

# F5042

FUJI Intelligent Power MOSFET

## Intelligent Power MOSFET

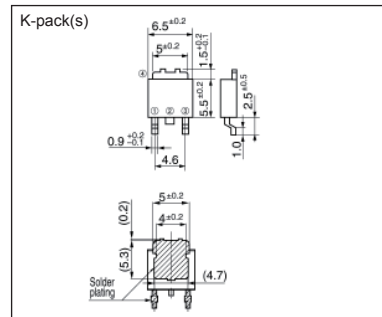
### Features

- Over temperature protection
- Short circuit protection
- Low on-resistance
- High speed switching

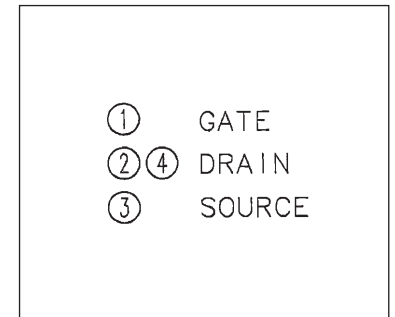
### Applications

- Solenoid driver
- Lamp driver
- Replacements for fuse and relay

### Outline drawings [mm]



### Connection



### Maximum ratings and characteristics

#### Absolute maximum ratings (at Tc=25°C, unless otherwise specified)

| Description   | Symbol           | Characteristics | Unit | Remarks  |
|---|------------------|-----------------|------|--|
| Drain-source voltage                                      | V <sub>DS</sub>  | 40              | V    | DC   |
| Gate-source voltage                                       | V <sub>GS</sub>  | -0.3~7.0        | V    | DC   |
| Continuous drain current                                  | I <sub>D</sub>   | 8               | A    | —  |
| Maximum power dissipation                                 | P <sub>D</sub>   | 15              | W    | —  |
| Operating junction temperature                            | T <sub>J</sub>   | 150             | °C   | —  |
| Storage temperature range                                 | T <sub>stg</sub> | -55 ~ 150       | °C   | —  |
| Single pulse inductive load switch-off energy dissipation | E <sub>CL</sub>  | 100             | mJ   | T <sub>J</sub> =150°C, L=5mH, I <sub>0</sub> =8A<br>Single pulse, dv/dt≤10V/μs |

#### Electrical characteristics (at Tc=25°C unless otherwise specified)

| Description  | Symbol   | Conditions  | min. | typ. | max. | Unit |
|--|--|---|------|------|------|------|
| Drain-source clamp voltage                           | V <sub>DSS</sub>                               | I <sub>D</sub> =1mA, V <sub>GS</sub> =0V                      | 40   | —    | 60   | V    |
| Gate threshold voltage                               | V <sub>GS(th)</sub>                            | I <sub>D</sub> =10mA, V <sub>DS</sub> =13V                    | 1.0  | —    | 2.8  | V    |
| Operation gate voltage (protection circuit operates) | V <sub>GS(p)</sub>                             | —   | 3.0  | —    | 7.0  | V    |
| Zero gate voltage drain current                      | I <sub>DSS</sub>                               | V <sub>DS</sub> =13V, V <sub>GS</sub> =0V                     | —    | —    | 100  | μA   |
|  |  | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                     | —    | —    | 1    | mA   |
| Gate-source leakage current                          | I <sub>GS(m)**</sub><br>I <sub>GS(um)***</sub> | V <sub>GS</sub> =5V   | —    | —    | 500  | μA   |
|  |  |   | —    | —    | 800  | μA   |
| Drain-source on-state resistance                     | R <sub>DS(on)</sub>                            | I <sub>D</sub> =5A, V <sub>GS</sub> =5V                       | —    | —    | 140  | mΩ   |
| Turn-on time   | t <sub>on</sub>                                | V <sub>DS</sub> =13V, I <sub>D</sub> =5A, V <sub>GS</sub> =5V | —    | —    | 50   | μs   |
| Turn-off time  | t <sub>off</sub>                               | V <sub>DS</sub> =13V, I <sub>D</sub> =5A, V <sub>GS</sub> =5V | —    | —    | 50   | μs   |
| Over-temperature protection                          | T <sub>trip</sub>                              | V <sub>GS</sub> =5V   | 150  | —    | —    | °C   |
| Short circuit protection                             | I <sub>OC</sub>                                | V <sub>GS</sub> =5V   | 12   | —    | —    | A    |

