# TOSHIBA

## Discrete Semiconductors

**2SK1767**

## Field Effect Transistor



## Silicon N Channel MOS Type (π-MOS III.5)

## High Speed, High Current Switching Applications

### Features

- Low Drain-Source ON Resistance
  - $R_{DS(ON)}$ = 1.9Ω (Typ.)
- High Forward Transfer Admittance
  - $|Y_{fs}|$ = 3.0S (Typ.)
- Low Leakage Current
  - $I_{DSS}$ = 100μA (Max.) @ $V_{DS}$ = 600V
- Enhancement-Mode
  - $V_{th}$ = 2.1 ~ 4.0V @ $V_{DS}$ = 10V, $I_D$ = -1mA

### Absolute Maximum Ratings (Ta = 25℃)

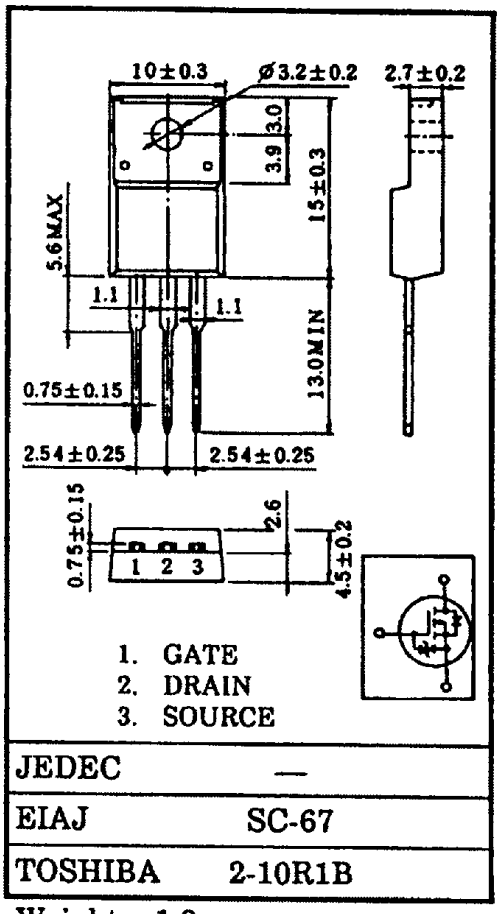
| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 600 | V |
| Drain-Gate Voltage ($R_{GS}$ = 20kΩ) | | $V_{DGR}$ | 600 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Drain Current | DC | $I_D$ | 3.5 | A |
| | Pulse | $I_{DP}$ | 14 | |
| Drain Power Dissipation (Tc = 25°C) | | $P_D$ | 40 | W |
| Channel Temperature | | $T_{ch}$ | 150 | °C |
| Storage Temperature | | $T_{stg}$ | -55 ~ 150 | °C |

### Thermal Characteristics

| CHARACTERISTIC | SYMBOL | MAX. | UNIT |
|---|---|---|---|
| Thermal Resistance, Channel to Case | $R_{th(ch-c)}$ | 3.125 | °C/W |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 62.5 | °C/W |

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

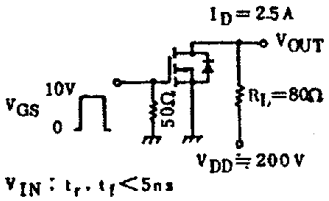
**Industrial Applications** **Unit in mm**




