

TOSHIBA Field Effect Transistor with Built-in Schottky Barrier Diode
Silicon N-Channel MOS Type (U-MOS V-H)

TPC8A03-H

High Efficiency DC-DC Converter Applications
Notebook PC Applications
Portable Equipment Applications

- Built-in schottky barrier diode
Low forward voltage: $V_{DSF} = -0.6\text{ V}$ (max)
- High-speed switching
- Small gate charge: $Q_{SW} = 8.4\text{ nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 4.1\text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 54\text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100\text{ }\mu\text{A}$ (max) ($V_{DS} = 30\text{ V}$)
- Enhancement mode: $V_{th} = 1.3\text{ to }2.3\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

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

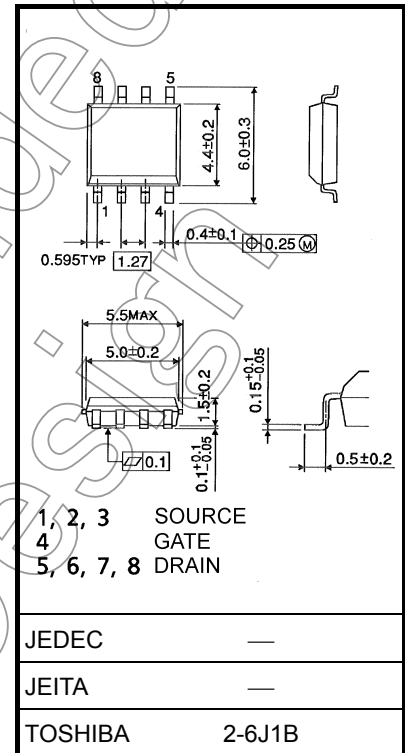
| Characteristic | | Symbol | Rating | Unit |
|--|-----------------|-----------|------------|------------------|
| Drain-source voltage | | V_{DSS} | 30 | V |
| Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$) | | V_{DGR} | 30 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | 17 | A |
| | Pulsed (Note 1) | I_{DP} | 68 | |
| Drain power dissipation ($t = 10\text{ s}$) (Note 2a) | | P_D | 1.9 | W |
| Drain power dissipation ($t = 10\text{ s}$) (Note 2b) | | P_D | 1.0 | W |
| Single-pulse avalanche energy (Note 3) | | E_{AS} | 188 | mJ |
| Avalanche current | | I_{AR} | 17 | A |
| Repetitive avalanche energy ($T_c = 25^\circ\text{C}$) (Note 4) | | E_{AR} | 0.108 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

Note: For Notes 1 to 4, refer to the next page.

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).

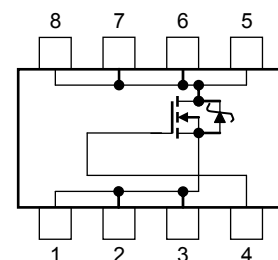
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.085g (typ.)

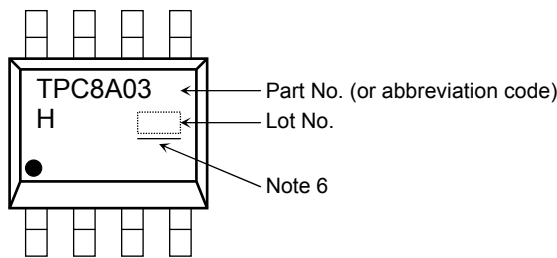
Circuit Configuration



Thermal Characteristics

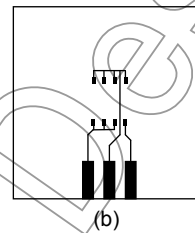
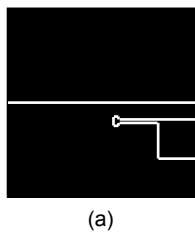
| Characteristic | Symbol | Max | Unit |
|--|-----------------|------|------|
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th} (ch-a)$ | 65.8 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b) | $R_{th} (ch-a)$ | 125 | °C/W |

Marking (Note 5)



Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)

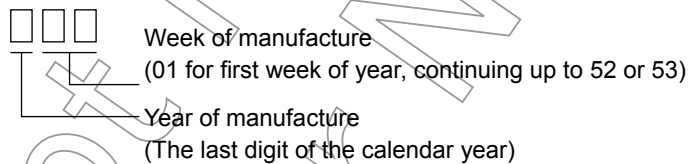


Note 3: $V_{DD} = 24 V$, $T_{ch} = 25^{\circ}C$ (initial), $L = 0.5 mH$, $R_G = 25 \Omega$, $I_{AR} = 17 A$

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

Note 5:

* Weekly code: (Three digits)



Note 6: A line under a Lot No. identifies the indication of product Labels.