Note \*\*: Under normal operation

Note \*\*\*: Under self protection

#### Electrical characteristics (at Tc=-40~105°C unless otherwise specified)

| Description  | Symbol                                       | Conditions  | min.                                       | typ. | max. | Unit |
|--|--|---|--|------|------|------|
| Drain-source clamp voltage                           | V <sub>DSS</sub>                             | I <sub>D</sub> =1mA, V <sub>GS</sub> =0V                      | 38   | —    | 62   | V    |
| Gate threshold voltage                               | V <sub>GS(th)</sub>                          | I <sub>D</sub> =10mA, V <sub>DS</sub> =13V                    | 1.0  | —    | 3.0  | V    |
| Operation gate voltage (protection circuit operates) | V <sub>GS(p)</sub>                           | —   | 3.0  | —    | 6.7  | V    |
| Zero gate voltage drain current                      | I <sub>DSS</sub>                             | V <sub>DS</sub> =13V, V <sub>GS</sub> =0V                     | —  | —    | 170  | μA   |
|  |  | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                     | —  | —    | 1.6  | mA   |
| Gate-source leakage current                          | I <sub>GS(m)*</sub><br>I <sub>GS(um)**</sub> | V <sub>GS</sub> =5V   | —  | —    | 600  | μA   |
|  |  |   | V <sub>GS</sub> =5V, T <sub>J</sub> >150°C | —    | —    | 940  |
| Drain-source on-state resistance                     | R <sub>DS(on)</sub>                          | I <sub>D</sub> =5A, V <sub>GS</sub> =5V                       | —  | —    | 205  | mΩ   |
| Turn-on time   | t <sub>on</sub>                              | V <sub>DS</sub> =13V, I <sub>D</sub> =5A, V <sub>GS</sub> =5V | —  | —    | 62   | μs   |
| Turn-off time  | t <sub>off</sub>                             |   | —  | —    | 52   | μs   |
| Short circuit protection                             | I <sub>OC</sub>                              | V <sub>GS</sub> =5V   | 8.4  | —    | —    | A    |

