

#### Product Summary

| $V_{DS}$ (V) | $R_{DS(on),max}$ (mΩ) | $I_D$ (A) |
|--------------|-----------------------|-----------|
| -20          | 18@ $V_{GS} = -4.5V$  | -10       |

#### Features

- ❖ Fast Switching
- ❖ Low On-Resistance
- ❖ Low Gate Charge

#### Application

- ❖ Load Switch
- ❖ Motor Control
- ❖ Power Management

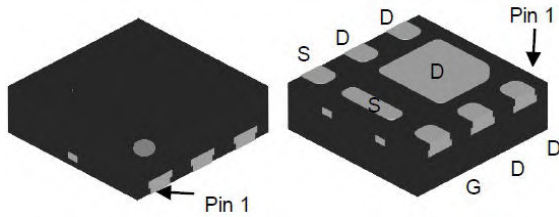
#### General Information

##### Shipping

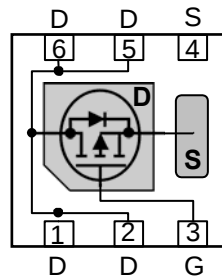
- ❖ One shipping options is offered as standard
- ❖ Un-sawn wafer

##### Handling

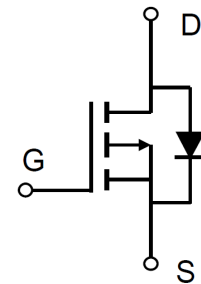
- ❖ Product must be handled only at ESD safe workstations. Standard ESD precautions and safe work environments are as defined in MIL-HDBK-263.
- ❖ Product must be handled only in a class 10,000 or better-designated clean room environmen



DFN2020-6L



#### Equivalent circuit



#### Absolute Maximum Rating ( $T_A=25^\circ C$ )

| Parameter                                                  | Symbol         | Limit      | Unit       |
|------------------------------------------------------------|----------------|------------|------------|
| Drain-source voltage                                       | $V_{DS}$       | -20        | V          |
| Gate-source voltage                                        | $V_{GS}$       | $\pm 12$   |            |
| Continuous drain current ( $V_{GS}=-4.5V$ ) <sup>(1)</sup> | $I_D$          | -10        | A          |
|                                                            | $I_D$          | -7         |            |
| Pulsed drain current <sup>(2)</sup>                        | $I_{D,pulse}$  | -32        |            |
| Power dissipation                                          | $P_D$          | 1.2        | W          |
|                                                            | $P_D$          | 0.73       | W          |
| Operating junction and storage temperature range           | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$ |

#### Thermal Characteristic ( $T_A=25^\circ C$ )

| Parameter                                              | Symbol          | Typ. | Max. | Unit         |
|--------------------------------------------------------|-----------------|------|------|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(3)</sup> | $R_{\theta JA}$ | 85   | 110  | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case <sup>(3)</sup>    | $R_{\theta JC}$ | 34   | 44   | $^\circ C/W$ |