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

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

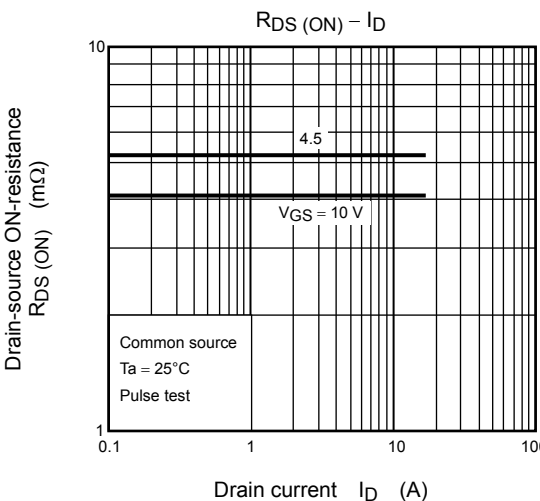
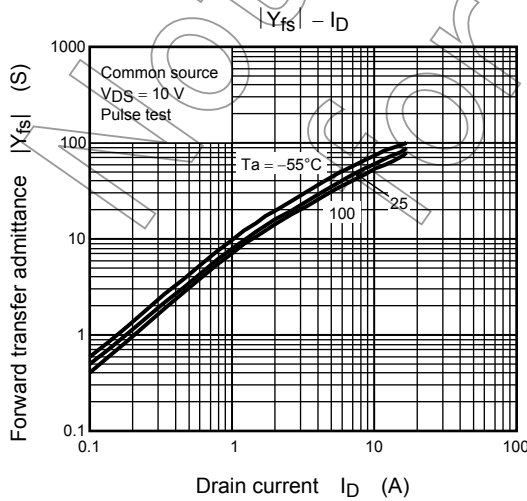
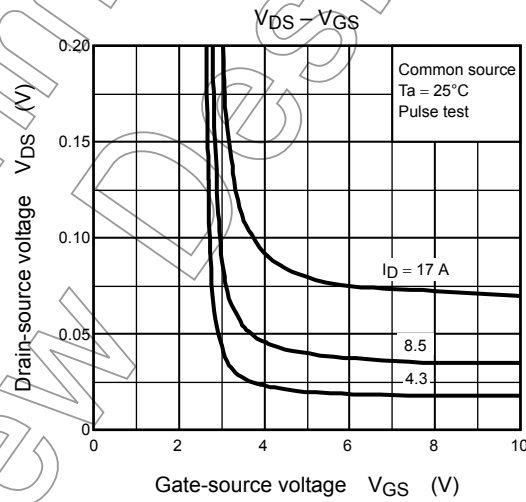
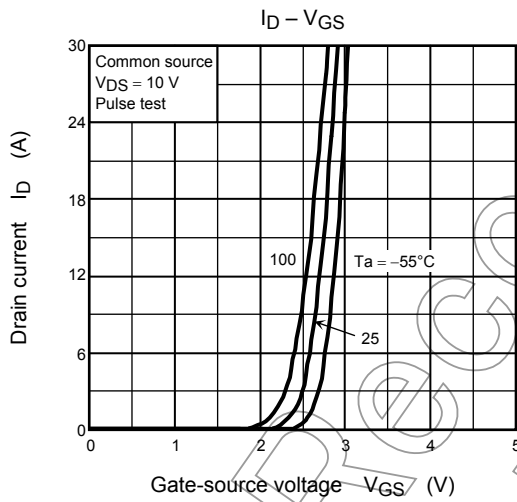
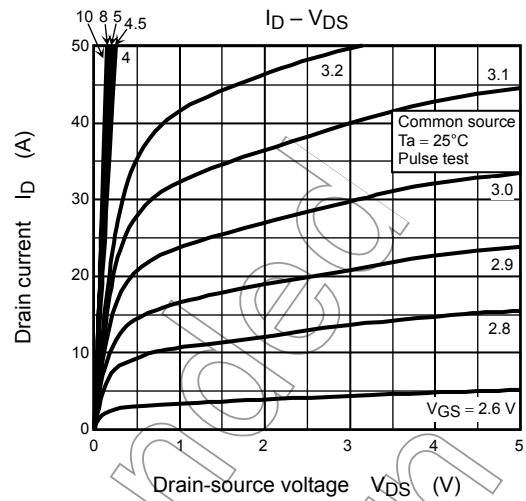
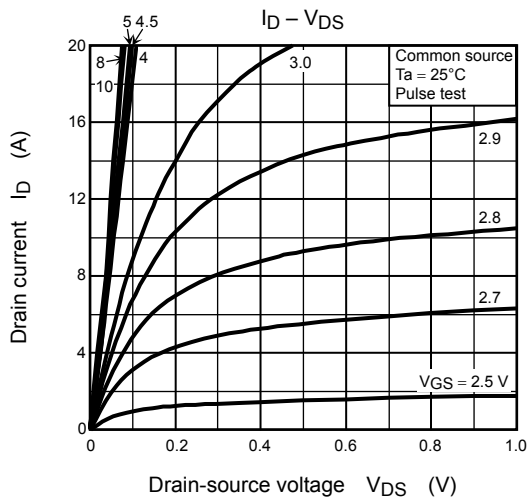
Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

