

9097250 TOSHIBA (DISCRETE/OPTO)

99D 16731 DT-39-13



# SEMICONDUCTOR

## TECHNICAL DATA

TOSHIBA FIELD EFFECT TRANSISTOR  
2 S K 6 4 4  
SILICON N CHANNEL MOS TYPE  
( $\pi$ -MOS I)

INDUSTRIAL APPLICATIONS

Unit in mm

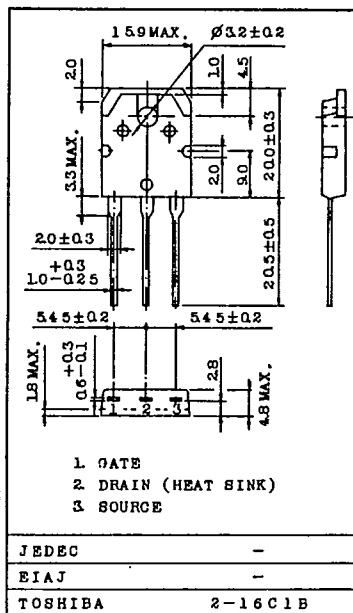
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS.  
CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR  
DRIVE APPLICATIONS.

## FEATURES:

- Low Drain-Source ON Resistance :  $R_{DS(ON)}=0.7\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}|=6.0S$  (Typ.)
- Low Leakage Current :  $I_{GSS}=\pm 100nA$ (Max.) @  $V_{GS}=\pm 20V$   
 $I_{DSS}=250\mu A$  (Max.) @  $V_{DS}=500V$
- Enhancement-Mode :  $V_{th}=2.0\sim 4.0V$  @  $V_{DS}=10V, I_D=1mA$

MAXIMUM RATINGS ( $T_a=25^\circ C$ )

| CHARACTERISTIC                               |       | SYMBOL    | RATING        | UNIT       |
|--|-------|-----------|---------------|------------|
| Drain-Source Voltage                         |       | $V_{DSX}$ | 500           | V          |
| Drain-Gate Voltage ( $R_{GS}=20k\Omega$ )    |       | $V_{DGR}$ | 500           | V          |
| Gate-Source Voltage                          |       | $V_{GSS}$ | $\pm 20$      | V          |
| Drain Current                                | DC    | $I_D$     | 10            | A          |
|  | Pulse | $I_{DP}$  | 30            |            |
| Drain Power Dissipation ( $T_c=25^\circ C$ ) |       | $P_D$     | 125           | W          |
| Channel Temperature                          |       | $T_{ch}$  | 150           | $^\circ C$ |
| Storage Temperature Range                    |       | $T_{stg}$ | $-55\sim 150$ | $^\circ C$ |



Weight : 4.6g

## THERMAL CHARACTERISTICS

| CHARACTERISTIC   | SYMBOL        | MAX. | UNIT         |
|--|---------------|------|--------------|
| Thermal Resistance, Junction to Case   | $R_{th(j-c)}$ | 1.0  | $^\circ C/W$ |
| Thermal Resistance, Junction to Ambient  | $R_{th(j-a)}$ | 50   | $^\circ C/W$ |
| Maximum Lead Temperature for Soldering Purposes (1.6mm from case for 10 seconds) | $T_L$         | 300  | $^\circ C$   |

TOSHIBA CORPORATION

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## ELECTRICAL CHARACTERISTICS (Ta=25°C)