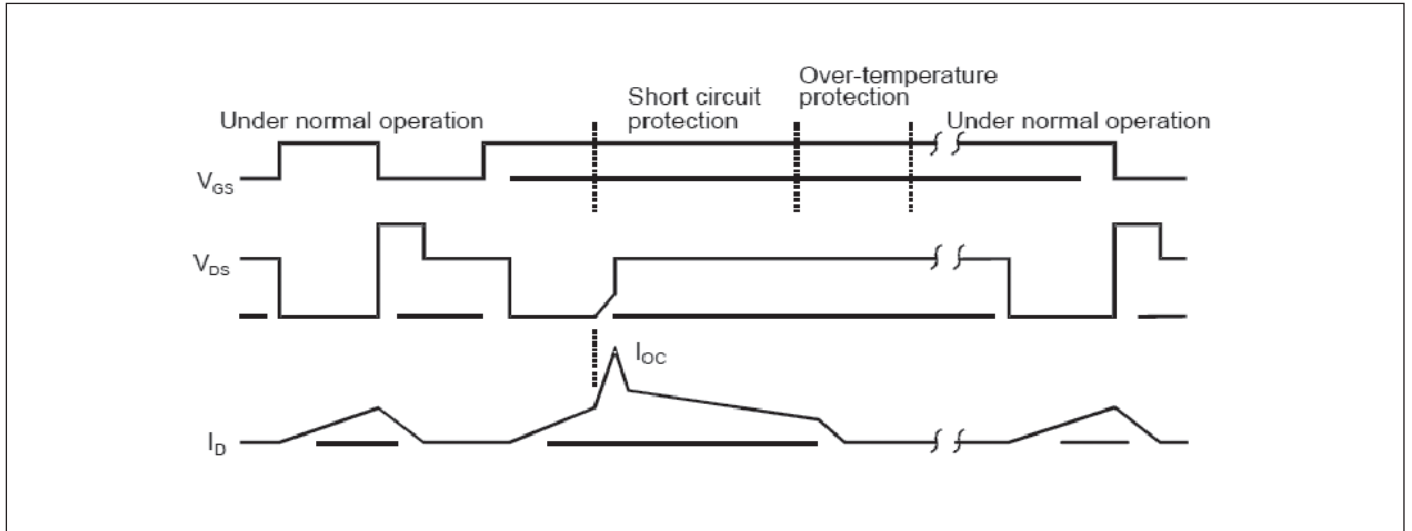
Note \*: Under normal operation

Note \*\*: Under self protection

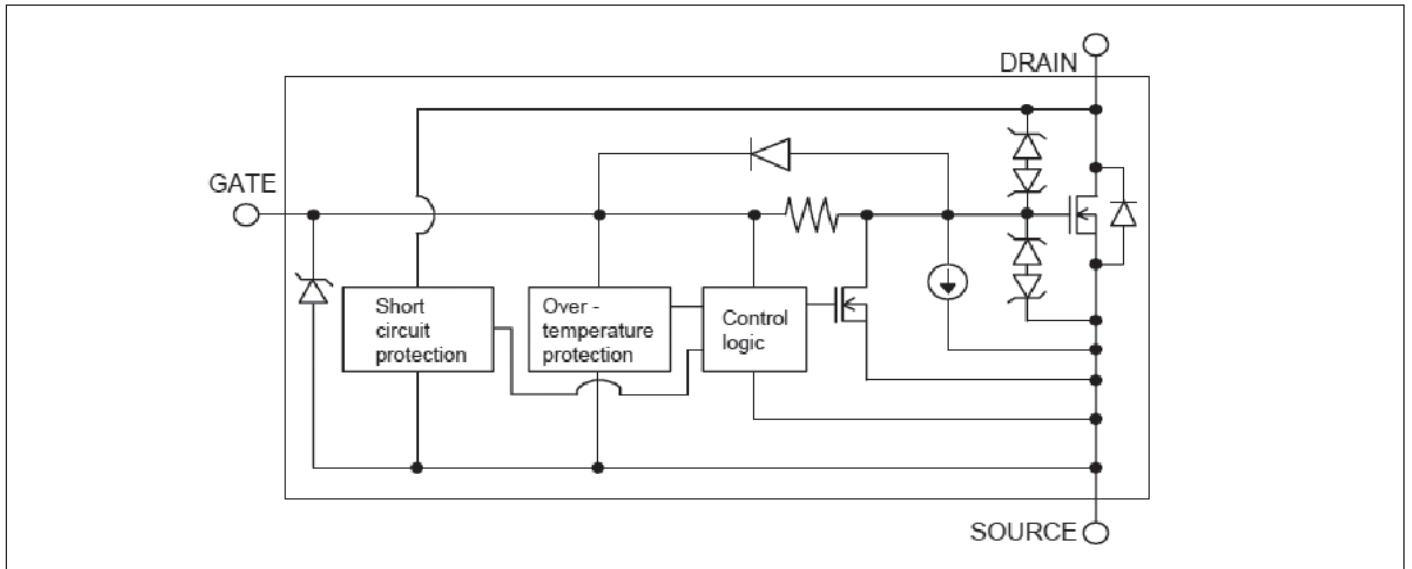
### Thermal resistance

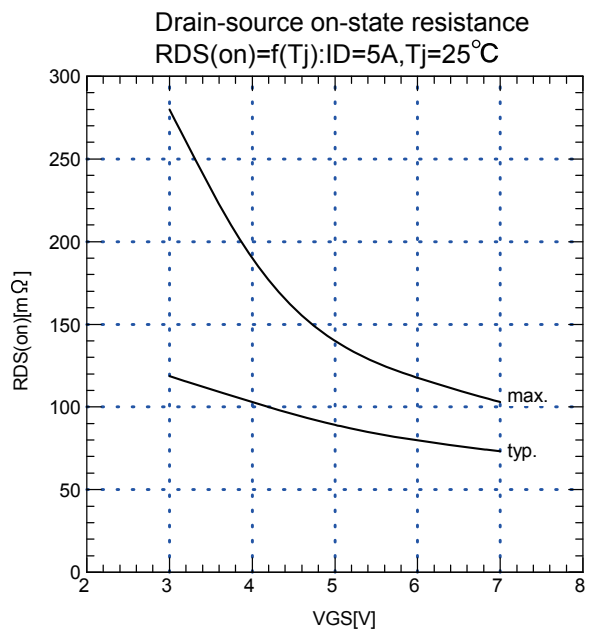
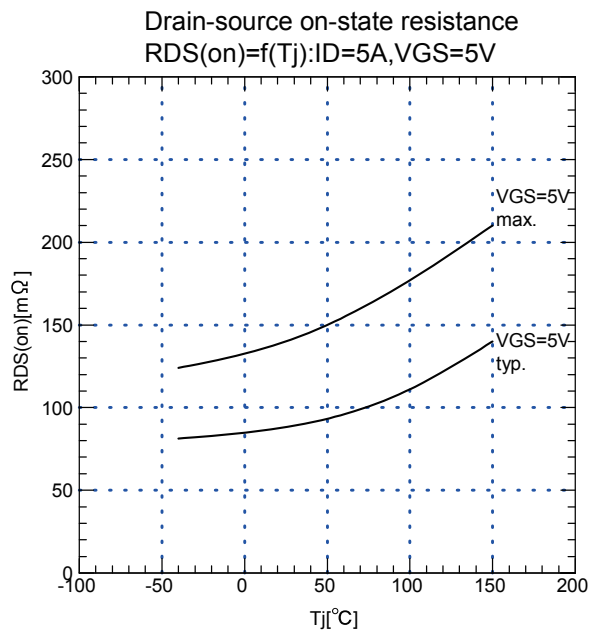
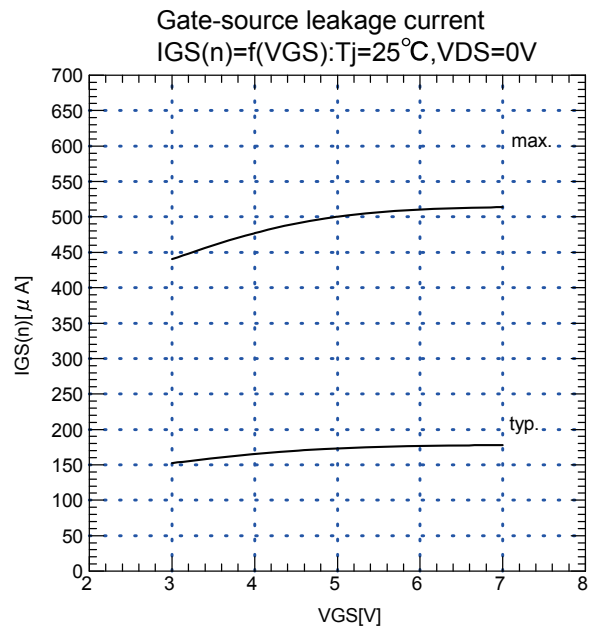
