

TPCS8209

Lithium Ion Battery Applications

Note Book PC

Portable Machines and Tools

- Has a small footprint.
- Low drain-source ON resistance: $R_{DS(ON)} = 19 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 9.2 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 20 \text{ V}$)
- Enhancement-mode: $V_{th} = 0.5 \sim 1.2 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 200 \text{ }\mu\text{A}$)

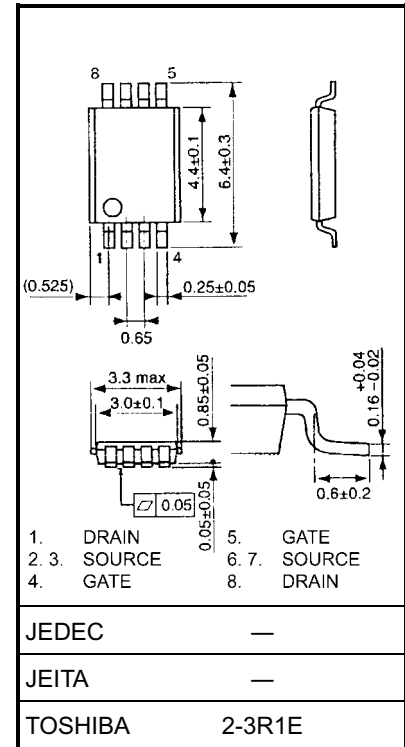
Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | | Symbol | Rating | Unit |
|--|---|-----------|----------------|------------------|
| Drain-source voltage | | V_{DSS} | 20 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | 20 | V |
| Gate-source voltage | | V_{GSS} | ± 12 | V |
| Drain current | DC (Note 1) | I_D | 5 | A |
| | Pulse (Note 1) | I_{DP} | 20 | |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2a) | Single-device operation (Note 3a) | P_D (1) | 1.1 | W |
| | Single-device value at dual operation (Note 3b) | P_D (2) | 0.75 | |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2b) | Single-device operation (Note 3a) | P_D (1) | 0.6 | W |
| | Single-device value at dual operation (Note 3b) | P_D (2) | 0.35 | |
| Single pulse avalanche energy (Note 4) | | E_{AS} | 32.5 | mJ |
| Avalanche current | | I_{AR} | 5 | A |
| Repetitive avalanche energy Single-device value at dual operation (Note 2a, 3b, 5) | | E_{AR} | 0.075 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | $-55 \sim 150$ | $^\circ\text{C}$ |

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5) Please see next page.

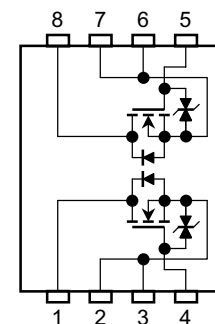
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

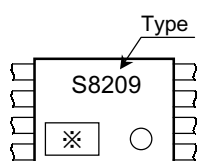
Circuit Configuration



Thermal Characteristics

| Characteristics | | Symbol | Max | Unit |
|--|---|-------------------|-----|------|
| Thermal resistance, channel to ambient (t = 10 s) | Single-device operation (Note 3a) | $R_{th(ch-a)}(1)$ | 114 | °C/W |
| | Single-device value at dual operation (Note 3b) | $R_{th(ch-a)}(2)$ | 167 | |
| Thermal resistance, channel to ambient (t = 10 s) | Single-device operation (Note 3a) | $R_{th(ch-a)}(1)$ | 208 | °C/W |
| | Single-device value at dual operation (Note 3b) | $R_{th(ch-a)}(2)$ | 357 | |

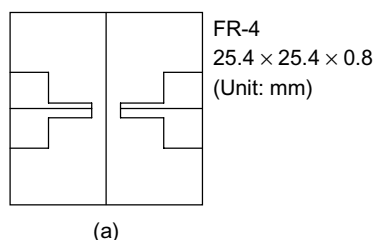
Marking (Note 6)



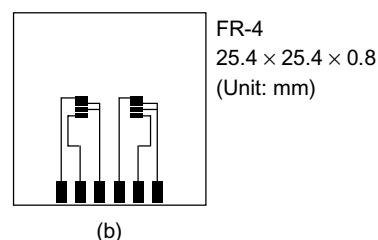
Note 1: The channel temperature should not exceed 150°C.