| CHARACTERISTIC                                  | SYMBOL               | TEST CONDITION   | MIN. | TYP.   | MAX. | UNIT |    |
|---|----------------------|--|------|--|------|------|----|
| Gate Leakage Current                            | IGSS                 | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                         | -    | -  | ±100 | nA   |    |
| Drain Cut-off Current                           | IDSS                 | V <sub>DS</sub> =500V, V <sub>GS</sub> =0V                         | -    | -  | 300  | µA   |    |
| Drain-Source Breakdown Voltage                  | V <sub>(BR)DSS</sub> | I <sub>D</sub> =10mA, V <sub>GS</sub> =0V                          | 500  | -  | -    | V    |    |
| Gate Threshold Voltage                          | V <sub>th</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =1mA                          | 2.0  | -  | 4.0  | V    |    |
| Forward Transfer Admittance                     | Y <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =5A                           | 3.0  | 6.0  | -    | S    |    |
| Drain-Source ON Resistance                      | R <sub>DS(ON)</sub>  | I <sub>D</sub> =5A, V <sub>GS</sub> =10V                           | -    | 0.7  | 1.0  | Ω    |    |
| Drain-Source ON Voltage                         | V <sub>DS(ON)</sub>  | I <sub>D</sub> =10A, V <sub>GS</sub> =10V                          | -    | 8.5  | 12.5 | V    |    |
| Input Capacitance                               | C <sub>iss</sub>     | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz                  | -    | 1350   | 1800 | pF   |    |
| Reverse Transfer Capacitance                    | C <sub>rss</sub>     |  | -    | 260  | 450  |      |    |
| Output Capacitance                              | C <sub>oss</sub>     |  | -    | 560  | 750  |      |    |
| Switching Time                                  | Rise Time            | t <sub>r</sub>   |      | -  | 35   | 70   | ns |
|   | Turn-on Time         | t <sub>on</sub>  |      | -  | 50   | 100  |    |
|   | Fall Time            | t <sub>f</sub>   |      | -  | 35   | 70   |    |
|   | Turn-off Time        | t <sub>off</sub>   |      | V <sub>IN</sub> : t <sub>r</sub> , t <sub>f</sub> < 5ns<br>Duty ≤ 1% | -    | 200  |    |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | Q <sub>g</sub>       | I <sub>D</sub> =10A, V <sub>GS</sub> =10V<br>V <sub>DD</sub> =400V | -    | 47   | 60   | nC   |    |
| Gate-Source Charge                              | Q <sub>gs</sub>      |  | -    | 22   | -    |      |    |
| Gate-Drain ("Miller") Charge                    | Q <sub>gd</sub>      |  | -    | 25   | -    |      |    |

