

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSV)

# 2SK2776

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

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.75\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 7.0S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (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                           |       | $V_{DSS}$ | 500            | V          |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )    |       | $V_{DGR}$ | 500            | V          |
| Gate-Source Voltage                            |       | $V_{GSS}$ | $\pm 30$       | V          |
| Drain Current                                  | DC    | $I_D$     | 8              | A          |
|  | Pulse | $I_{DP}$  | 32             | A          |
| Drain Power Dissipation ( $T_c = 25^\circ C$ ) |       | $P_D$     | 65             | W          |
| Single Pulse Avalanche Energy**                |       | $E_{AS}$  | 312            | mJ         |
| Avalanche Current                              |       | $I_{AR}$  | 8              | A          |
| Repetitive Avalanche Energy*                   |       | $E_{AR}$  | 6.5            | mJ         |
| Channel Temperature                            |       | $T_{ch}$  | 150            | $^\circ C$ |
| Storage Temperature Range                      |       | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |

Thermal Characteristics

| CHARACTERISTIC                         | SYMBOL         | MAX. | UNIT         |
|--|----------------|------|--------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 1.92 | $^\circ C/W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 83.3 | $^\circ C/W$ |

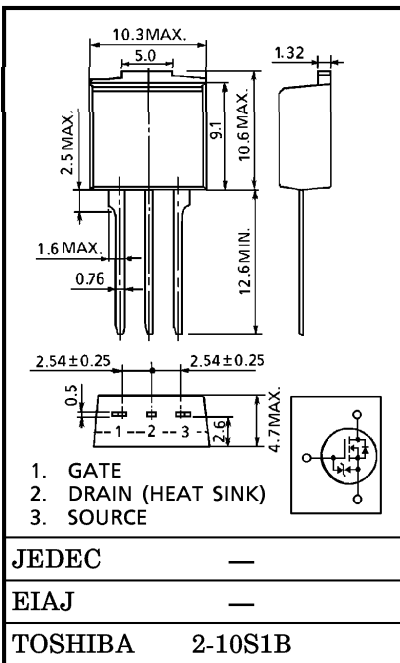
Note ;

\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

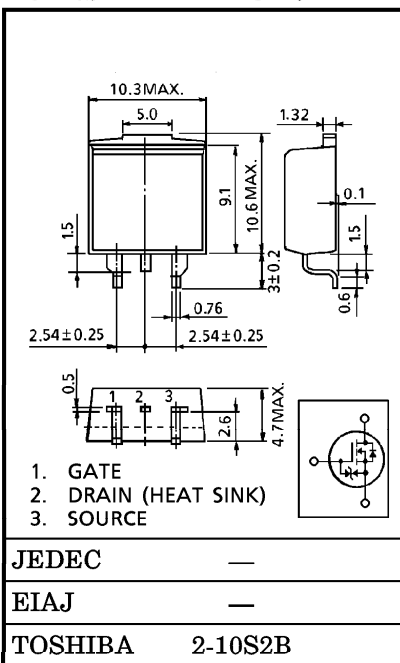
\*\*  $V_{DD} = 90V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 8.3mH$   
 $R_G = 25\Omega, I_{AR} = 8A$