Note 2:

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



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



Note 3:

- The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.).
- The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.).

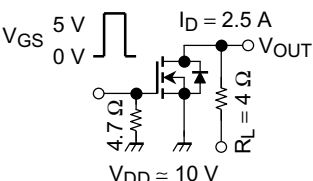
Note 4: $V_{DD} = 16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 5\text{ A}$

Note 5: Repetitive rating; pulse width limited by max channel temperature.

Note 6: o on lower right of the marking indicates Pin 1.

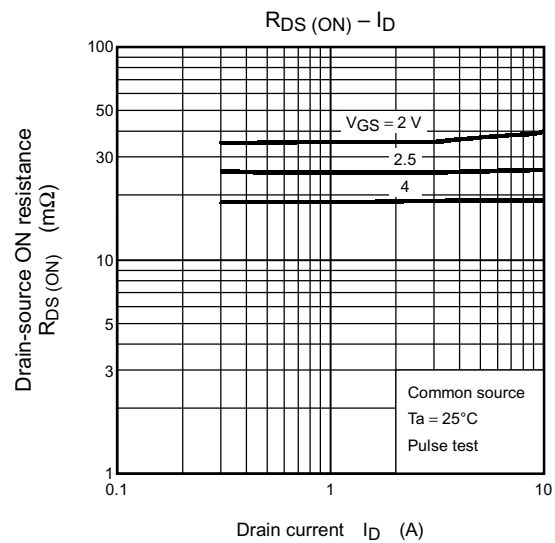
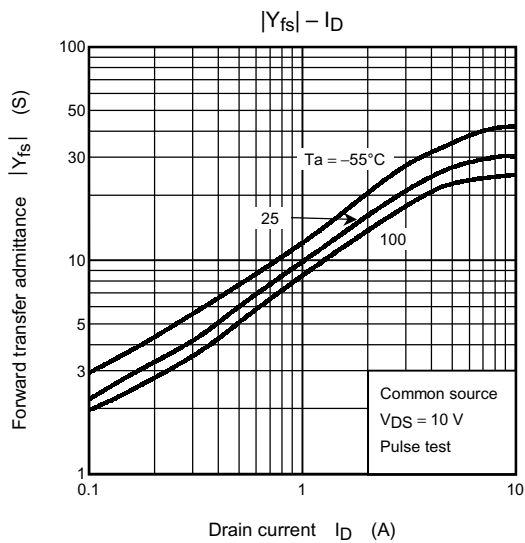
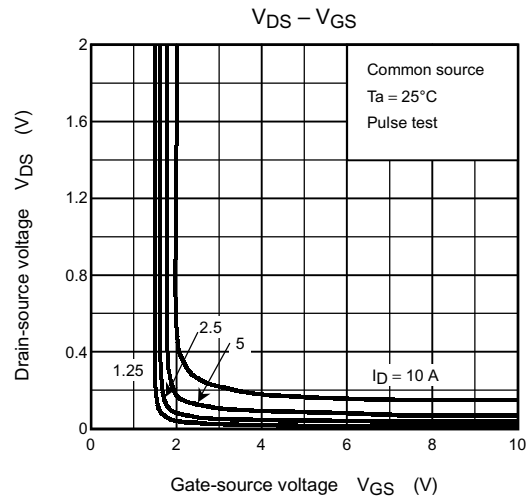
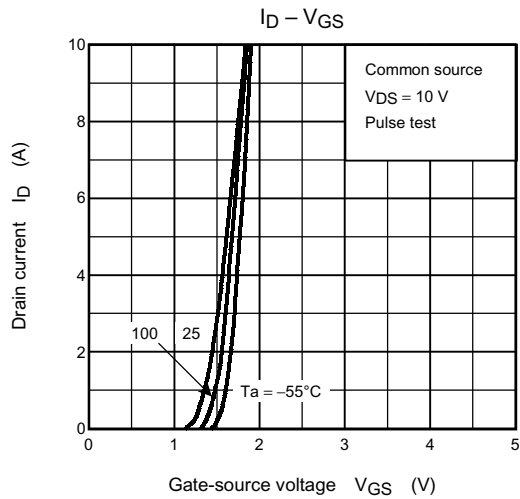
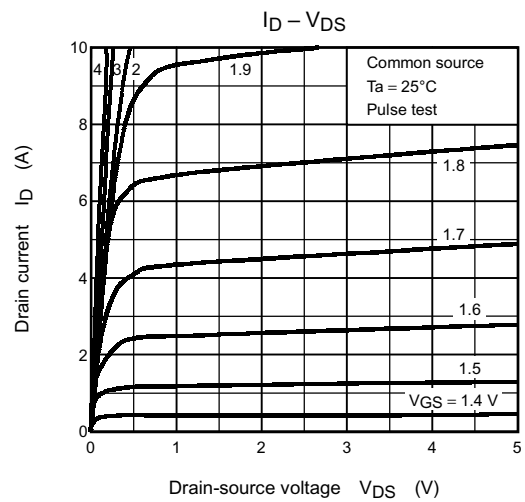
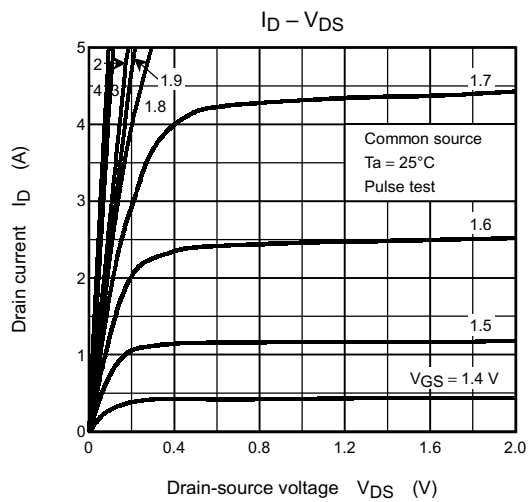
* shows lot number. (Year of manufacture: last decimal digit of the year of manufacture, Month of manufacture: January to December are denoted by letters A to L respectively)