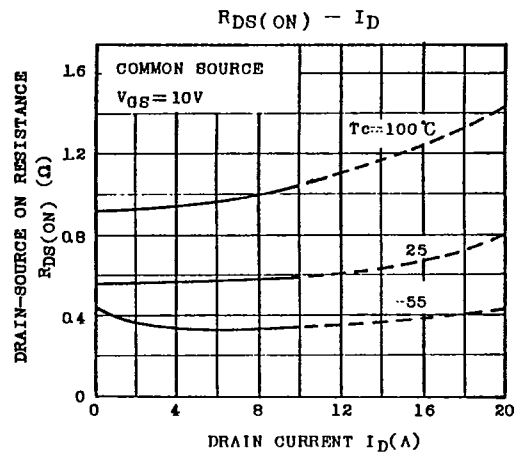
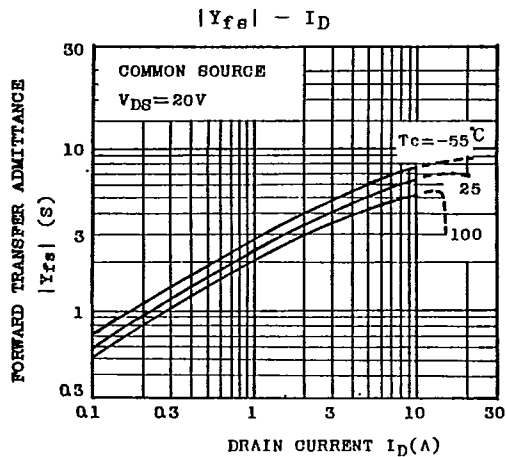
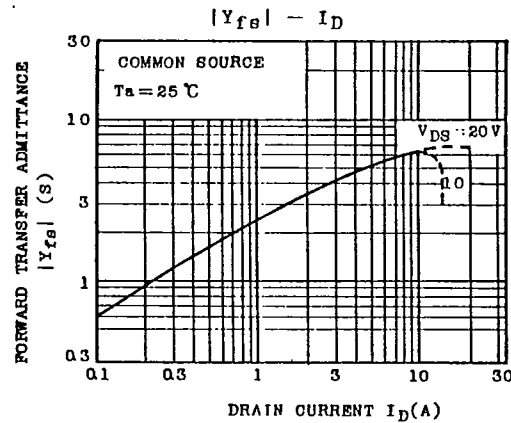
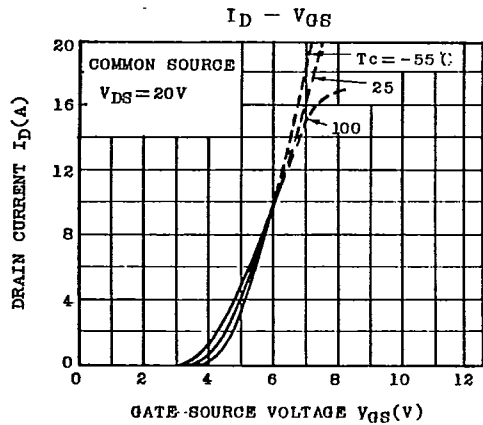
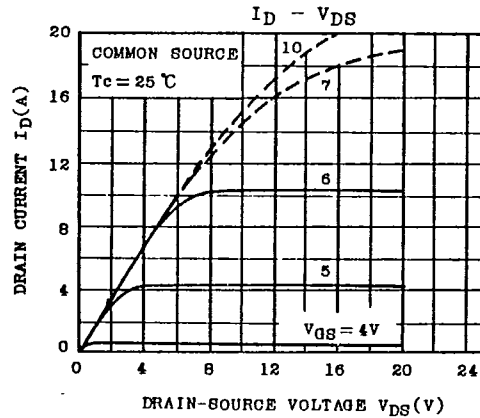
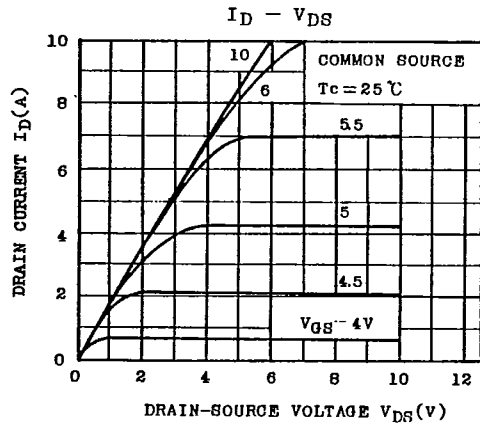
## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta=25°C)

| CHARACTERISTIC                   | SYMBOL           | TEST CONDITION                            | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|------------------|---|------|------|------|------|
| Continuous Drain Reverse Current | I <sub>DR</sub>  | --  | -    | -    | 10   | A    |
| Pulse Drain Reverse Current      | I <sub>DRP</sub> | --  | -    | -    | 30   | A    |
| Diode Forward Voltage            | V <sub>DSF</sub> | I <sub>DR</sub> =10A, V <sub>GS</sub> =0V | -    | -    | 2.0  | V    |
| Reverse Recovery Time            | t <sub>rr</sub>  | I <sub>DR</sub> =10A                      | -    | 350  | -    | ns   |
| Reverse Recovered Charge         | Q <sub>rr</sub>  | dI <sub>DR</sub> /dt=100A/µs              | -    | 2.4  | -    | µC   |