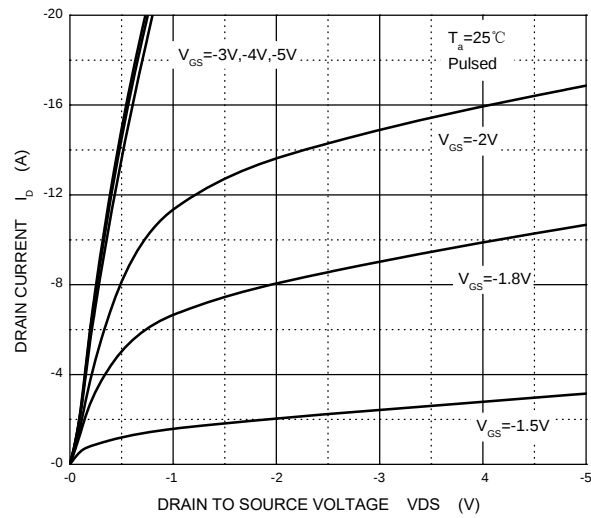
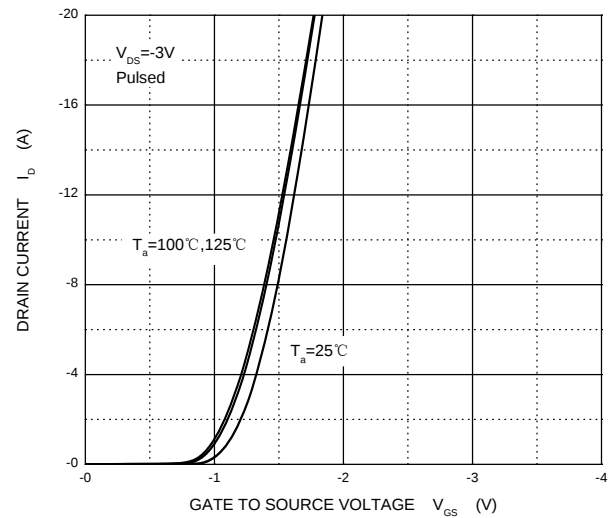
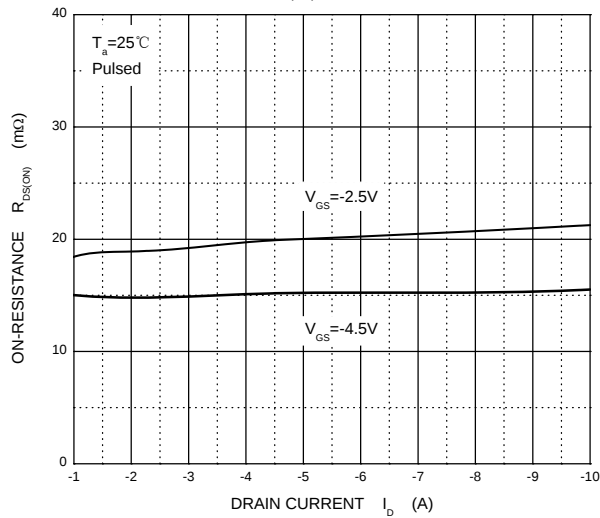
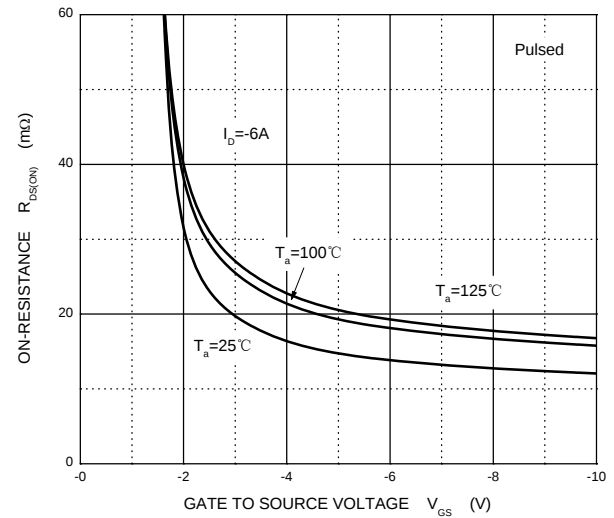
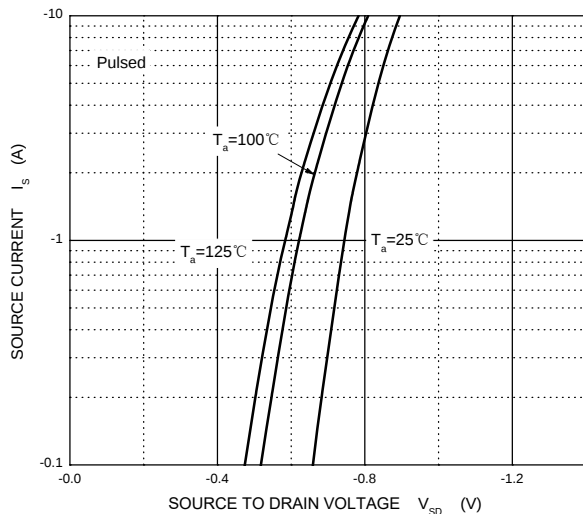
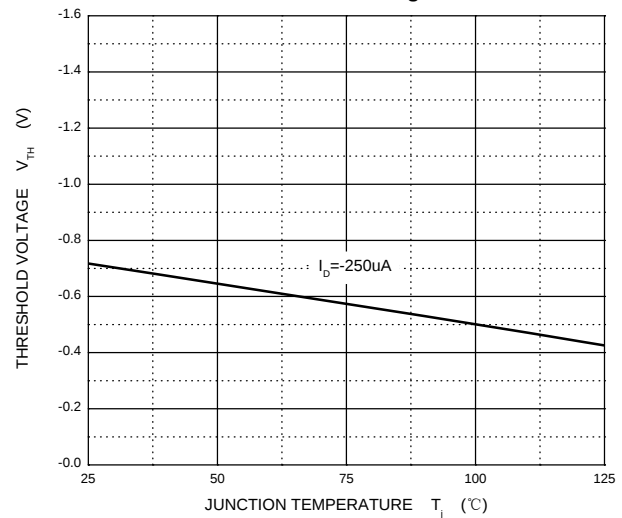
**Electrical characteristics (Ta=25°C ± 3°C)**

