

TPCC8105

Lithium Ion Battery Applications
Power Management Switch Applications

- Small footprint due to a small and thin package
- Low drain-source ON-resistance:
 $R_{DS(ON)} = 6.0 \text{ m}\Omega$ (typ.) ($V_{GS} = -10 \text{ V}$)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -30 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8$ to -2.0 V ($V_{DS} = -10 \text{ V}$, $I_D = -0.5 \text{ mA}$)

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

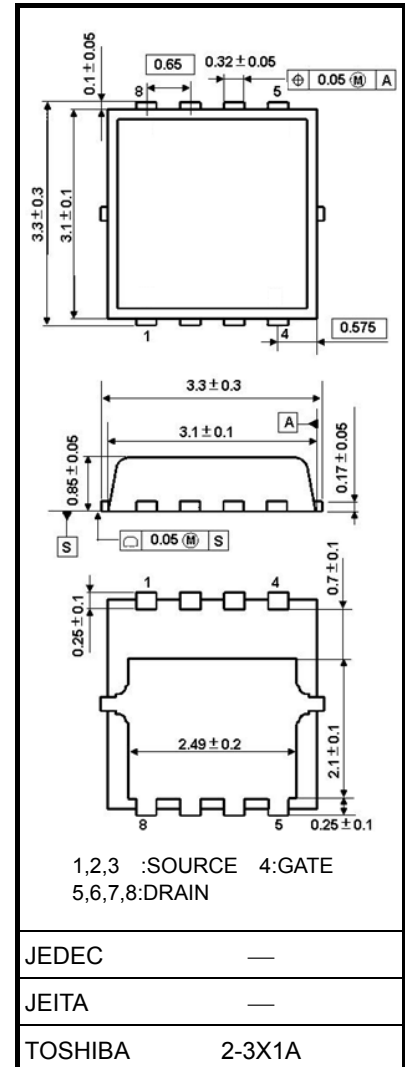
| Characteristic | Symbol | Rating | Unit |
|--|-----------------|------------|------------------|
| Drain-source voltage | V_{DSS} | -30 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | V_{DGR} | -30 | V |
| Gate-source voltage | V_{GSS} | -25/+20 | V |
| Drain current | DC (Note 1) | I_D | -23 |
| | Pulsed (Note 1) | I_{DP} | -69 |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | P_D | 30 | W |
| 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 | 0.7 | W |
| Single-pulse avalanche energy (Note 3) | E_{AS} | 138 | mJ |
| Avalanche current | I_{AR} | -23 | A |
| 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).

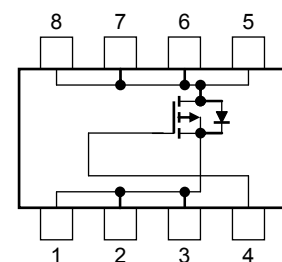
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.02 g (typ.)

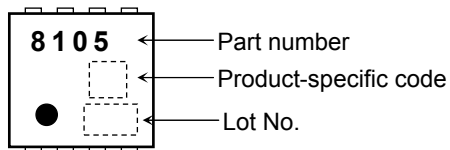
Circuit Configuration



Thermal Characteristics

| Characteristic | Symbol | Max | Unit |
|---|----------------|------|--------------------|
| Thermal resistance, channel to case ($T_c = 25^\circ\text{C}$) | $R_{th(ch-c)}$ | 4.16 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a) | $R_{th(ch-a)}$ | 65.7 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b) | $R_{th(ch-a)}$ | 178 | $^\circ\text{C/W}$ |

Marking

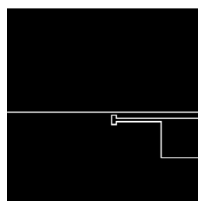


Note 1: Ensure that the channel temperature does not exceed 150°C .