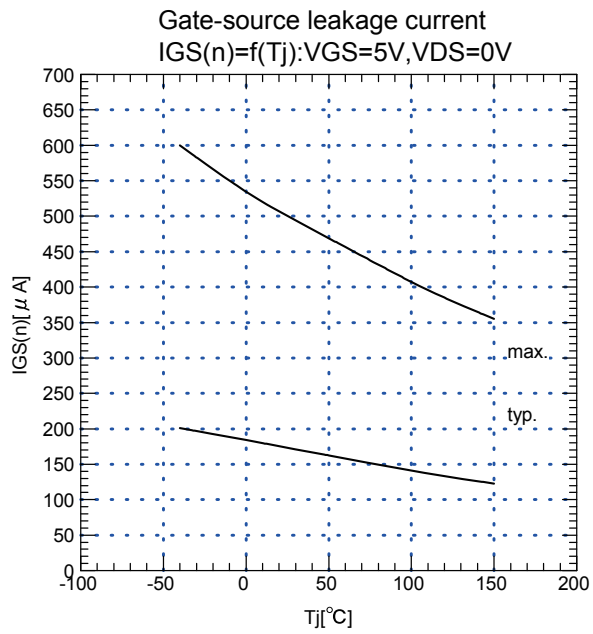
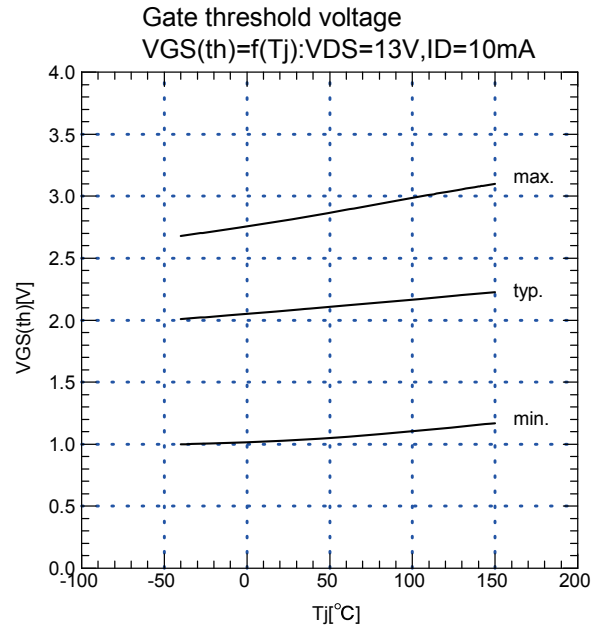
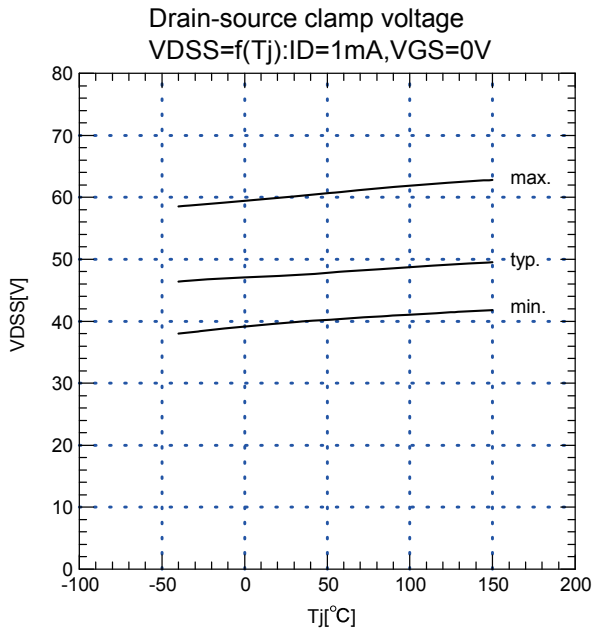
| Description        | Symbol               | Test conditions  | min. | typ. | max. | Unit |
|--------------------|----------------------