# i8810

## Dual N-Channel Enhancement Mode MOSFET

**TSSOP8**

### Features

- Surface-mounted package
- Extremely low threshold voltage
- Advanced trench cell design
- ESD protected (HBM>2KV)

### Applications

- Portable appliances
- Battery management

### Quick reference

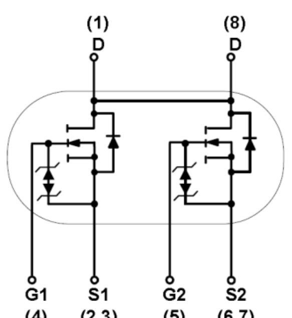
- BV ≧ 20 V  $P_{tot}$ ≦ 1.25 W  $I_D$ ≦ 6.8 A
- $R_{DS(ON)}$ ≦ 18 mΩ @ $V_{GS}$ = 4.5 V / $R_{DS(ON)}$ ≦ 27 mΩ @ $V_{GS}$ = 2.5 V

### Pin Description

| Pin Description | Simplified Outline | Symbol |
|---|---|---|

1  Drain(D)
2,3  Source(S1)
4  Gate(G1)
5  Gate(G2)
6,7  Source(S2)
8  Drain(D)

8 5
1 4
Top View
TSSOP8




### Limiting Values

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | $T_A$ = 25 ℃ | - | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | $T_A$ = 25 ℃ | - | ± 12 | V |
| $I_D$* | Drain Current | $T_A$ = 25 ℃, $V_{GS}$ = 4.5 V | - | 6.8 | A |
| | | $T_A$ = 100 ℃, $V_{GS}$ = 4.5 V | - | 4.3 | A |
| $I_{DM}$*,** | Pulsed Drain Current | $T_A$ = 25 ℃, $V_{GS}$ = 4.5 V | - | 24 | A |
| $P_{tot}$ | Total Power Dissipation | $T_A$ = 25 ℃ | - | 1.25 | W |
| $T_{stg}$ | Storage Temperature | | - 55 | 150 | ℃ |
| $T_J$ | Junction Temperature | | - 55 | 150 | ℃ |
| $I_S$ | Diode Forward Current | $T_A$ = 25 ℃ | - | 1.5 | A |
| $R_{\theta JA}$* | Thermal Resistance- Junction to Ambient | | | 100 | ℃ / W |

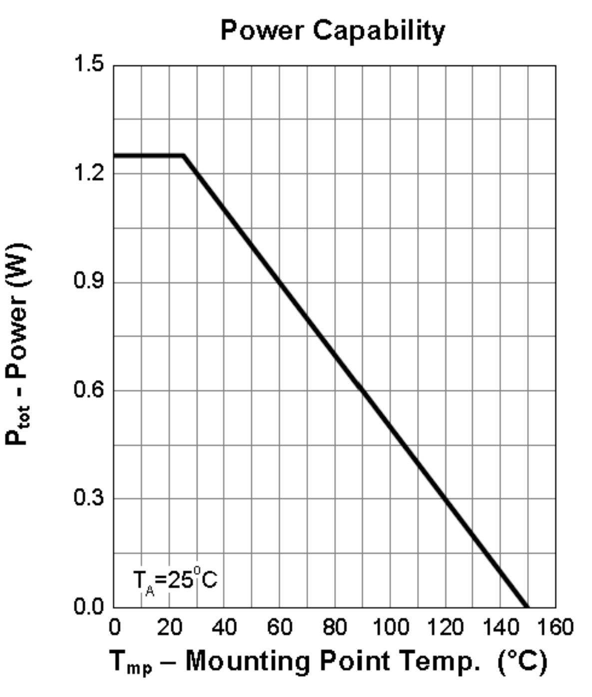
Notes： * Surface Mounted on 1 in2 pad area, t ≤ 10 sec  ** Pulse width ≤ 300 μs, duty cycle ≤ 2 %