Note 2

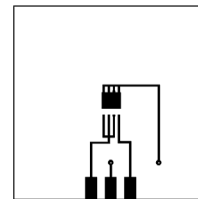
a: Device mounted on a glass-epoxy board (a)

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



(a)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

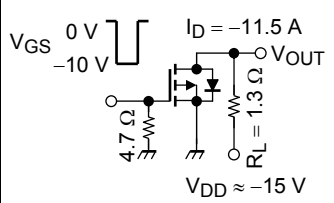


(b)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 200\ \mu\text{H}$, $R_G = 1\ \Omega$, $I_{AR} = -23\text{ A}$

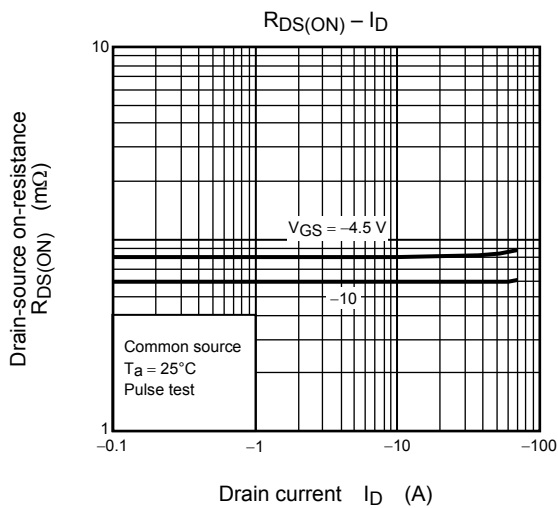
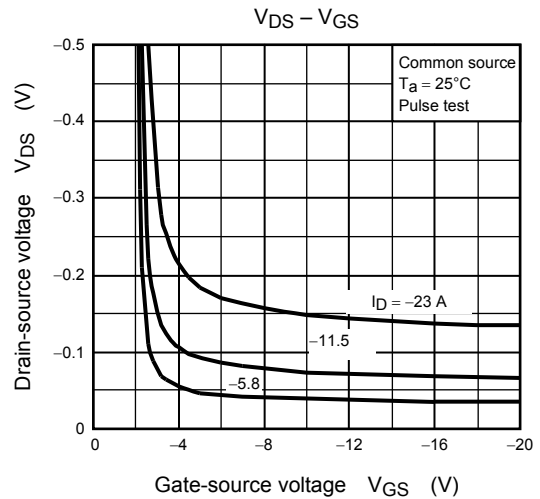
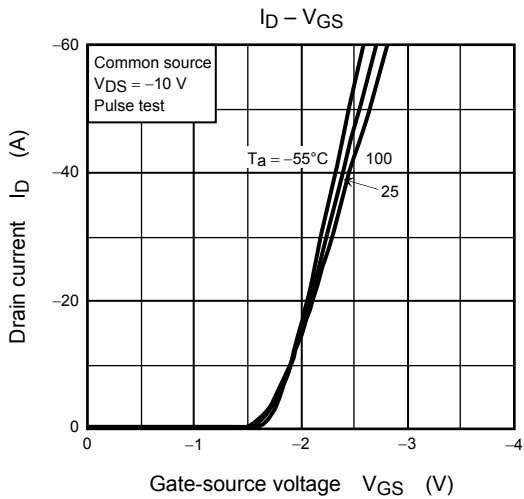
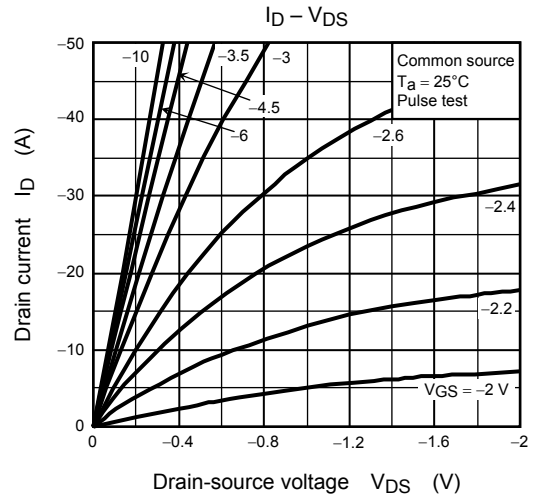
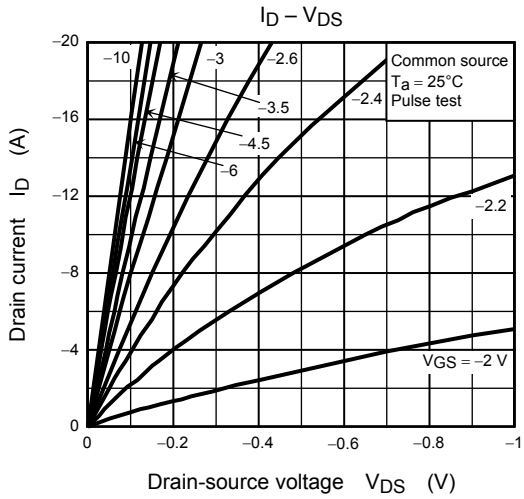
Electrical Characteristics (T_a = 25°C)