| | |
|---|---|
| JEDEC | — |
| EIAJ | SC-67 |
| TOSHIBA | 2-10R1B |

Weight : 1.9g

## Electrical Characteristics (Ta = 25℃)

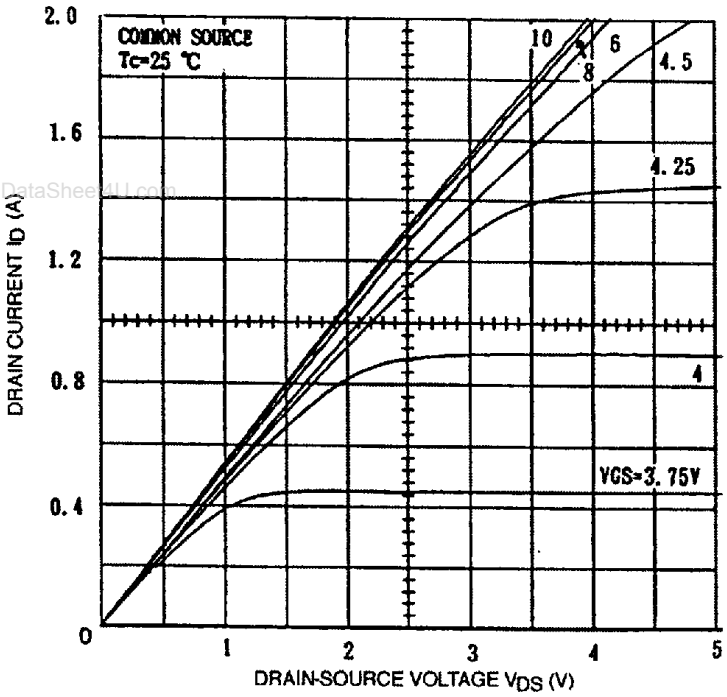
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Gate Leakage Current | | $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | – | – | ±100 | nA |
| Drain Cut-off Current | | $I_{DSS}$ | $V_{DS}$ = 600V, $V_{GS}$ = 0V | – | – | 100 | μA |
| Drain-Source Breakdown Voltage | | $V_{(BR)\ DSS}$ | $I_D$ = 250μA, $V_{GS}$ = 0V | 600 | – | – | V |
| Gate Threshold Voltage | | $V_{th}$ | $V_{DS}$ = -10V, $I_D$ = -1mA | 2.1 | – | 4.0 | V |
| Drain-Source ON Resistance | | $R_{DS\ (ON)}$ | $I_D$ = 2.5A, $V_{GS}$ = 10V | – | 1.9 | 2.5 | Ω |
| Forward Transfer Admittance | | $\|Y_{fs}\|$ | $V_{DS}$ = 25V, $I_{DS}$ = 2.5A | 1.5 | 3.0 | – | S |
| Input Capacitance | | $C_{iss}$ | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | – | 600 | 1000 | pF |
| Reverse Transfer Capacitance | | $C_{rss}$ | | – | 30 | 50 | |
| Output Capacitance | | $C_{oss}$ | | – | 100 | 150 | |
| Switching Time | Rise Time | tr |  | – | 20 | 40 | ns |
| | Turn-on Time | $t_{on}$ | | – | 60 | 120 | |
| | Fall Time | tf | | – | 30 | 60 | |
| | Turn-off Time | $t_{off}$ | | – | 120 | 240 | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | | $Q_g$ | $V_{DD}$ = 400V, $V_{GS}$ = -10V, $I_D$ = -3.5A | – | 35 | 70 | nC |
| Gate-Source Charge | | $Q_{gs}$ | | – | 20 | – | |
| Gate-Drain ("Miller") Charge | | $Q_{gd}$ | | – | 15 | – | |



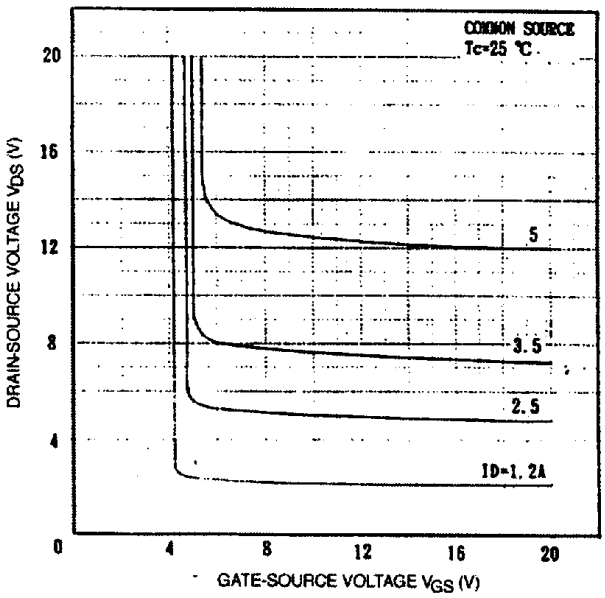
## Source-Drain Diode Ratings and Characteristics (Ta = 25℃)

