

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ( $\pi$ -MOSV)

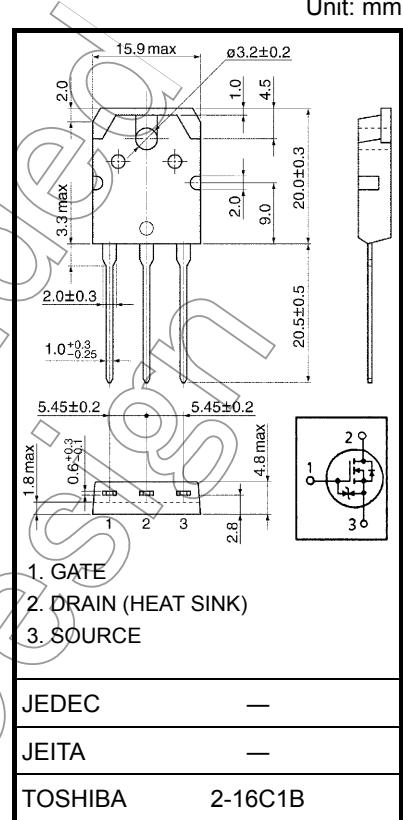
## 2SK2967

DC-DC Converter, Relay Drive and Motor Drive Applications

- Low drain-source ON resistance :  $R_{DS\ (ON)} = 48\ m\Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 30\ S$  (typ.)
- Low leakage current :  $I_{DSS} = 100\ \mu A$  (max) ( $V_{DS} = 250\ V$ )
- Enhancement mode :  $V_{th} = 1.5$  to  $3.5\ V$  ( $V_{DS} = 10\ V$ ,  $I_D = 1\ mA$ )

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

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	250	V
Drain-gate voltage ( $R_{GS} = 20\ k\Omega$ )	$V_{DGR}$	250	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	A
	Pulse (Note 1)	$I_{DP}$	A
Drain power dissipation ( $T_c = 25^\circ C$ )	$P_D$	150	W
Single pulse avalanche energy (Note 2)	$E_{AS}$	925	mJ
Avalanche current	$I_{AR}$	30	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	15	mJ
Channel temperature	$T_{ch}$	150	$^\circ C$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ C$



Weight: 4.6 g (typ.)

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	$R_{th}(ch-c)$	0.833	$^\circ C / W$
Thermal resistance, channel to ambient	$R_{th}(ch-a)$	50	$^\circ C / W$

Note 1: Ensure that the channel temperature does not exceed  $150^\circ C$ .Note 2:  $V_{DD} = 50\ V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 1.74\ mH$ ,  $I_{AR} = 30\ A$ ,  $R_G = 25\ \Omega$ 

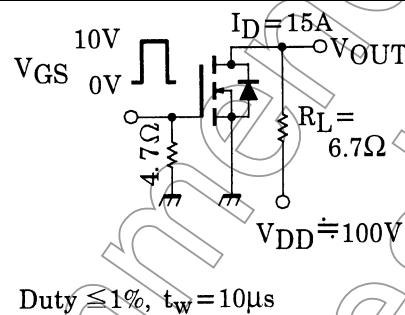
Note 3: Repetitive rating: pulse width limited by maximum channel temperature.

This transistor is an electrostatic-sensitive device.

Please handle with caution.

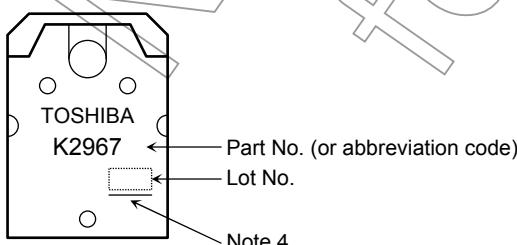
Electrical Characteristics ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 16 V, V_{DS} = 0 V$	—	—	$\pm 10$	$\mu A$
Drain cut-off current	$I_{DSS}$	$V_{DS} = 250 V, V_{GS} = 0 V$	—	—	100	$\mu A$
Drain-source breakdown voltage	$V_{(BR) DSS}$	$I_D = 10 mA, V_{GS} = 0 V$	250	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10 V, I_D = 1 mA$	1.5	—	3.5	V
Drain-source ON resistance	$R_{DS (ON)}$	$V_{GS} = 10 V, I_D = 15 A$	—	48	68	$m\Omega$
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 V, I_D = 15 A$	15	30	—	S
Input capacitance	$C_{iss}$	$V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz$	5400	—	—	pF
Reverse transfer capacitance	$C_{rss}$		580	—	—	
Output capacitance	$C_{oss}$		1900	—	—	
Switching time	Rise time	$t_r$	—	20	—	ns
	Turn-on time	$t_{on}$	—	50	—	
	Fall time	$t_f$	—	35	—	
	Turn-off time	$t_{off}$	—	200	—	
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} \approx 200 V, V_{GS} = 10 V, I_D = 30 A$	132	—	—	nC
Gate-source charge	$Q_{gs}$		80	—	—	
Gate-drain ("miller") Charge	$Q_{gd}$		52	—	—	

