

# TPCS8101

Lithium Ion Battery Applications  
 Portable Equipment Applications  
 Notebook PCs

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 15\text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 12\text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10\text{ }\mu\text{A}$  (max) ( $V_{DS} = -30\text{ V}$ )
- Enhancement-mode:  $V_{th} = -0.8\sim -2.0\text{ V}$  ( $V_{DS} = -10\text{ V}$ ,  $I_D = -1\text{ mA}$ )

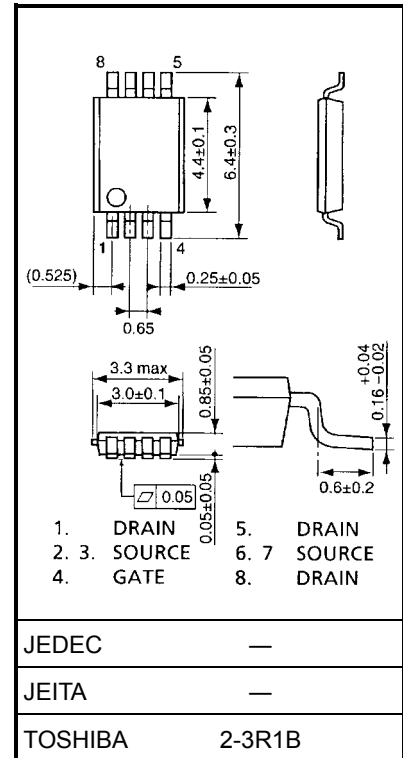
## Maximum Ratings (Ta = 25°C)

| Characteristics                                     |                | Symbol    | Rating     | Unit |
|---|----------------|-----------|------------|------|
| Drain-source voltage                                |                | $V_{DSS}$ | -30        | V    |
| Drain-gate voltage ( $R_{GS} = 20\text{ k}\Omega$ ) |                | $V_{DGR}$ | -30        | V    |
| Gate-source voltage                                 |                | $V_{GSS}$ | $\pm 20$   | V    |
| Drain current                                       | DC (Note 1)    | $I_D$     | -6         | A    |
|   | Pulse (Note 1) | $I_{DP}$  | -24        |      |
| Drain power dissipation (t = 10 s) (Note 2a)        |                | $P_D$     | 1.5        | W    |
| Drain power dissipation (t = 10 s) (Note 2b)        |                | $P_D$     | 0.6        | W    |
| Single pulse avalanche energy (Note 3)              |                | $E_{AS}$  | 46.8       | mJ   |
| Avalanche current                                   |                | $I_{AR}$  | -6         | A    |
| Repetitive avalanche energy (Note 2a, Note 4)       |                | $E_{AR}$  | 0.15       | mJ   |
| Channel temperature                                 |                | $T_{ch}$  | 150        | °C   |
| Storage temperature range                           |                | $T_{stg}$ | -55 to 150 | °C   |

Note: For (Note 1), (Note 2), (Note 3) and (Note 4), please refer to the next page.

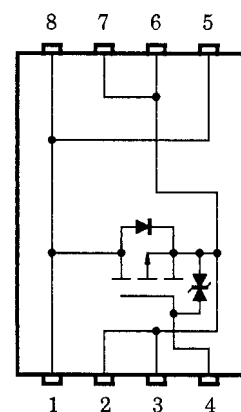
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

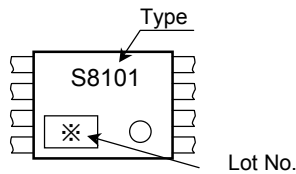
## Circuit Configuration



## Thermal Characteristics

| Characteristics   | Symbol          | Max  | Unit |
|---|-----------------|------|------|
| Thermal resistance, channel to ambient<br>(t = 10 s)<br>(Note 2a) | $R_{th (ch-a)}$ | 83.3 | °C/W |
| Thermal resistance, channel to ambient<br>(t = 10 s)<br>(Note 2b) | $R_{th (ch-a)}$ | 208  | °C/W |