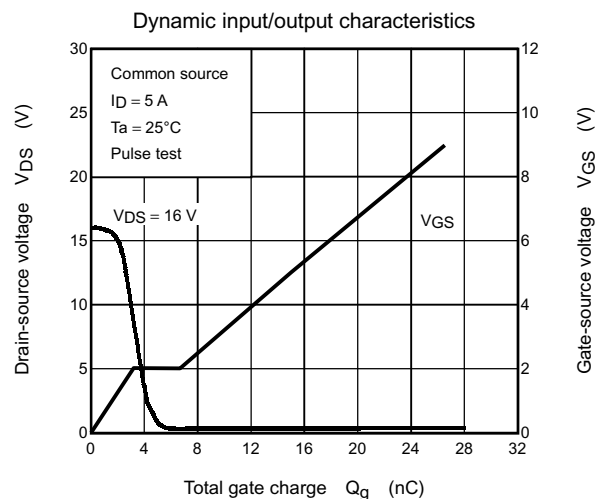
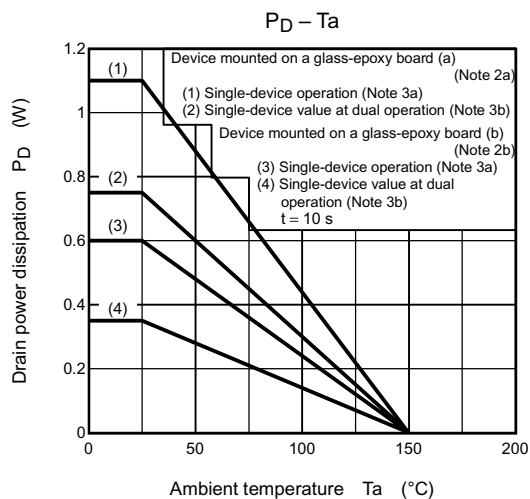
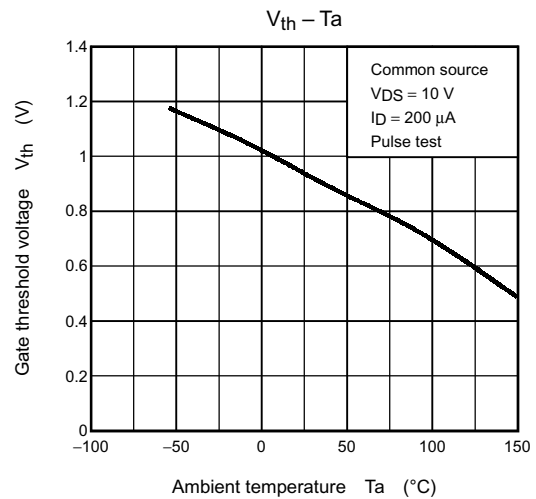
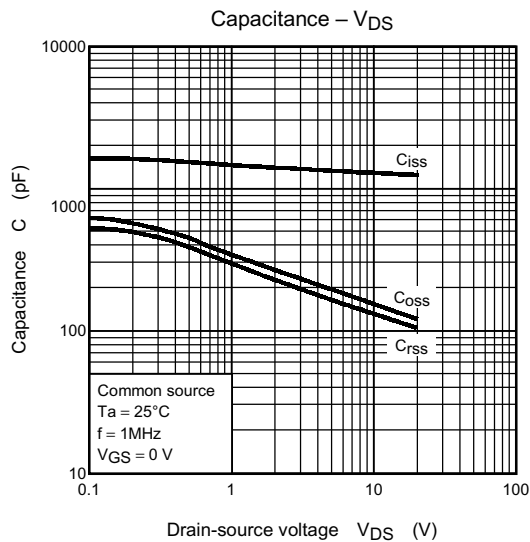
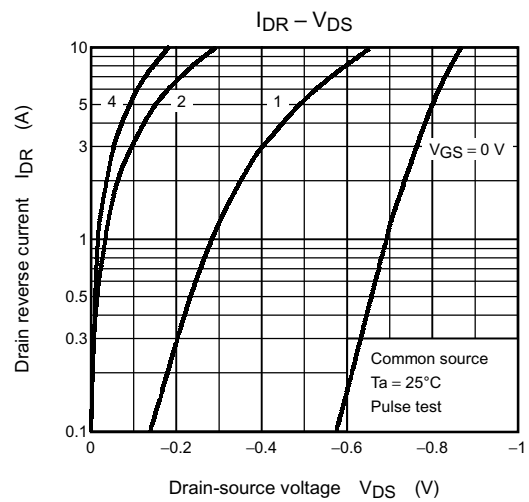
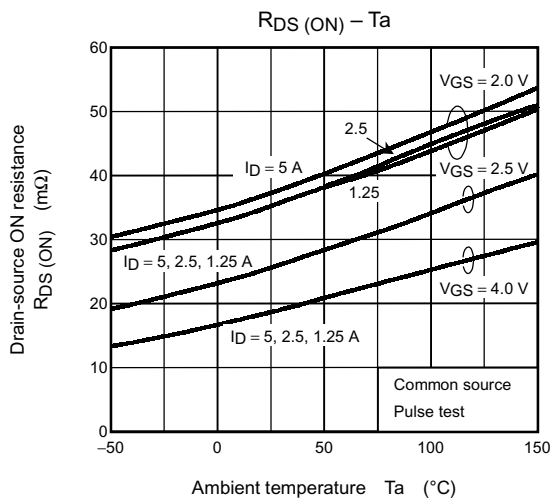
Electrical Characteristics (Ta = 25°C)