| CHARACTERISTICS | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Continuous Drain Reverse Current | $I_{DR}$ | – | – | – | 3.5 | A |
| Pulse Drain Reverse Current | $I_{DRP}$ | – | – | – | 14 | A |
| Diode Forward Voltage | $V_{DSF}$ | $I_{DR}$ = 3.5A, $V_{GS}$ = 0V | – | – | -1.8 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{DR}$ = 3.5A, $V_{GS}$ = 0V, $dI_{DR}/dt$ = 100A/μs | – | 250 | – | ns |
| Reverse Recovered Charge | $Q_{rr}$ | | – | 2.0 | – | μC |

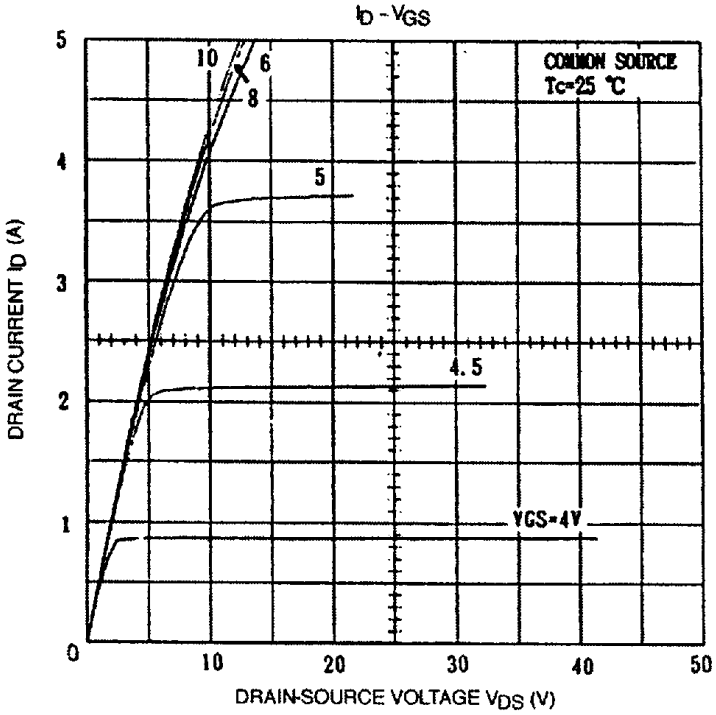
$I_D$ - $V_{GS}$



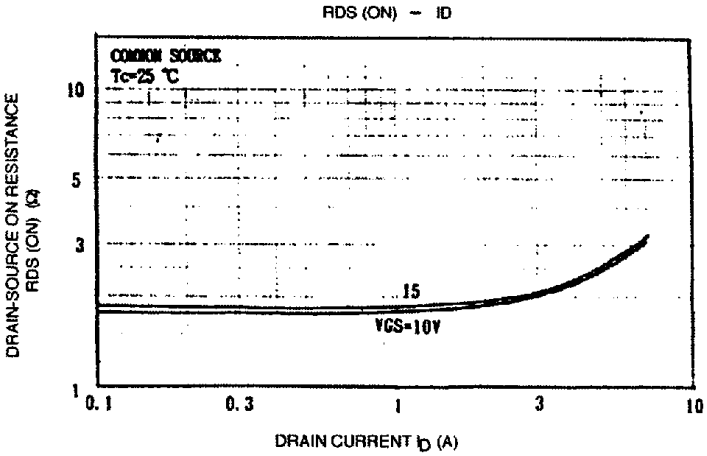

$V_D$ - $V_{GS}$




$I_D$ - $V_{GS}$




RDS (ON) – ID



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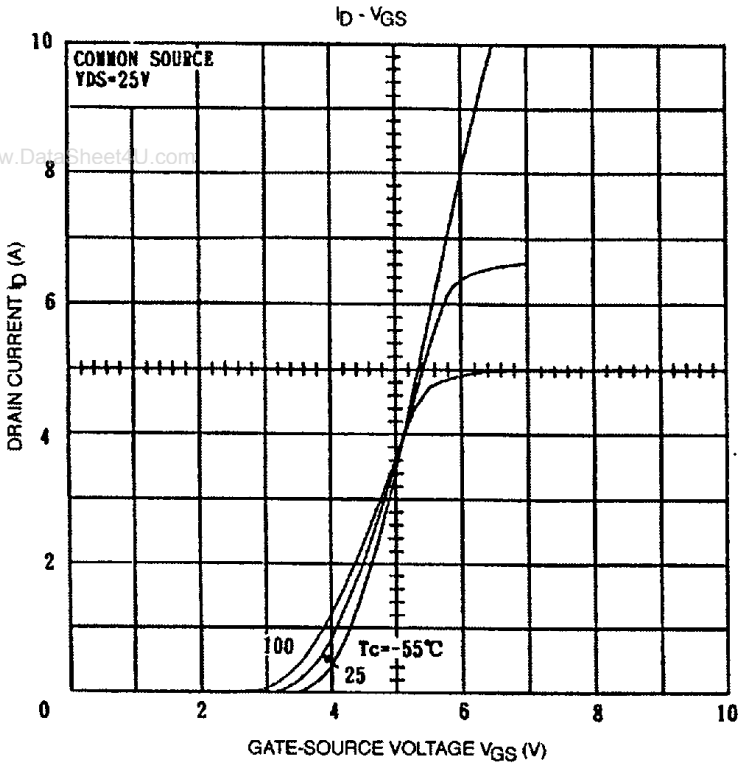
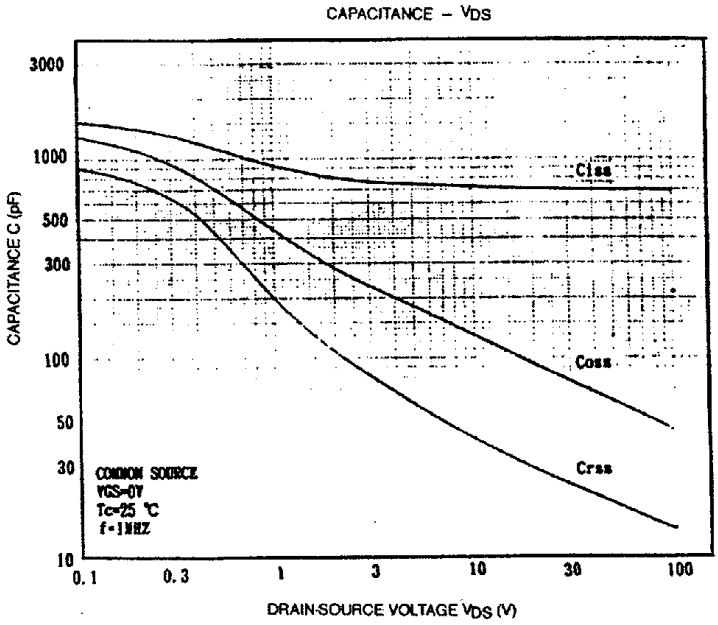
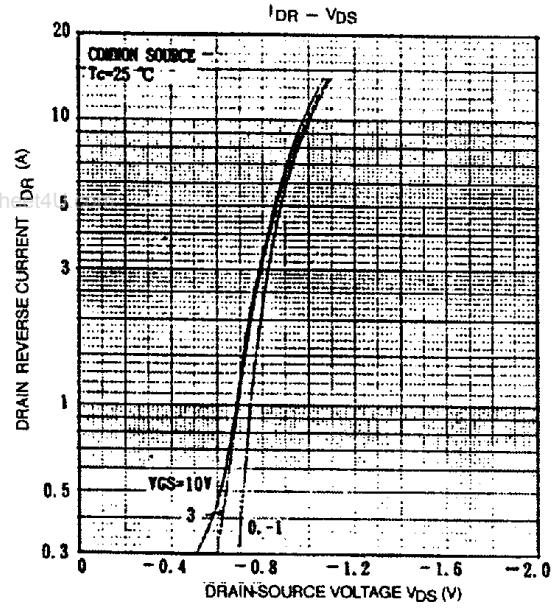
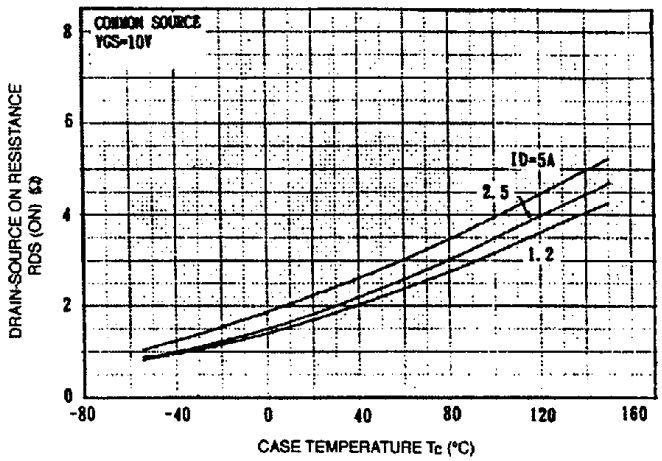