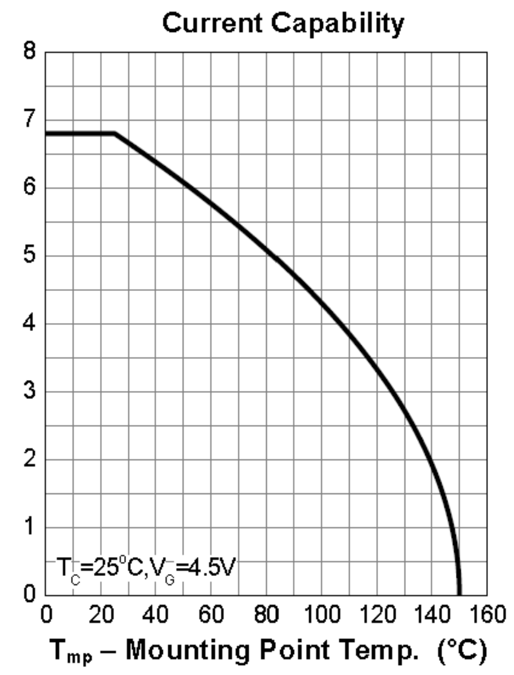
**Electrical Characteristics** (TA = 25 °C Unless Otherwise Noted)

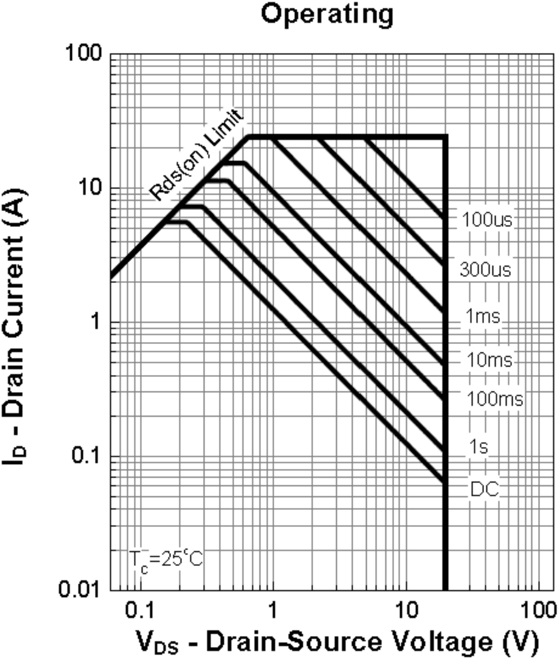
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Static Characteristics | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_{DS}$ = 250 µA | 20 | - | - | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 250 µA | 0.5 | 0.7 | 1 | V |
| $I_{DSS}$ | Drain Leakage Current | $V_{DS}$ = 16 V, $V_{GS}$ = 0V | - | - | 1 | µA |
| | | $T_J$ = 85 °C | - | - | 30 | µA |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$ = ± 10 V, $V_{DS}$ = 0 V | - | - | ± 10 | µA |
| | | $V_{GS}$ = ± 4.5 V, $V_{DS}$ = 0 V | - | - | ± 0.8 | |
| $R_{DS(ON)}$ [a] | On-State Resistance | $V_{GS}$ = 4.5 V, $I_{DS}$ = 6.8 A | - | 14 | 18 | mΩ |
| | | $V_{GS}$ = 2.5 V, $I_{DS}$ = 5 A | - | 19 | 27 | |
| Diode Characteristics | | | | | | |
| $V_{SD}$ [a] | Diode Forward Voltage | $I_{SD}$ = 1.5 A, $V_{GS}$ = 0 V | - | 0.7 | 1.1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$ = 6.8 A, $dI_{SD}/dt$ = 100 A/µs | - | 29 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 16 | - | nC |
| Dynamic Characteristics [b] | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$ = $V_{DS}$ = 0 V, F = 1 MHz | - | 4 | - | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0 V, $V_{DS}$ = 10 V<br>Frequency = 1 MHz | - | 850 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 200 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 185 | - | |
| $t_d$(on) | Turn-on Delay Time | $V_{DS}$ = 10 V, $V_{GEN}$ = 4.5 V,<br>$R_G$ = 6 Ω, $R_L$ = 10 Ω,<br>$I_{DS}$ = 1 A | - | 7 | 12 | ns |
| $t_r$ | Turn-on Rise Time | | - | 11 | 24 | |
| $t_d$(off) | Turn-off Delay Time | | - | 63 | 120 | |
| $t_f$ | Turn-off Fall Time | | - | 38 | 65 | |
| Gate Charge Characteristics [b] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{GS}$ = 4.5 V, $V_{DS}$ = 10 V,<br>$I_{DS}$ = 6.8 A | - | 18.5 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 1.2 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 7.4 | - | |