Source-Drain Ratings and Characteristics ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	30	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	120	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = 30 A, V_{GS} = 0 V$	—	—	-2.0	V
Reverse recovery time	$t_{rr}$	$I_{DR} = 30 A, V_{GS} = 0 V$ $dI_{DR} / dt = 100 A / \mu s$	—	270	—	ns
Reverse recovery charge	$Q_{rr}$		—	3.0	—	$\mu C$

## Marking

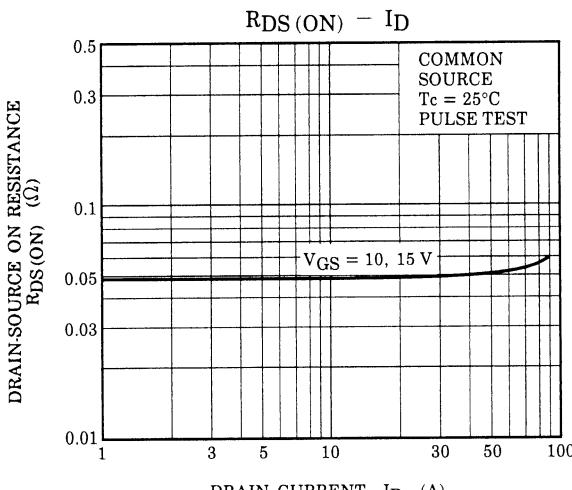
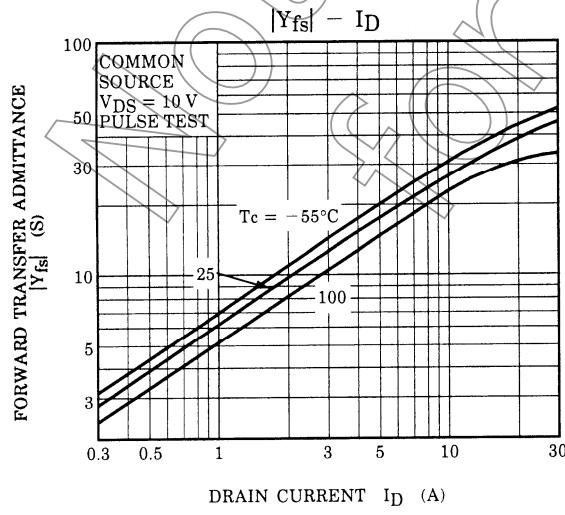
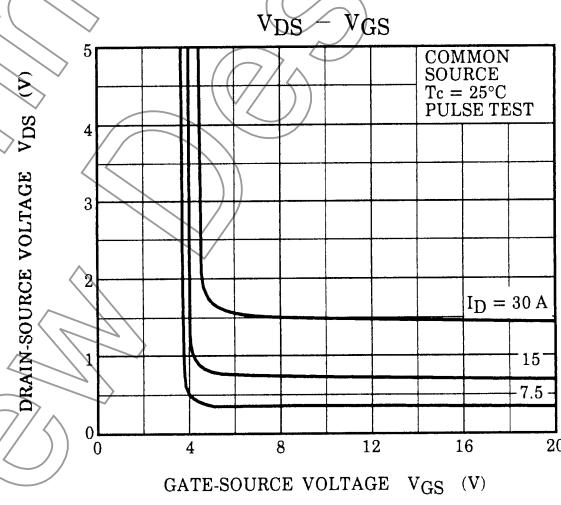
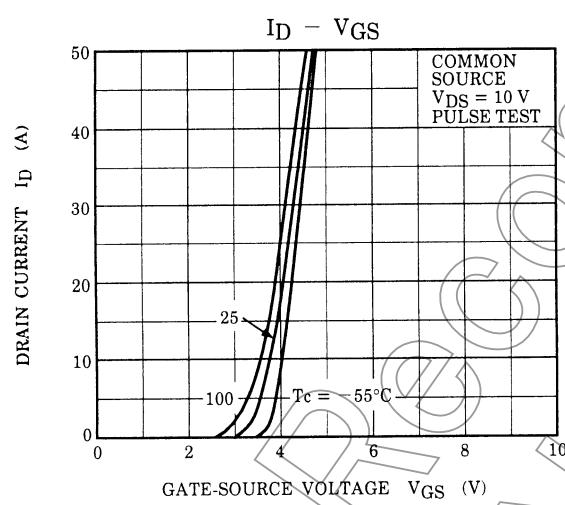
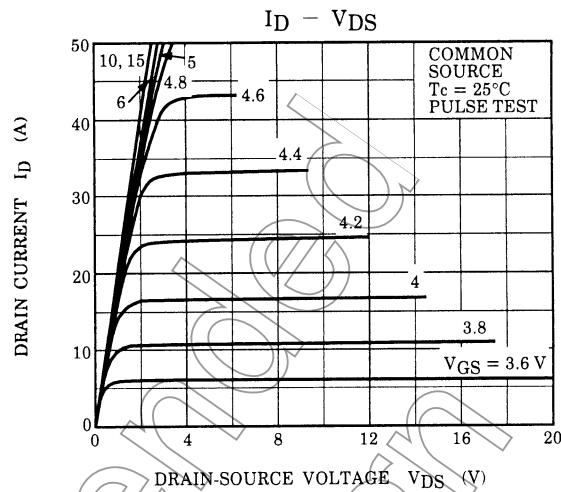
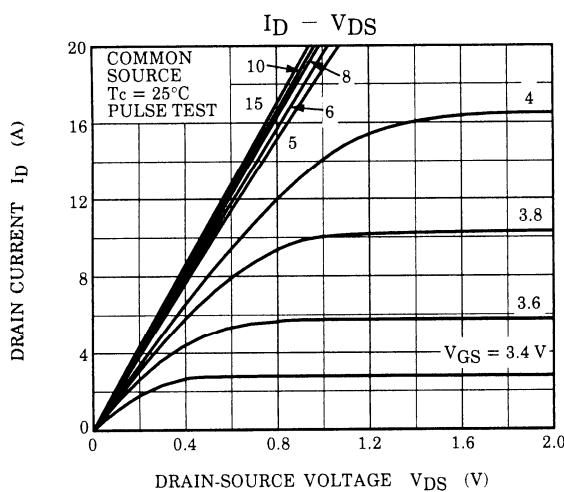