TOSHIBA CORPORATION

**TOSHIBA** SEMICONDUCTOR  
TECHNICAL DATA

2SK644



EGA-2SK644-3

TOSHIBA CORPORATION

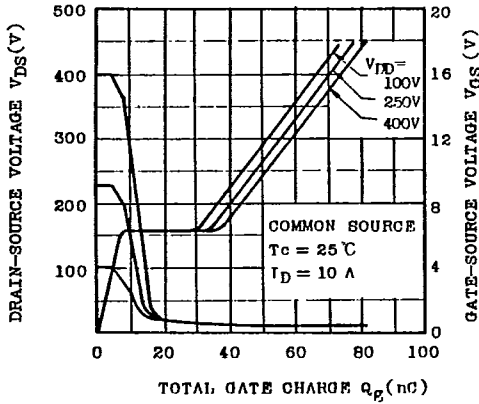
9097250 TOSHIBA (DISCRETE/OPTO)

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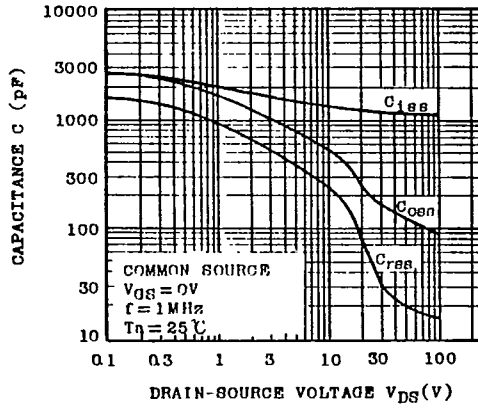
**TOSHIBA** SEMICONDUCTOR  
TECHNICAL DATA

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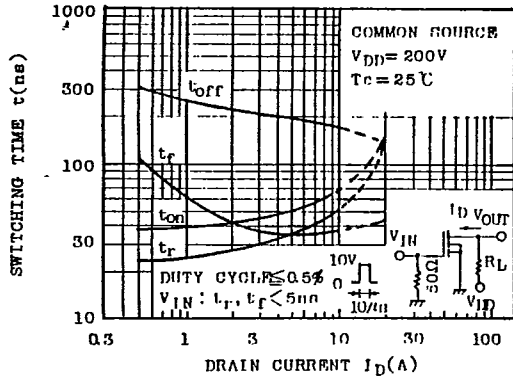
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



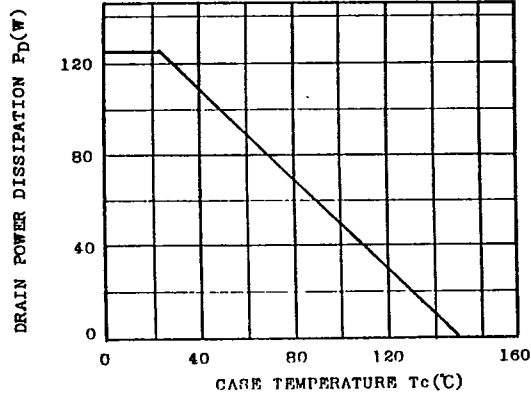
CAPACITANCE -  $V_{DS}$



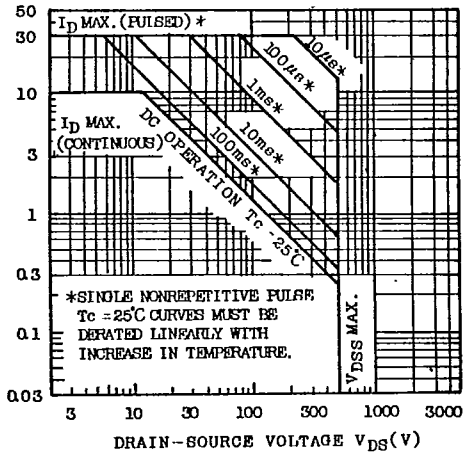
SWITCHING TIME -  $I_D$



$P_D - T_c$



SAFE OPERATING AREA



EGA-2SK644-4  
TOSHIBA CORPORATION