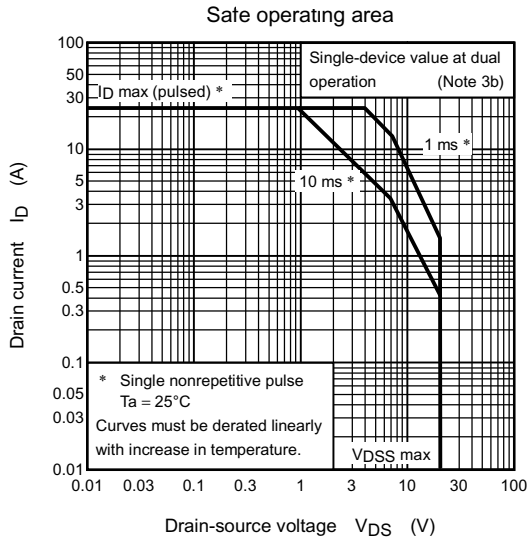
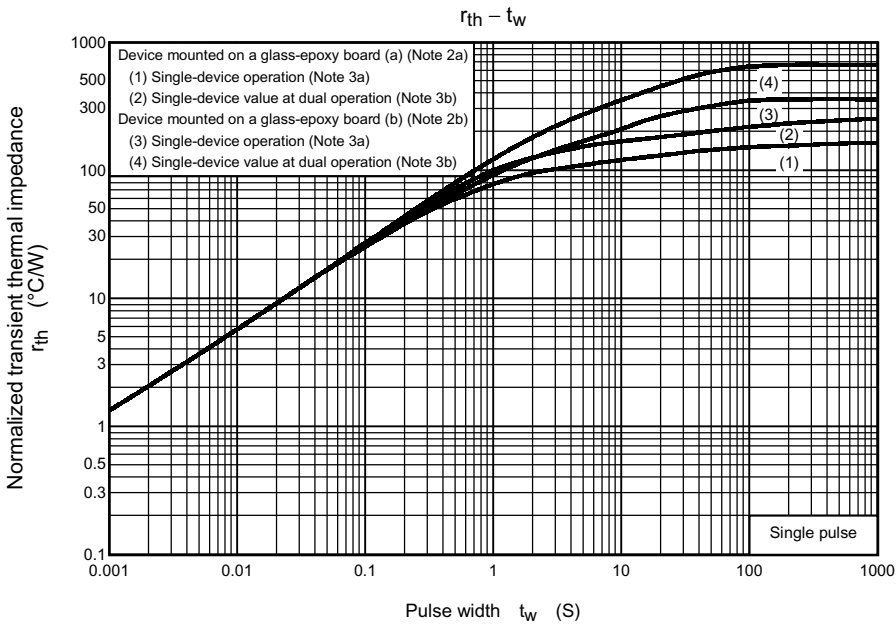
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|-----------------------|---|-----|------|-----|------|
| Gate leakage current | | I _{GSS} | V _{GS} = ±10 V, V _{DS} = 0 V | — | — | ±10 | μA |
| Drain cut-OFF current | | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | — | — | 10 | μA |
| Drain-source breakdown voltage | | V _(BR) DSS | I _D = 10 mA, V _{GS} = 0 V | 20 | — | — | V |
| | | V _(BR) DSX | I _D = 10 mA, V _{GS} = −12 V | 8 | — | — | |
| Gate threshold voltage | | V _{th} | V _{DS} = 10 V, I _D = 200 μA | 0.5 | — | 1.2 | V |
| Drain-source ON resistance | | R _{DS} (ON) | V _{GS} = 2.0 V, I _D = 3.5 A | — | 34 | 60 | mΩ |
| | | | V _{GS} = 2.5 V, I _D = 3.5 A | — | 26 | 40 | |
| | | | V _{GS} = 4.0 V, I _D = 4.0 A | — | 19 | 30 | |
| Forward transfer admittance | | Y _{fs} | V _{DS} = 10 V, I _D = 2.5 A | 4.6 | 9.2 | — | S |
| Input capacitance | | C _{iss} | V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz | — | 1280 | — | pF |
| Reverse transfer capacitance | | C _{rss} | | — | 130 | — | |
| Output capacitance | | C _{Oss} | | — | 150 | — | |
| Switching time | Rise time | t _r |  V _{GS} 5 V 0 V I _D = 2.5 A V _{OUT} 4.7 Ω R _L = 4 Ω V _{DD} = 10 V Duty ≤ 1%, t _w = 10 μs | — | 4.5 | — | ns |
| | Turn-ON time | t _{on} | | — | 11 | — | |
| | Fall time | t _f | | — | 7.3 | — | |
| | Turn-OFF time | t _{off} | | — | 33 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q _g | V _{DD} = 16 V, V _{GS} = 5 V, I _D = 5 A | — | 15 | — | nC |
| Gate-source charge 1 | | Q _{gs1} | | — | 3.3 | — | |
| Gate-drain (“miller”) charge | | Q _{gd} | | — | 3.5 | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-----------------------|----------------|-----------|--|-----|------|------|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | 20 | A |
| Diode forward voltage | | V_{DSF} | $I_{DR} = 5 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | -1.2 | V |







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