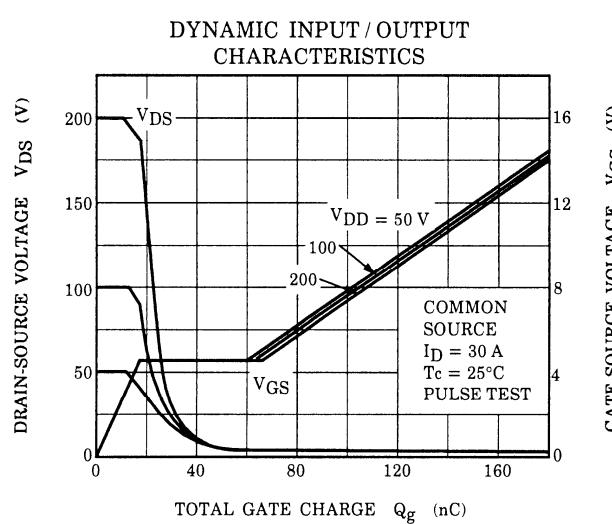
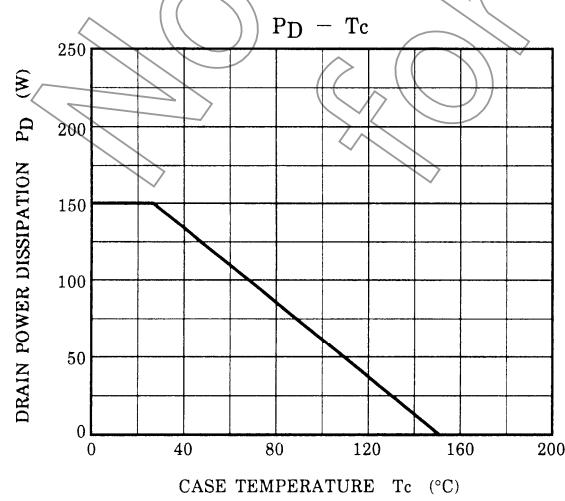
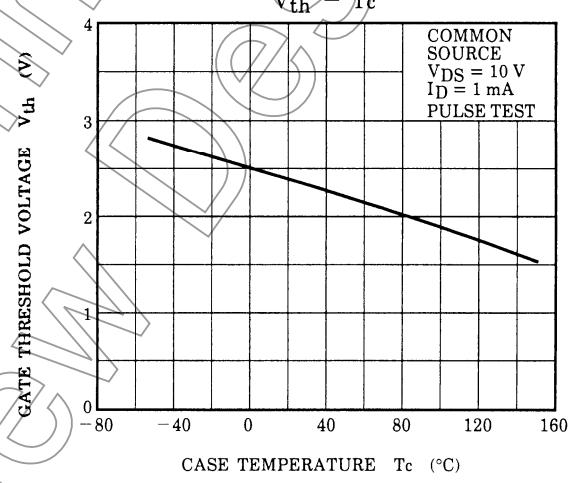
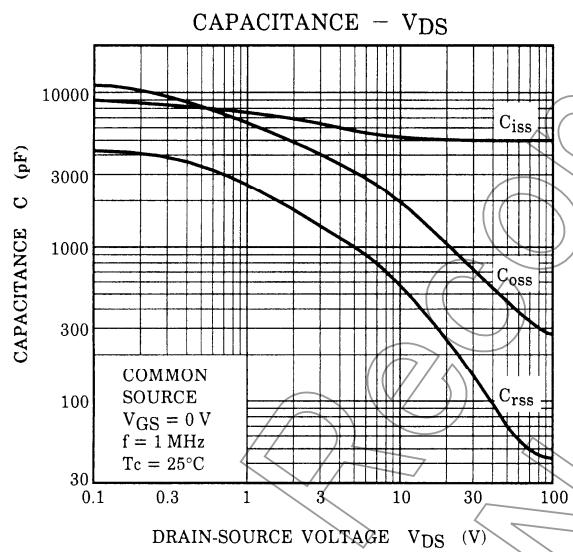
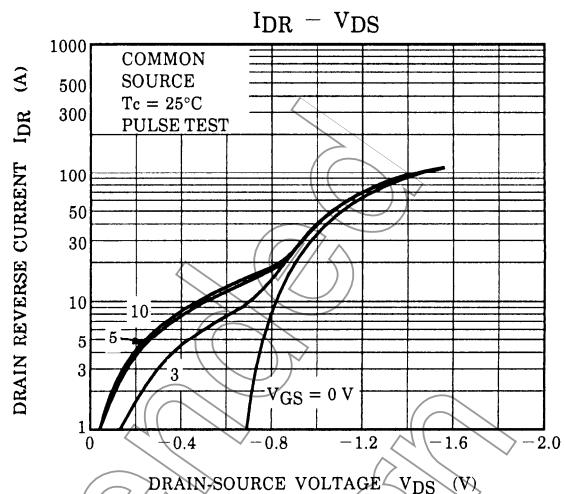
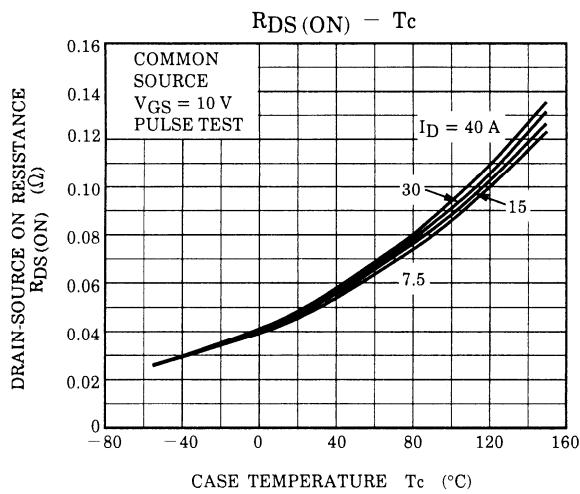
Note 4: A line under a Lot No. identifies the indication of product Labels.