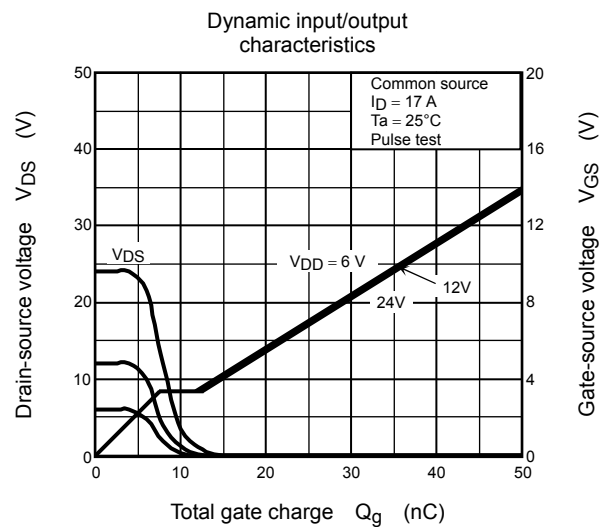
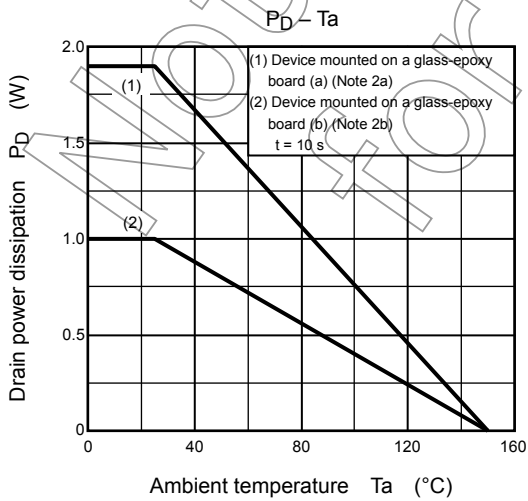
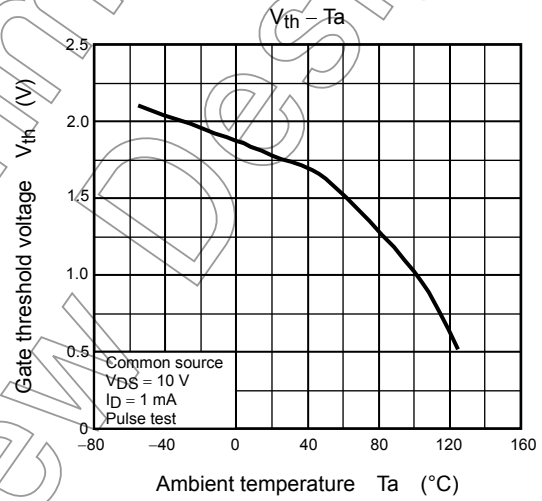
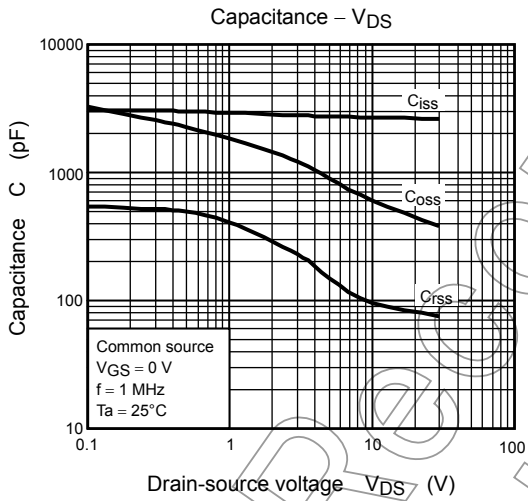
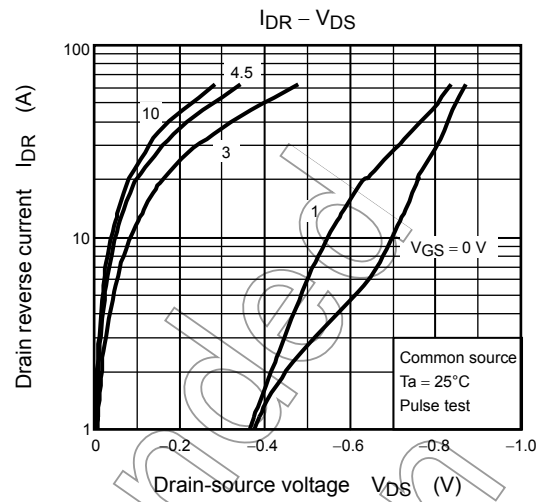
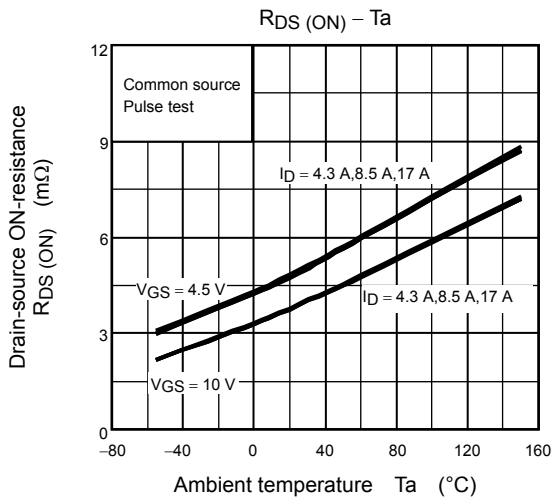
Electrical Characteristics (Ta = 25°C)