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

INDUSTRIAL APPLICATIONS  
 TO-220FL Unit in mm



TO-220SM Unit in mm



Weight : 1.5g

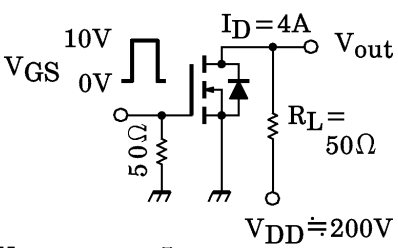
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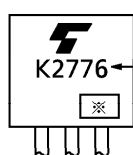
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL        | CONDITION   | MIN.   | TYP. | MAX.     | UNIT     |
|---|---------------|---------------|---|--|------|----------|----------|
| Gate Leakage Current                            |               | $I_{GSS}$     | $V_{GS} = \pm 25V, V_{DS} = 0V$   | —  | —    | $\pm 10$ | $\mu A$  |
| Gate-Source Breakdown Voltage                   |               | $V_{(BR)GSS}$ | $I_G = \pm 10\mu A, V_{DS} = 0V$  | $\pm 30$   | —    | —        | V        |
| Drain Cut-off Current                           |               | $I_{DSS}$     | $V_{DS} = 500V, V_{GS} = 0V$  | —  | —    | 100      | $\mu A$  |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10mA, V_{GS} = 0V$   | 500  | —    | —        | V        |
| Gate Threshold Voltage                          |               | $V_{th}$      | $V_{DS} = 10V, I_D = 1mA$   | 2.0  | —    | 4.0      | V        |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = 10V, I_D = 4A$  | —  | 0.75 | 0.85     | $\Omega$ |
| Forward Transfer Admittance                     |               | $ Y_{fs} $    | $V_{DS} = 10V, I_D = 4A$  | 3.5  | 7.0  | —        | S        |
| Input Capacitance                               |               | $C_{iss}$     | $V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$   | —  | 1300 | —        | pF       |
| Reverse Transfer Capacitance                    |               | $C_{rss}$     |   | —  | 130  | —        |          |
| Output Capacitance                              |               | $C_{oss}$     |   | —  | 400  | —        |          |
| Switching Time                                  | Rise Time     | $t_r$         |  <p><math>V_{GS} = 10V, 0V</math><br/> <math>I_D = 4A</math><br/> <math>R_L = 50\Omega</math><br/> <math>V_{DD} \doteq 200V</math></p> | —  | 26   | —        | ns       |
|   | Turn-on Time  | $t_{on}$      |   | —  | 45   | —        |          |
|   | Fall Time     | $t_f$         |   | —  | 40   | —        |          |
|   | Turn-off Time | $t_{off}$     |   | $V_{IN} : t_r, t_f < 5ns,$<br>$Duty \leq 1\%, t_w = 10\mu s$ | —    | 140      |          |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$         | $V_{DD} \doteq 400V, V_{GS} = 10V, I_D = 8A$  | —  | 30   | —        | nC       |
| Gate-Source Charge                              |               | $Q_{gs}$      |   | —  | 17   | —        |          |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$      |   | —  | 13   | —        |          |

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

| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION                | MIN. | TYP. | MAX. | UNIT    |
|----------------------------------|-----------|-------------------------------|------|------|------|---------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                             | —    | —    | 8    | A       |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                             | —    | —    | 32   | A       |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 8A, V_{GS} = 0V$    | —    | —    | -1.7 | V       |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 8A, V_{GS} = 0V$    | —    | 1200 | —    | ns      |
| Reverse Recovery Charge          | $Q_{rr}$  | $dI_{DR} / dt = 100A / \mu s$ | —    | 10   | —    | $\mu C$ |