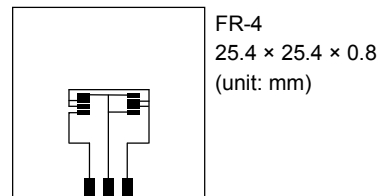
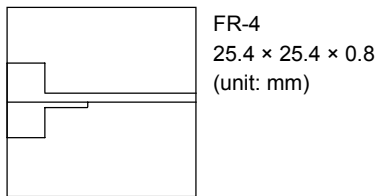
## Marking (Note 5)



Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2:

- a) Device mounted on a glass-epoxy board (a)      b) Device mounted on a glass-epoxy board (b)

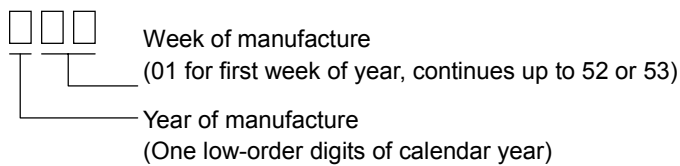


Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -6.0\text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

Note 5: ○ on lower right of the marking indicates Pin 1.

※ Weekly code: (Three digits)

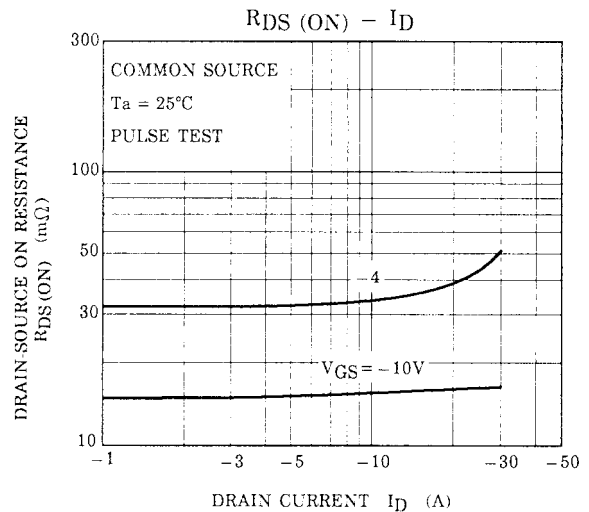
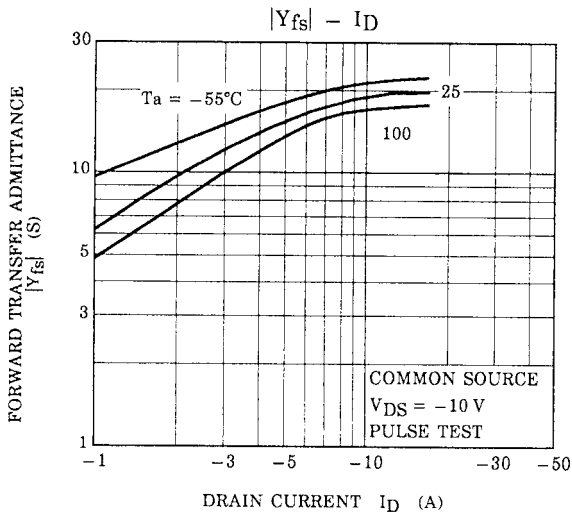
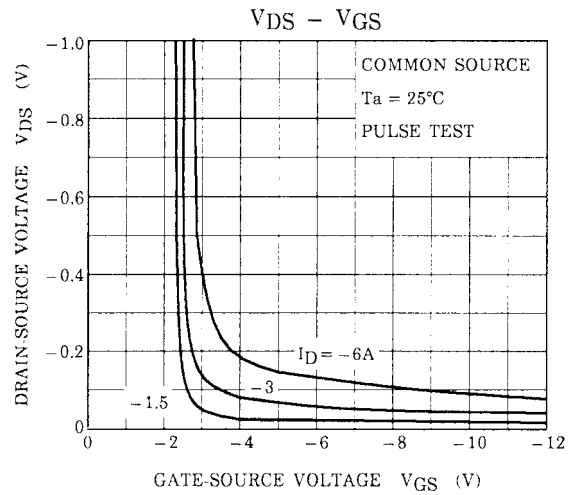
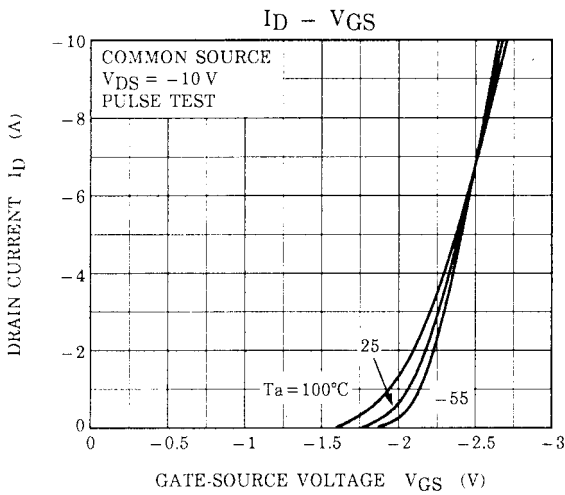
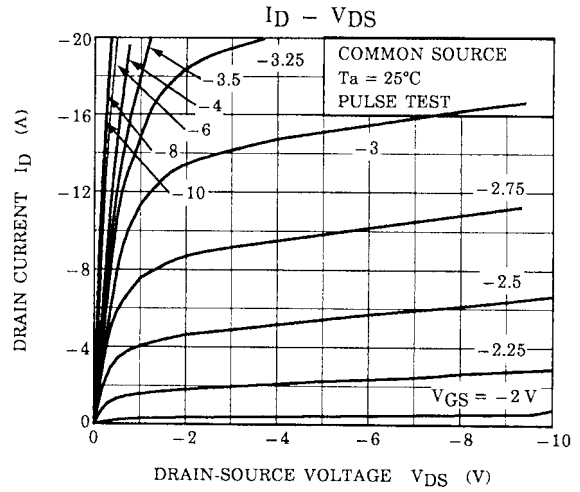
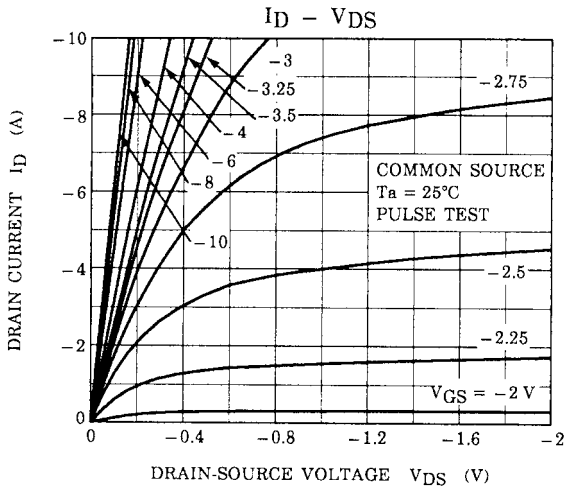