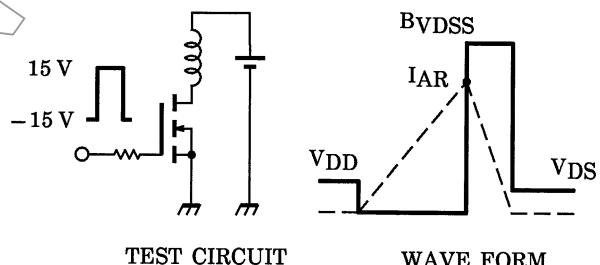
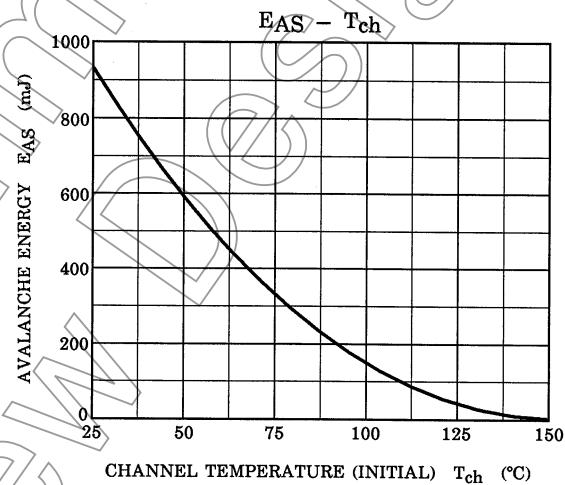
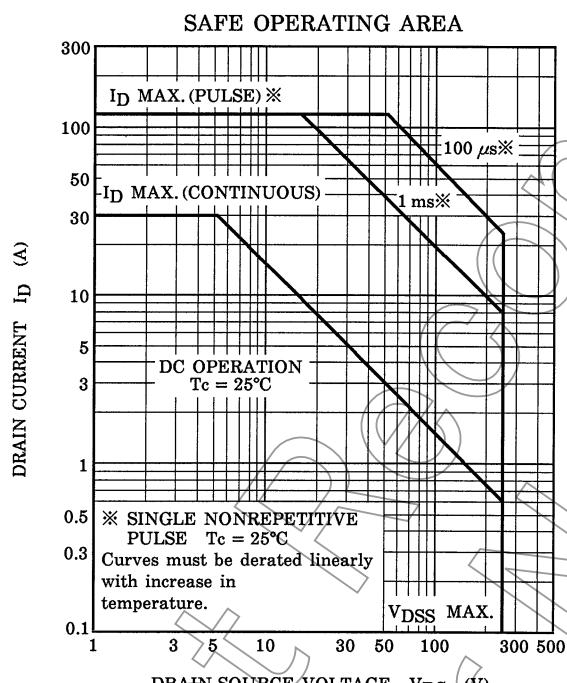
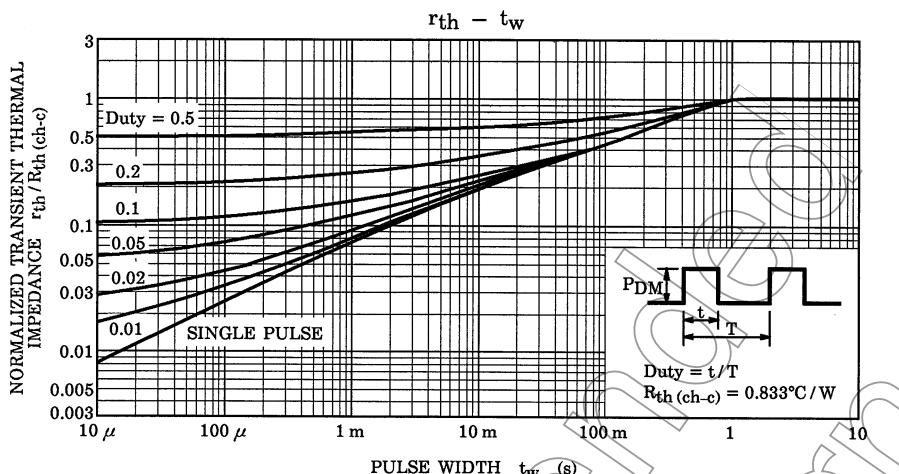
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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$$R_G = 25 \Omega$$

$$V_{DD} = 50 \text{ V}, L = 1.74 \text{ mH}$$

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

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