| Parameter                                    | Symbol               | Test conditions                                                                                   | Min. | Typ. | Max. | Unit |
|----------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------|------|------|------|------|
| Static parameter <sup>(4)</sup>              |                      |                                                                                                   |      |      |      |      |
| Drain to source breakdown voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA                                                   | -20  |      |      | V    |
| Gate-source threshold voltage                | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA                                      | -0.4 | -0.7 | -1.0 | V    |
| Gate-body leakage                            | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V                                                    |      |      | ±100 | nA   |
| Zero gate voltage drain current              | I <sub>DSS</sub>     | V <sub>DS</sub> = -20 V, V <sub>GS</sub> = 0 V                                                    |      |      | -1   | μA   |
| Drain-source on-resistance                   | R <sub>DS(on)</sub>  | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -8 A                                                    |      | 14.2 | 18   | mΩ   |
|                                              |                      | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4 A                                                    |      | 18   | 20   | mΩ   |
| Forward transconductance                     | g <sub>fs</sub>      | V <sub>DS</sub> = -5.0V, I <sub>D</sub> = -8A                                                     |      | 15   |      | S    |
| Gate resistance                              | R <sub>g</sub>       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz                                              |      | 22   |      | Ω    |
| Dynamic <sup>(5)</sup>                       |                      |                                                                                                   |      |      |      |      |
| Total gate charge                            | Q <sub>g</sub>       | V <sub>DS</sub> = -10V, I <sub>D</sub> = -8A<br>V <sub>GS</sub> = -4.5V                           |      | 33   |      | nC   |
| Gate-source charge                           | Q <sub>gs</sub>      |                                                                                                   |      | 5    |      |      |
| Gate-drain charge                            | Q <sub>gd</sub>      |                                                                                                   |      | 8    |      |      |
| Turn-on delay time                           | t <sub>d(on)</sub>   | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V<br>I <sub>D</sub> = -6 A, R <sub>GEN</sub> = 1.0Ω |      | 10   |      | ns   |
| Rise time                                    | t <sub>r</sub>       |                                                                                                   |      | 33   |      |      |
| Turn-off delay time                          | t <sub>d(off)</sub>  |                                                                                                   |      | 28   |      |      |
| Fall time                                    | t <sub>f</sub>       |                                                                                                   |      | 8    |      |      |
| Input capacitance                            | C <sub>iss</sub>     | V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                         |      | 1105 |      | pF   |
| Output capacitance                           | C <sub>oss</sub>     |                                                                                                   |      | 147  |      |      |
| Reverse transfer capacitance                 | C <sub>rss</sub>     |                                                                                                   |      | 128  |      |      |
| Reverse Diode Characteristics <sup>(5)</sup> |                      |                                                                                                   |      |      |      |      |
| Diode forward voltage                        | V <sub>SD</sub>      | I <sub>S</sub> = -2.0A, V <sub>GS</sub> = 0V                                                      |      | -0.9 | -1.2 | V    |
| Diode Forward Current                        | I <sub>s</sub>       | T <sub>A</sub> = 25°C                                                                             |      |      | -10  | A    |

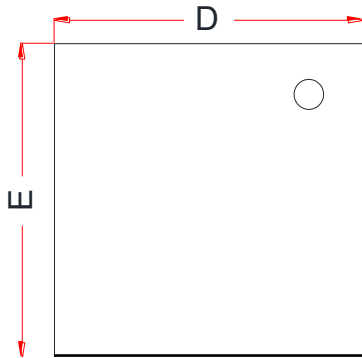
**Notes**

1. This current is chip limited, which is calculated based on  $R_{thjc}$ .
2. This current is calculated on single pulse with 10μs Pulse & Duty Cycle = 1%.
3. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
4. Short duration pulse test used to minimize self-heating effect.
5. Defined by design, not subject to production.

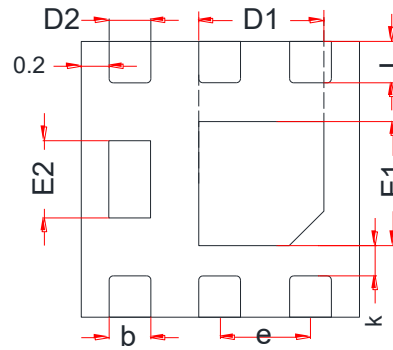
## Electrical characteristics diagrams

**Output Characteristics**

**Transfer Characteristics**

 **$R_{DS(ON)}$  —  $I_D$** 

 **$R_{DS(ON)}$  —  $V_{GS}$** 

 **$I_S$  —  $V_{SD}$** 

**Threshold Voltage**


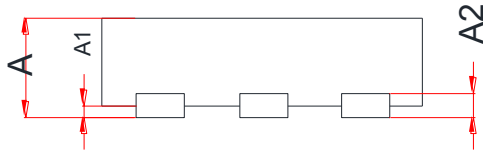
## Package outline dimensions DFN2020-6L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

| Symbol | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Typ. | Max. |
| A      | 0.70                      | 0.75 | 0.85 |
| A1     | 0.00                      | 0.02 | 0.05 |
| A2     | 0.20 Ref.                 |      |      |
| b      | 0.25                      | 0.30 | 0.35 |
| D      | 1.95                      | 2.00 | 2.05 |
| D1     | 0.85                      | 0.90 | 0.95 |
| D2     | 0.25                      | 0.30 | 0.35 |
| E      | 1.95                      | 2.00 | 2.05 |
| E1     | 0.75                      | 0.80 | 0.85 |
| E2     | 0.56 Ref.                 |      |      |
| e      | 0.65 BSC.                 |      |      |
| L      | 0.30                      | 0.35 | 0.40 |
| K      | 0.20                      | -    | -    |

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