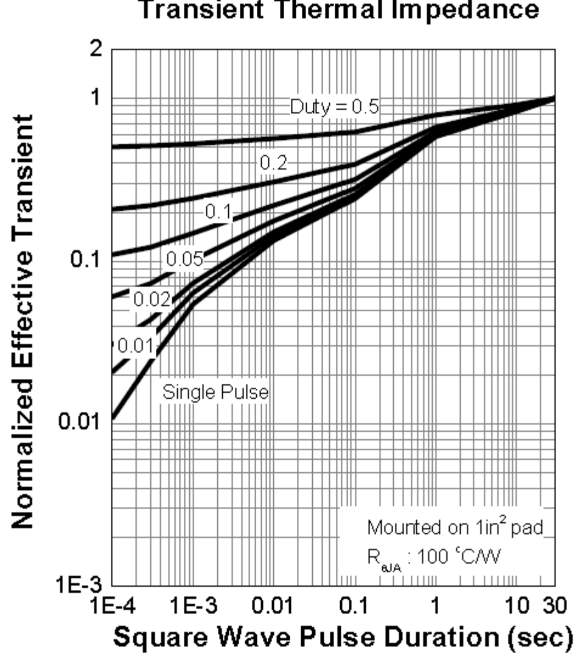
Notes： a : Pulse test ; pulse width ≤ 300 µs, duty cycle ≤ 2% b : Guaranteed by design, not subject to production testing

## Typical Characteristics



**Output Characteristics**

$I_D$ - Drain Current (A)

$V_{GS}$= 2, 2.5, 4, 5, 6, 7, 8, 9, 10V

1.5V

$V_{DS}$ - Drain-Source Voltage (V)

**On Resistance**

$R_{DS(ON)}$ - On Resistance (mΩ)

$V_{GS}$=2.5V

$V_{GS}$=4.5V

$I_D$ - Drain Current (A)

**Transfer Characteristics**

$R_{DS(ON)}$ - On Resistance (mΩ)

$I_D$= 6.8A

$V_{GS}$ - Gate-Source Voltage (V)

**Normalized Threshold Voltage**

Normalized Threshold Voltage

$I_{DS}$ =250μA

$T_j$ - Junction Temperature (°C)