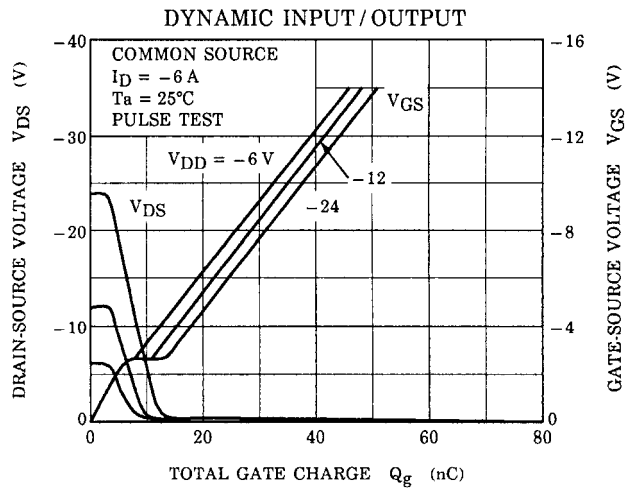
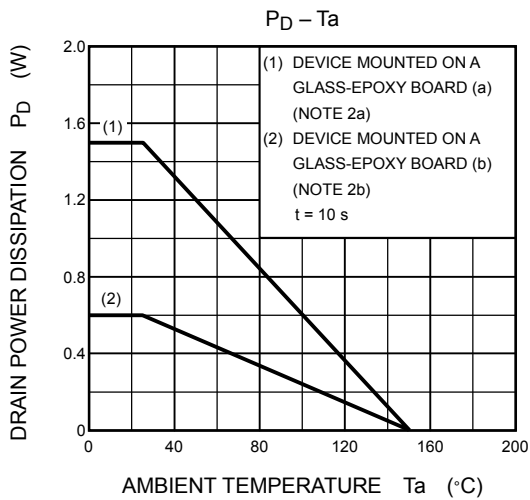
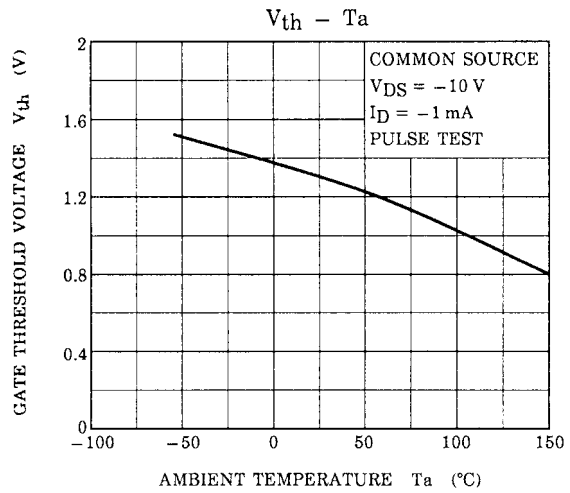
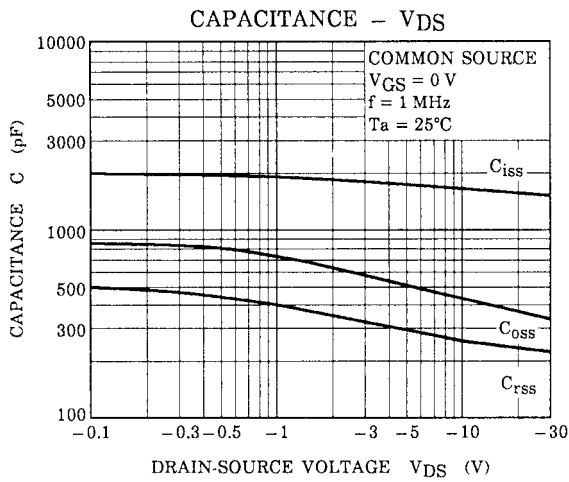
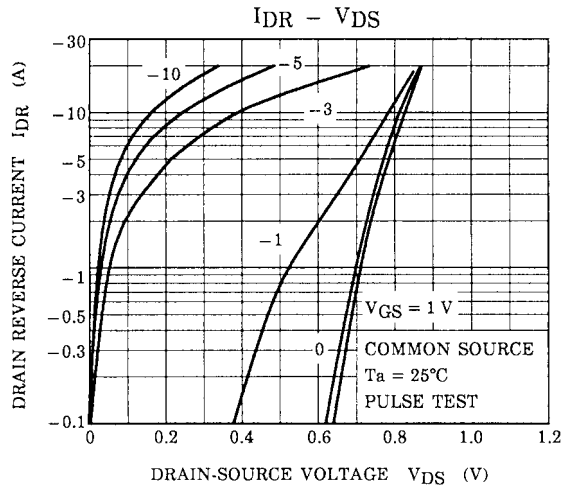
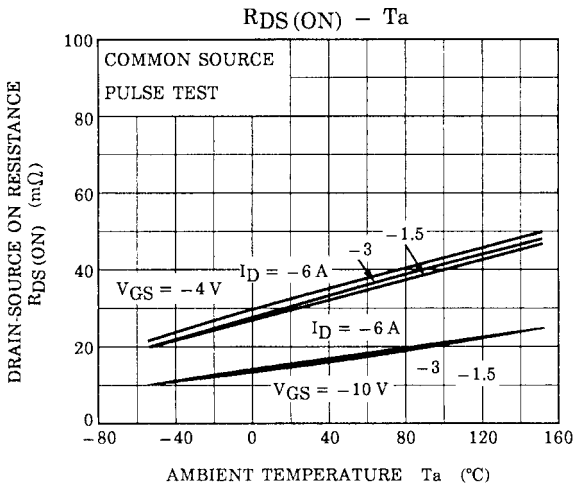
## Electrical Characteristics (Ta = 25°C)