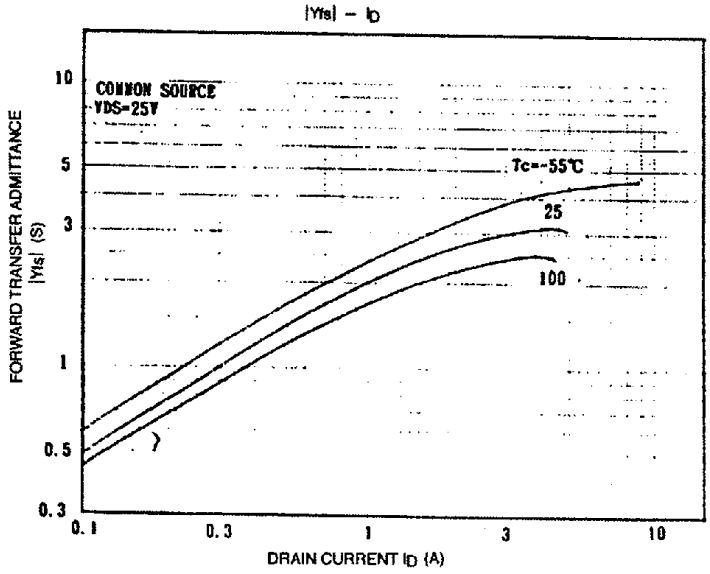
$I_{DR}$ – $V_{DS}$



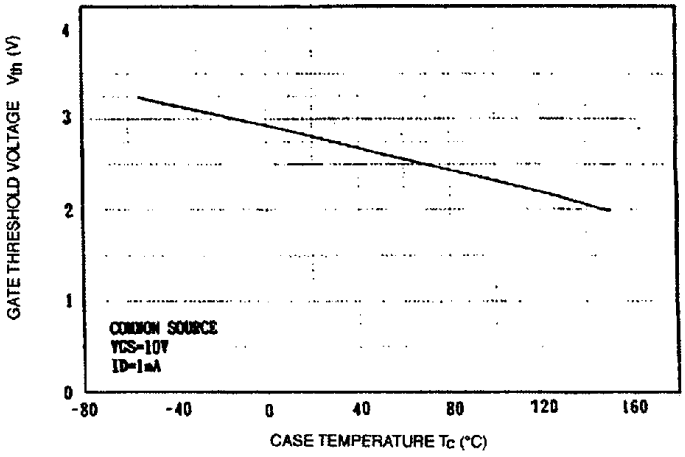

RDS (ON) – Tc




|Yfs| – $I_D$




$V_{th}$ – Tc



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