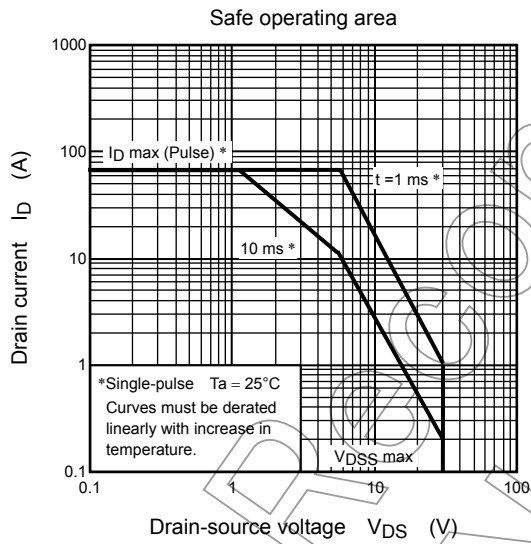
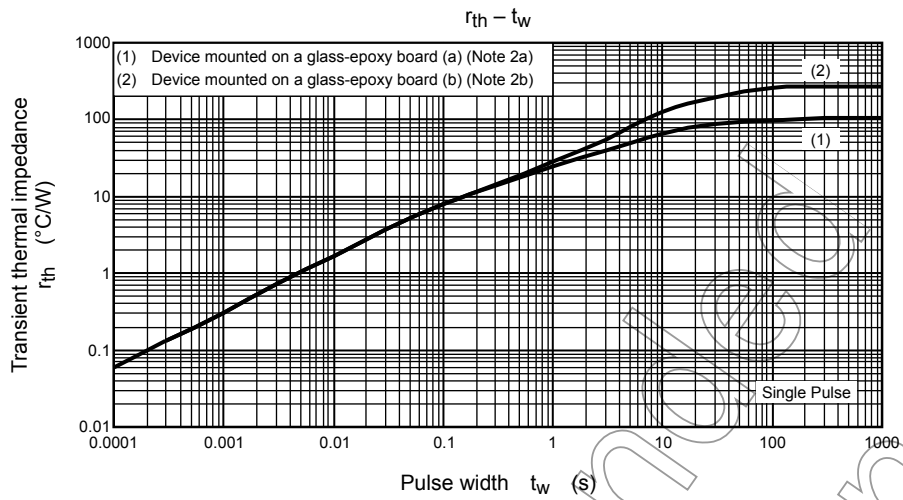
| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|---------------|---|-----|------|-----------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 100 | nA |
| Drain cut-off current | | I_{DSS} | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 100 | μA |
| 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} | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 1.3 | — | 2.3 | V |
| Drain-source ON-resistance | | $R_{DS(ON)}$ | $V_{GS} = 4.5\text{ V}, I_D = 8.5\text{ A}$ | — | 5.1 | 7.0 | m Ω |
| | | | $V_{GS} = 10\text{ V}, I_D = 8.5\text{ A}$ | — | 4.1 | 5.6 | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10\text{ V}, I_D = 8.5\text{ A}$ | 27 | 54 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 2640 | 3430 | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 100 | 150 | |
| Output capacitance | | C_{oss} | | — | 610 | — | |
| Gate resistance | | r_g | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 5\text{ MHz}$ | — | 1.0 | 1.5 | Ω |
| Switching time | Rise time | t_r | | — | 3.6 | — | ns |
| | Turn-on time | t_{on} | | — | 11.0 | — | |
| | Fall time | t_f | | — | 7.2 | — | |
| | Turn-off time | t_{off} | | — | 42 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} \approx 24\text{ V}, V_{GS} \approx 10\text{ V}, I_D = 17\text{ A}$ | — | 36 | — | nC |
| | | | $V_{DD} \approx 24\text{ V}, V_{GS} = 5\text{ V}, I_D = 17\text{ A}$ | — | 19 | — | |
| Gate-source charge 1 | | Q_{gs1} | | — | 7.6 | — | |
| Gate-drain ("Miller") charge | | Q_{gd} | $V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 17\text{ A}$ | — | 5.0 | — | |
| Gate switch charge | | Q_{sw} | | — | 8.4 | — | |