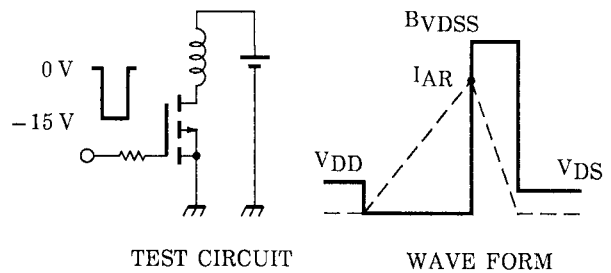
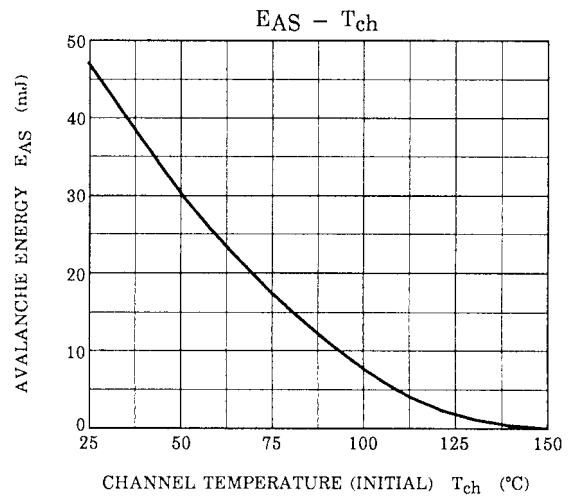
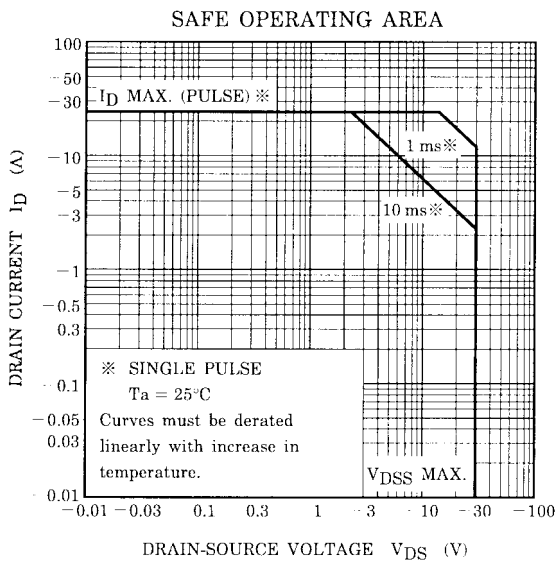
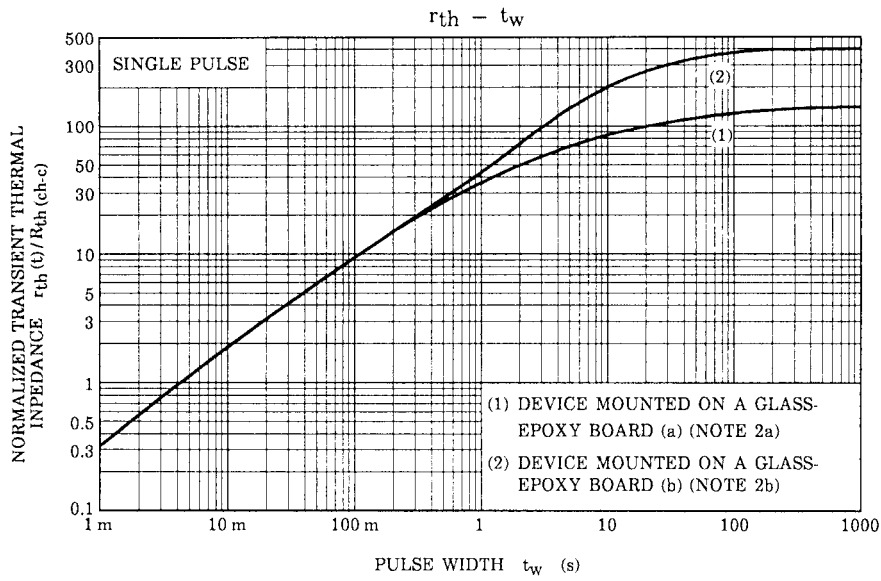
| Characteristics                                 |               | Symbol        | Test Condition  | Min  | Typ. | Max      | Unit          |
|---|---------------|---------------|---|------|------|----------|---------------|
| Gate leakage current                            |               | $I_{GSS}$     | $V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$   | —    | —    | $\pm 10$ | $\mu\text{A}$ |
| Drain cut-OFF current                           |               | $I_{DSS}$     | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$  | —    | —    | -10      | $\mu\text{A}$ |
| Drain-source breakdown voltage                  |               | $V_{(BR)DSS}$ | $I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$  | -30  | —    | —        | V             |
|   |               | $V_{(BR)DSX}$ | $I_D = -10\text{ mA}, V_{GS} = 20\text{ V}$   | -15  | —    | —        |               |
| Gate threshold voltage                          |               | $V_{th}$      | $V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$   | -0.8 | —    | -2.0     | V             |
| Drain-source ON resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = -4\text{ V}, I_D = -3\text{ A}$   | —    | 32   | 40       | m $\Omega$    |
|   |               | $R_{DS(ON)}$  | $V_{GS} = -10\text{ V}, I_D = -3\text{ A}$  | —    | 15   | 25       |               |
| Forward transfer admittance                     |               | $ Y_{fs} $    | $V_{DS} = -10\text{ V}, I_D = -3\text{ A}$  | 6    | 12   | —        | S             |
| Input capacitance                               |               | $C_{iss}$     | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$  | —    | 1810 | —        | pF            |
| Reverse transfer capacitance                    |               | $C_{rss}$     |   | —    | 350  | —        | pF            |