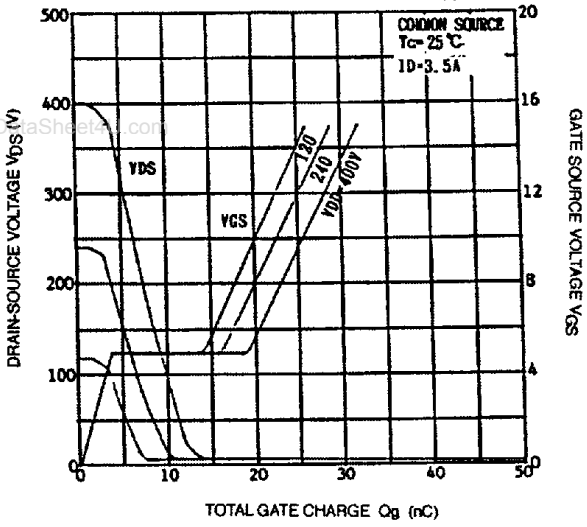
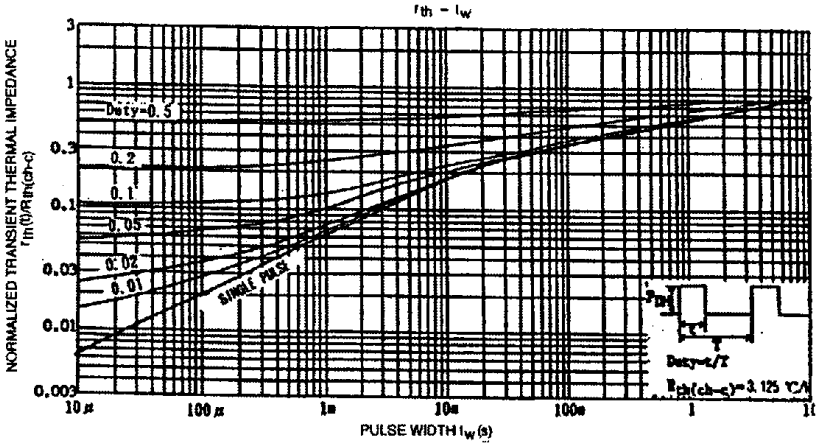
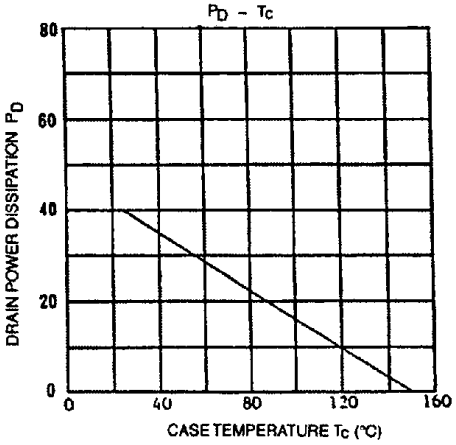
DYNAMIC INPUT/OUTPUT CHARACTERISTICS




$r_{th}$ – $t_w$




$P_D$ – $T_c$




SAFE OPERATING AREA