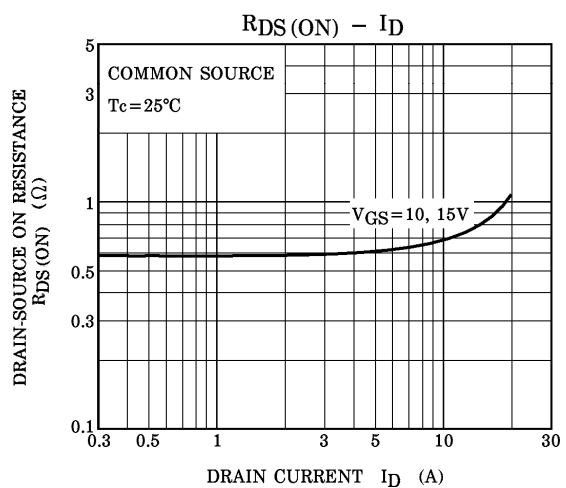
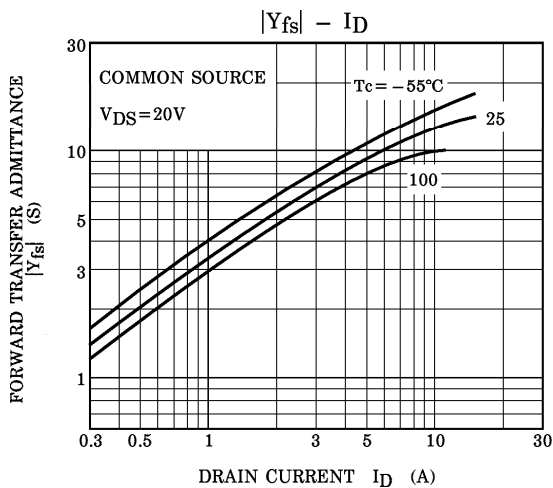
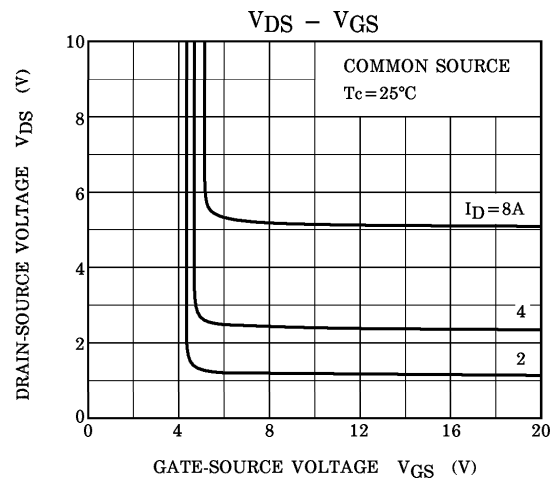
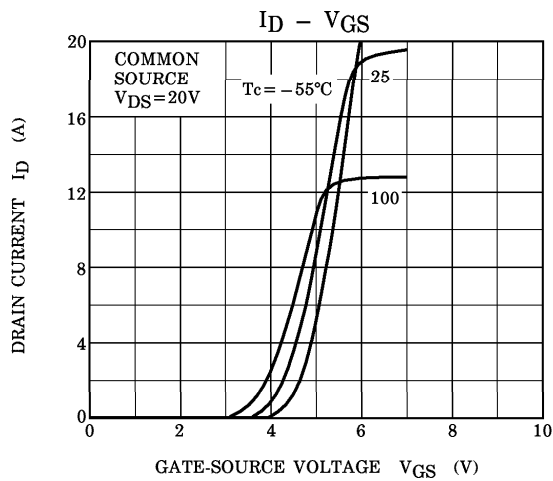
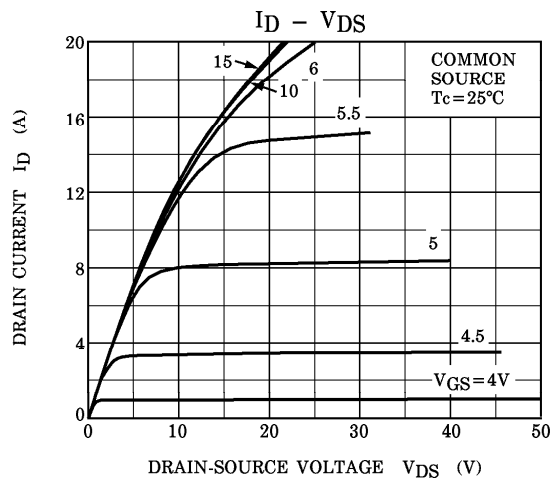
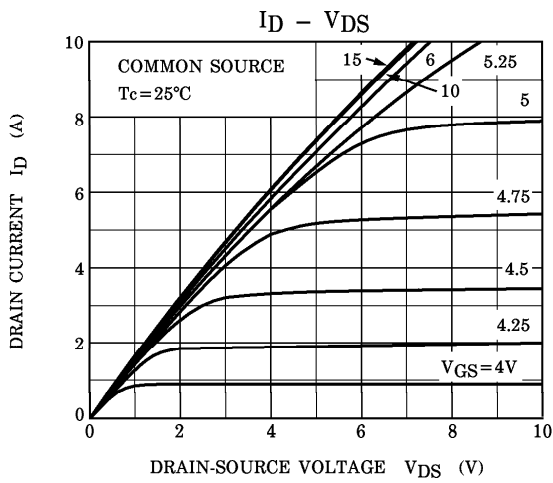