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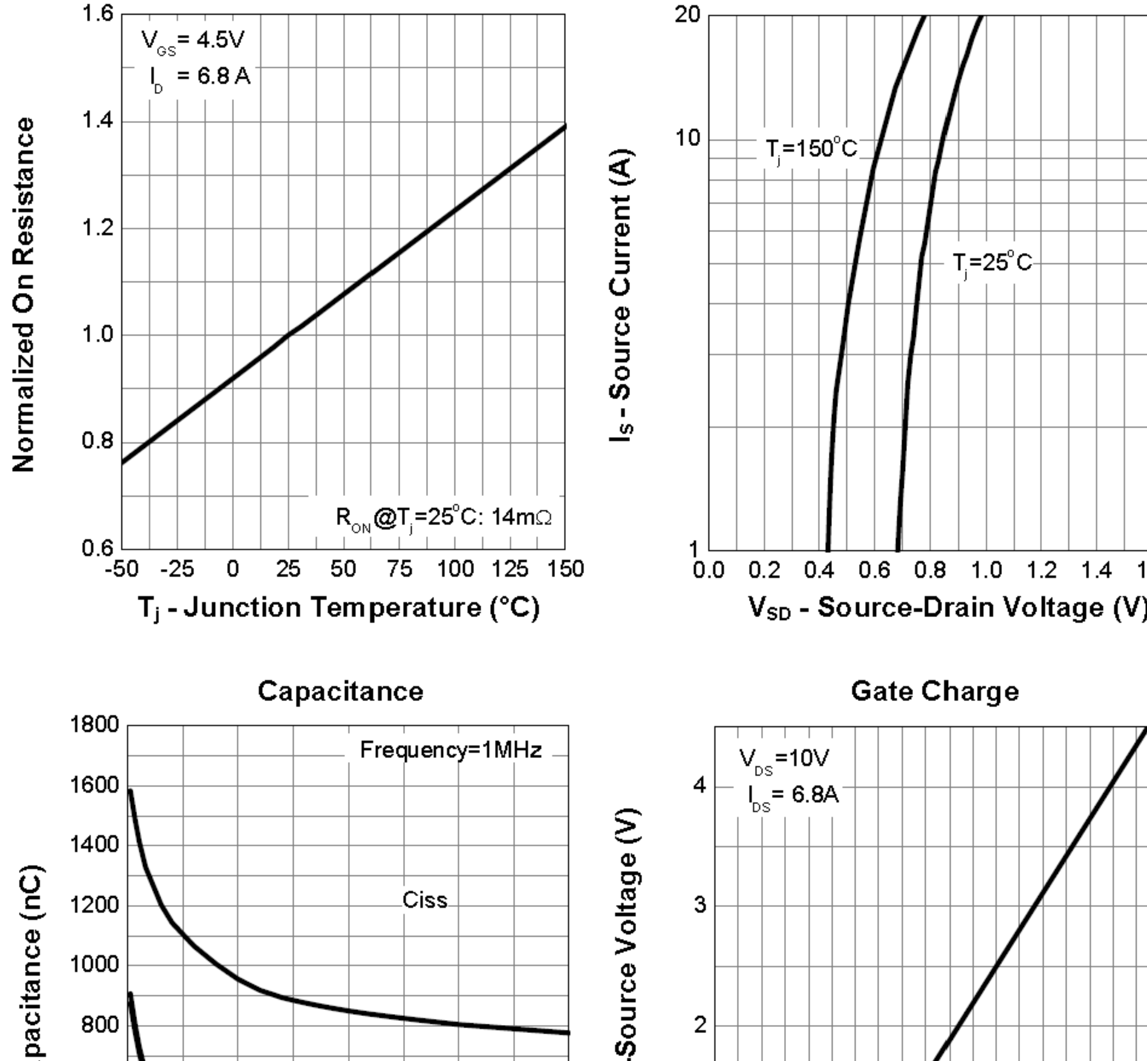
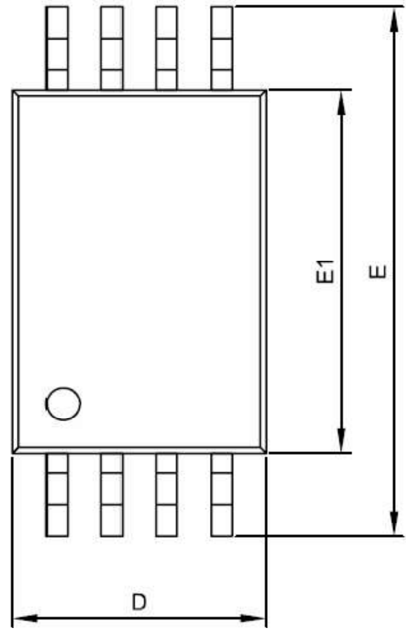
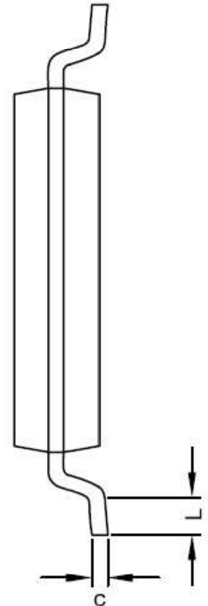
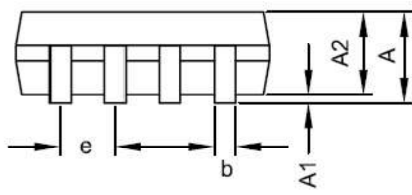

Normalized On Resistance
V_GS = 4.5V
I_D = 6.8 A
R_ON@T_j=25°C: 14mΩ
Normalized On Resistance
T_j - Junction Temperature (°C)
1.6
1.4
1.2
1.0
0.8
0.6
-50 -25 0 25 50 75 100 125 150
Diode Forward Current
T_j=150°C
T_j=25°C
I_S - Source Current (A)
V_SD - Source-Drain Voltage (V)
20
10
1
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6
Capacitance
Frequency=1MHz
Ciss
Coss
Crss
C - Capacitance (nC)
V_DS - Drain-Source Voltage (V)
1800
1600
1400
1200
1000
800
600
400
200
0
0 5 10 15 20
Gate Charge
V_DS=10V
I_DS= 6.8A
V_GS - Gate-Source Voltage (V)
Q_G - Gate Charge (nC)
4
3
2
1
0
0 2 4 6 8 10 12 14 16 18

## Package Dimensions

**TSSOP- 8**




| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | MIN. | MAX. |
| A | — | 1.20 |
| A1 | 0.00 | 0.15 |
| A2 | 0.85 | 1.05 |
| D | 2.90 | 3.10 |
| E | 6.20 | 6.60 |
| E1 | 4.30 | 4.50 |
| c | 0.09 | 0.20 |
| b | 0.19 | 0.30 |
| e | 0.65 BSC | |
| L | 0.45 | 0.75 |