$  A

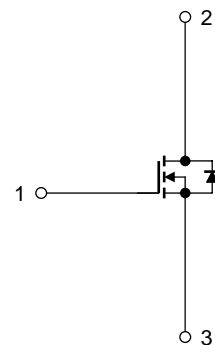
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

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

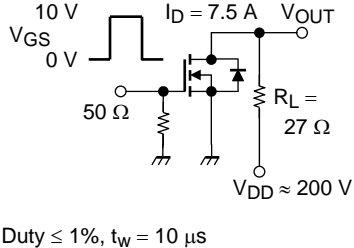
Unit: mm



Weight : 4.6 g (typ.)



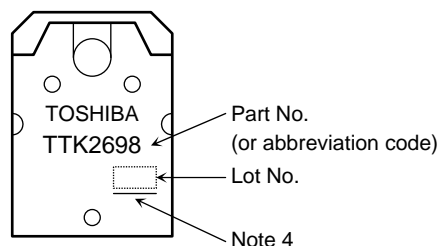
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 1$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = 500 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$	500	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	1.5	—	3.0	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 10 \text{ V}, I_D = 7.5 \text{ A}$	—	0.36	0.44	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10 \text{ V}, I_D = 7.5 \text{ A}$	2.0	8.0	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	(1800)	—	pF
Reverse transfer capacitance		$C_{rss}$		—	(9)	—	
Output capacitance		$C_{oss}$		—	(190)	—	
Switching time	Rise time	$t_r$		—	(40)	—	ns
	Turn-on time	$t_{on}$		—	(80)	—	
	Fall time	$t_f$		—	(15)	—	
	Turn-off time	$t_{off}$		—	(110)	—	
Total gate charge		$Q_g$	$V_{DD} \approx 400 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$	—	(38)	—	nC
Gate-source charge		$Q_{gs}$		—	(24)	—	
Gate-drain charge		$Q_{gd}$		—	(14)	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	15	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	60	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 15 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.7	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 15 \text{ A}, V_{GS} = 0 \text{ V},$	—	(1200)	—	ns
Reverse recovery charge	$Q_{rr}$	$dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	(13)	—	$\mu\text{C}$

## Marking



Note 4: A line under a Lot No. identifies the indication of product Labels  
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

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