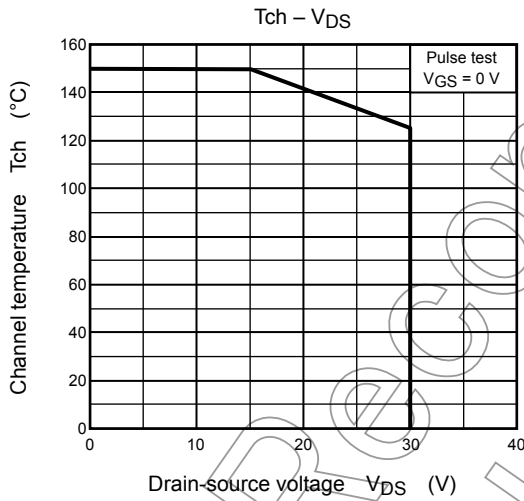
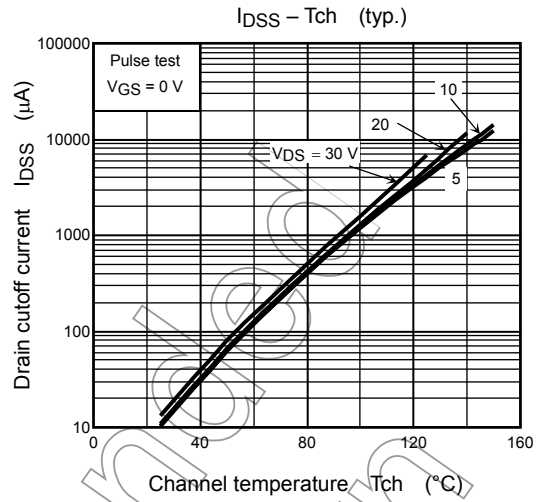
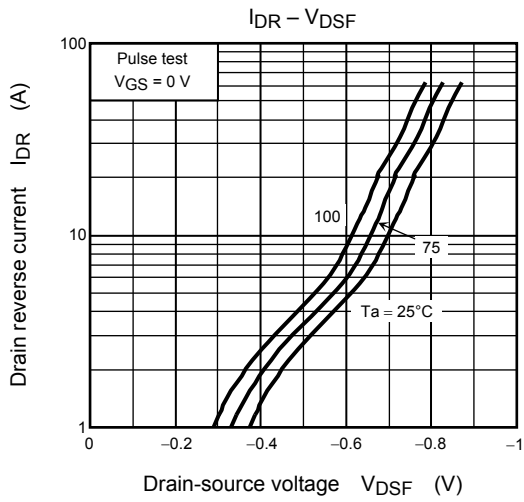
Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|---|-----|------|------|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | 68 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = 1\text{ A}, V_{GS} = 0\text{ V}$ | — | -0.4 | -0.6 | V |
| | | | $I_{DR} = 17\text{ A}, V_{GS} = 0\text{ V}$ | — | — | -1.2 | V |









Not for New Design

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