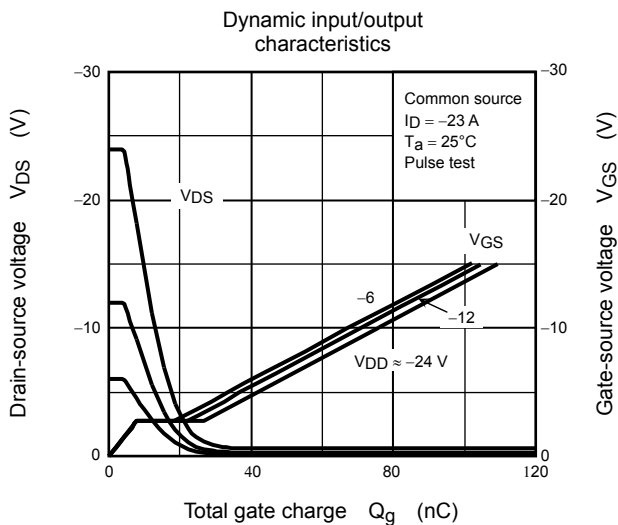
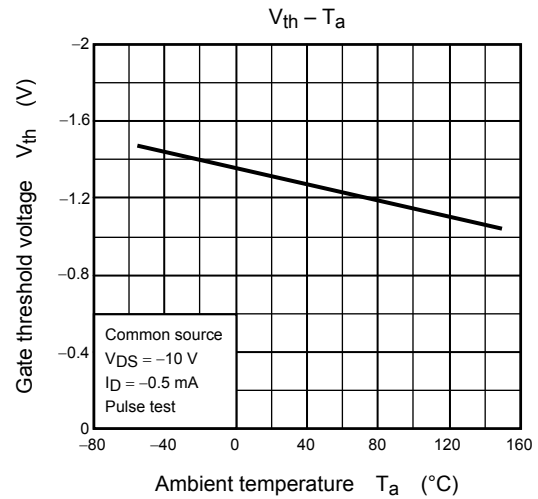
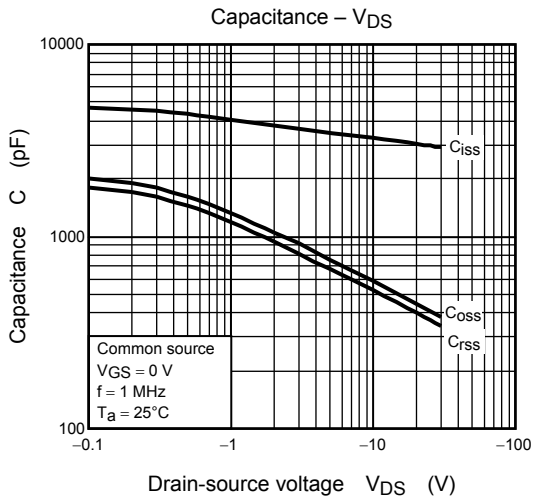
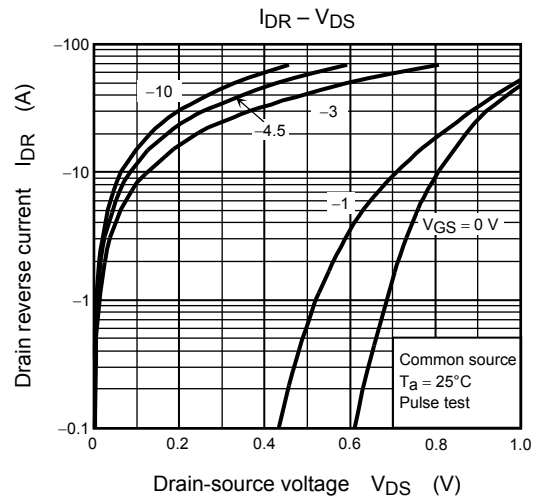
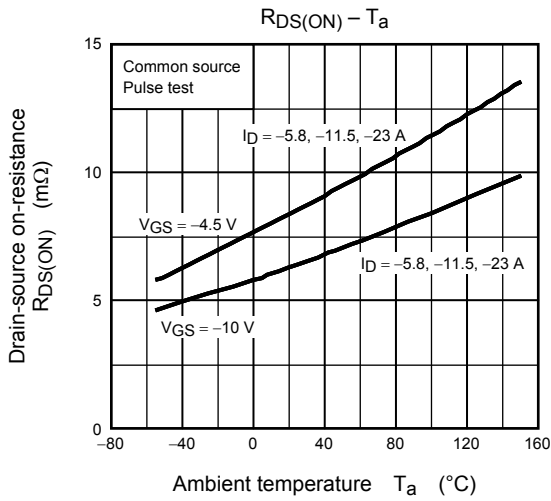
| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|----------------------|--|-----------------------------------|------|------|------|
| Gate leakage current | | I _{GSS} | V _{GS} = ±20 V, V _{DS} = 0 V | — | — | ±100 | nA |
| Drain cutoff current | | I _{DSS} | V _{DS} = -30 V, V _{GS} = 0 V | — | — | -10 | μA |
| Drain-source breakdown voltage | | V _{(BR)DSS} | I _D = -10 mA, V _{GS} = 0 V | -30 | — | — | V |
| | | V _{(BR)DSX} | I _D = -10 mA, V _{GS} = 10 V (Note 4) | -21 | — | — | |
| Gate threshold voltage | | V _{th} | V _{DS} = -10 V, I _D = -0.5 mA | -0.8 | — | -2.0 | V |
| Drain-source on-resistance | | R _{DS(ON)} | V _{GS} = -4.5 V, I _D = -11.5 A | — | 8 | 10.4 | mΩ |
| | | | V _{GS} = -10 V, I _D = -11.5 A | — | 6 | 7.8 | |
| Input capacitance | | C _{iss} | V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz | — | 3240 | — | pF |
| Reverse transfer capacitance | | C _{rss} | | — | 520 | — | |
| Output capacitance | | C _{oss} | | — | 580 | — | |
| Switching time | Rise time | t _r |  | — | 8 | — | ns |
| | Turn-on time | t _{on} | | — | 14 | — | |
| | Fall time | t _f | | — | 110 | — | |
| | Turn-off time | t _{off} | | Duty ≤ 1%, t _w = 10 μs | — | 330 | |
| Total gate charge (gate-source plus gate-drain) | | Q _g | V _{DD} ≈ -24 V, V _{GS} = -10 V, I _D = -23 A | — | 76 | — | nC |
| Gate-source charge 1 | | Q _{gs1} | | — | 7.6 | — | |
| Gate-drain ("Miller") charge | | Q _{gd} | | — | 20 | — | |