| Output capacitance                              |               | $C_{oss}$     |   | —    | 610  | —        | pF            |
| Switching time                                  | Rise time     | $t_r$         | <p><math>I_D = -3\text{ A}</math><br/><math>V_{GS} = 0\text{ V}</math><br/><math>V_{GS} = -10\text{ V}</math><br/><math>V_{OUT}</math><br/><math>R_L = 5\ \Omega</math><br/><math>V_{DD} = -15\text{ V}</math><br/>Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p> | —    | 9    | —        | ns            |
|   | Turn-ON time  | $t_{on}$      |   | —    | 15   | —        |               |
|   | Fall time     | $t_f$         |   | —    | 49   | —        |               |
|   | Turn-OFF time | $t_{off}$     |   | —    | 135  | —        |               |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -6\text{ A}$   | —    | 37   | —        | nC            |
| Gate-source charge                              |               | $Q_{gs}$      |   | —    | 30   | —        | nC            |
| Gate-drain ("miller") charge                    |               | $Q_{gd}$      |   | —    | 7    | —        | nC            |

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

| Characteristics         |                | Symbol    | Test Condition                              | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|---|-----|------|-----|------|
| Drain reverse current   | Pulse (Note 1) | $I_{DRP}$ | —   | —   | —    | -24 | A    |
| Forward voltage (diode) |                | $V_{DSF}$ | $I_{DR} = -6\text{ A}, V_{GS} = 0\text{ V}$ | —   | —    | 1.2 | V    |







$T_{ch} = 25^\circ\text{C}$  (Initial)  
 Peak  $I_{AR} = -6\text{ A}$ ,  $R_G = 25\ \Omega$   $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BV_{DSS}}{BV_{DSS} - V_{DD}} \right)$   
 $V_{DD} = -16\text{ V}$ ,  $L = 1.0\text{ mH}$

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