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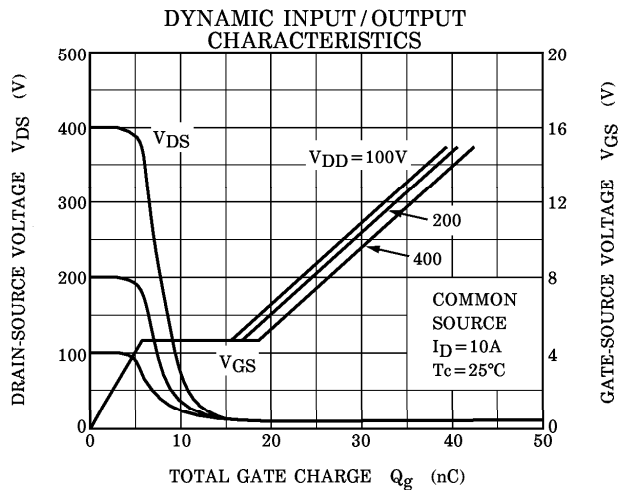
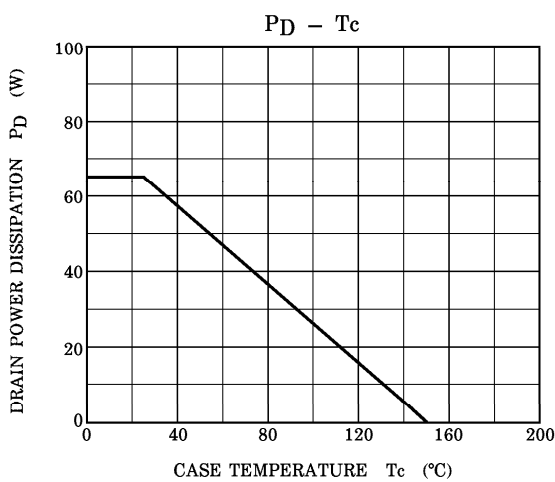
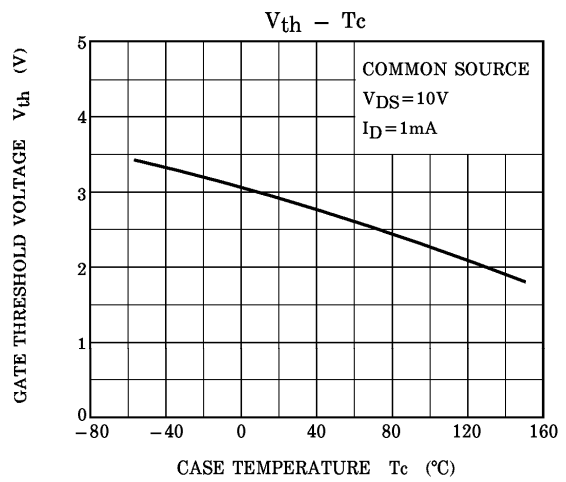
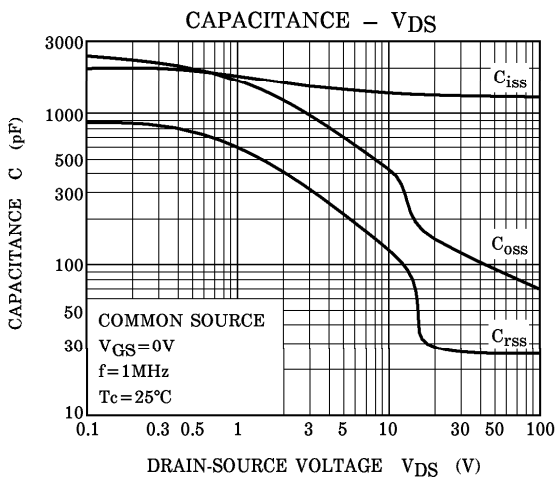
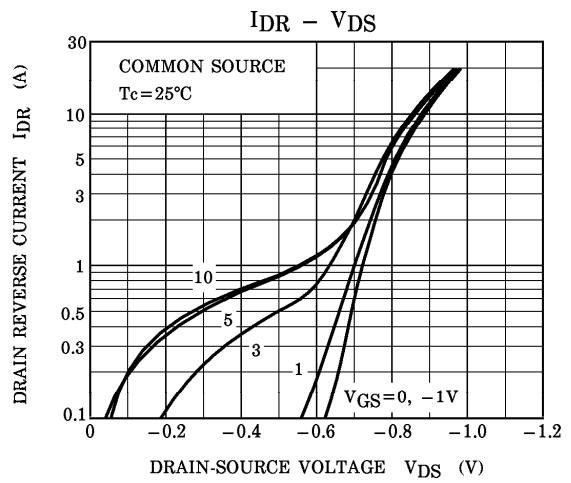
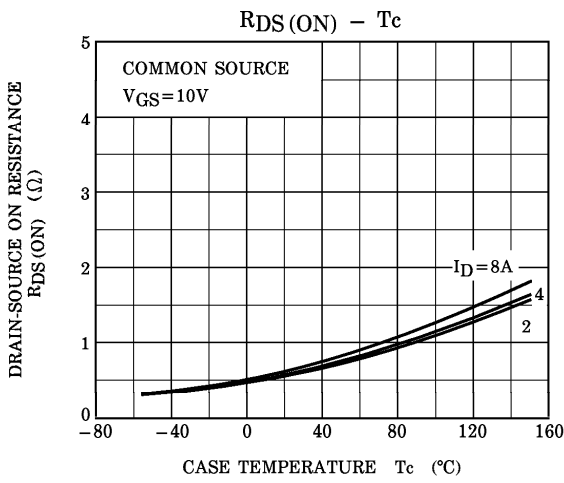