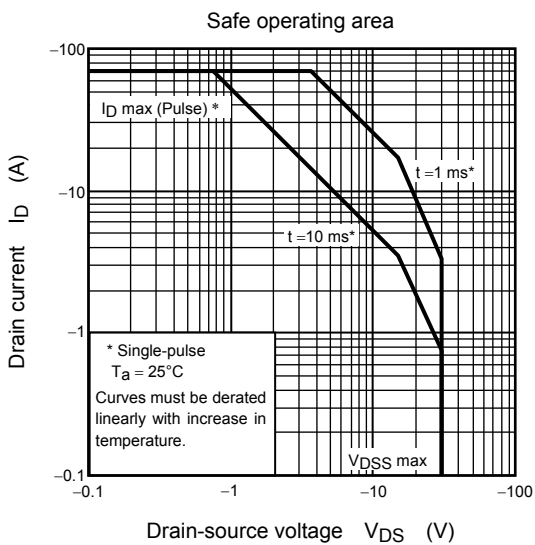
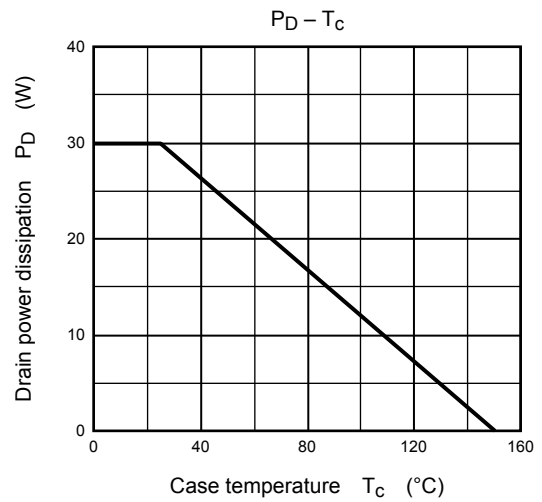
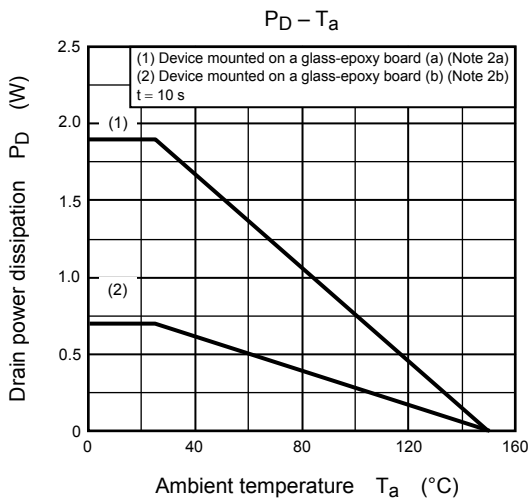
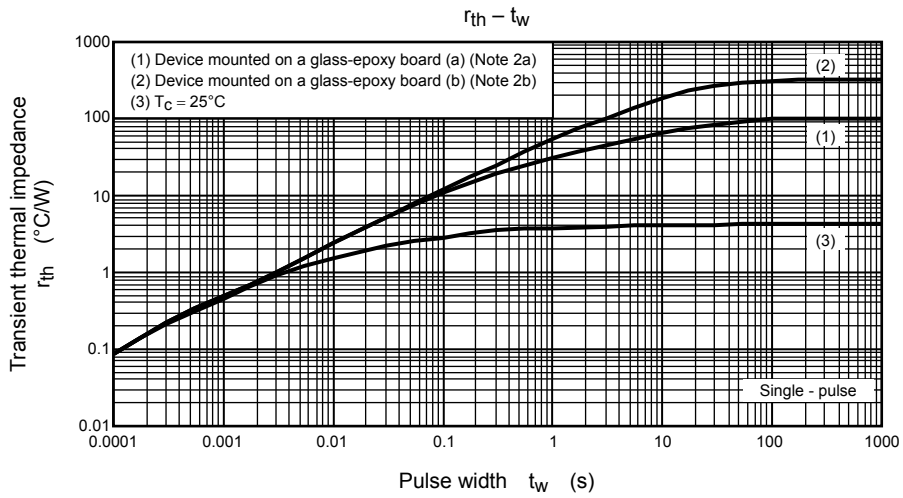
Source-Drain Ratings and Characteristics (T_a = 25°C)

| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|------------------|--|-----|------|-----|------|
| Drain reverse current | Pulse (Note 1) | I _{DRP} | — | — | — | -69 | A |
| Forward voltage (diode) | | V _{DSF} | I _{DR} = -23 A, V _{GS} = 0 V | — | — | 1.2 | V |

Note 4: V_{DSX} mode (the application of a plus voltage between gate and source) may cause decrease in maximum rating of drain-source voltage.







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