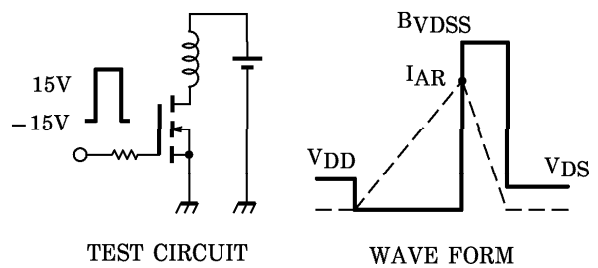
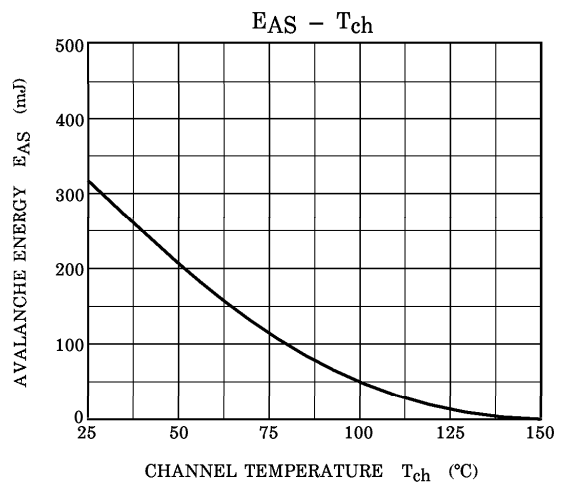
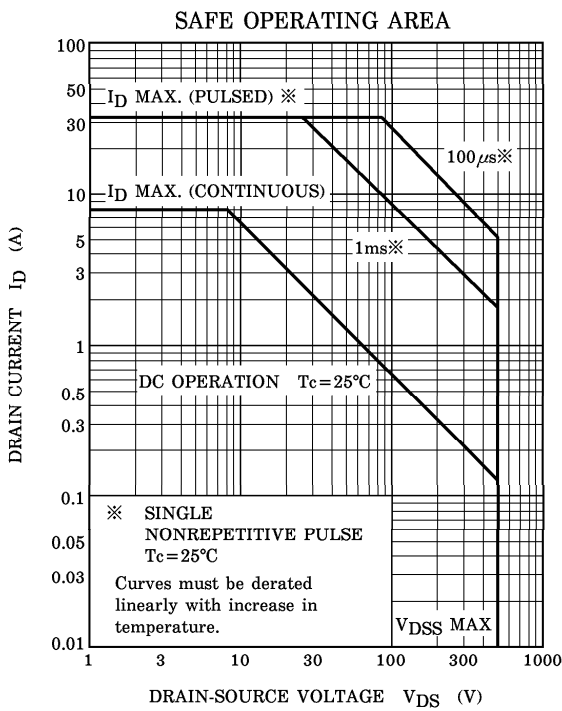
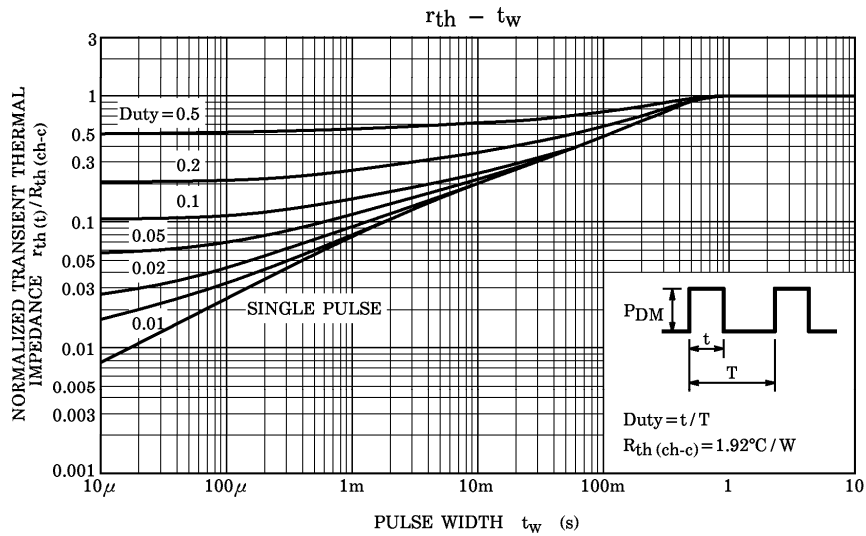
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







Peak  $I_{AR} = 8\text{A}$ ,  $R_G = 25\Omega$   
 $V_{DD} = 90\text{V}$ ,  $L = 8.3\text{mH}$

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