|------------------|------|------|------|------|
| Thermal resistance | R <sub>th(j-c)</sub> | Junction-case    | —    | —    | 8.3  | °C/W |
|                    | R <sub>th(j-a)</sub> | Junction-ambient | —    | —    | 125  | °C/W |

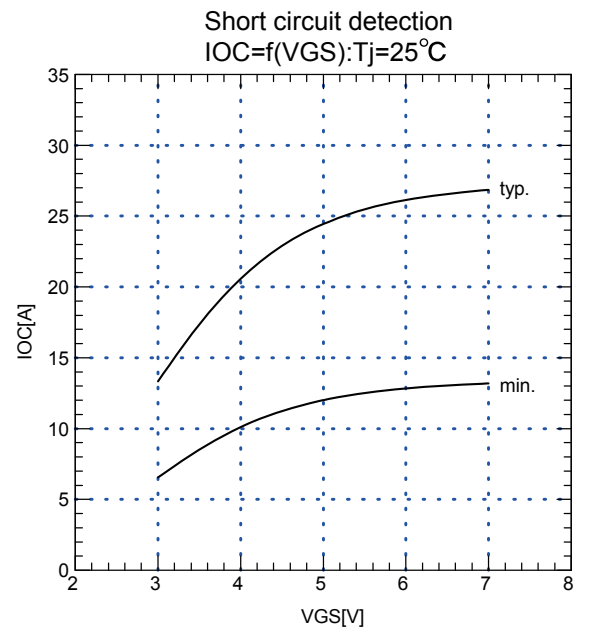
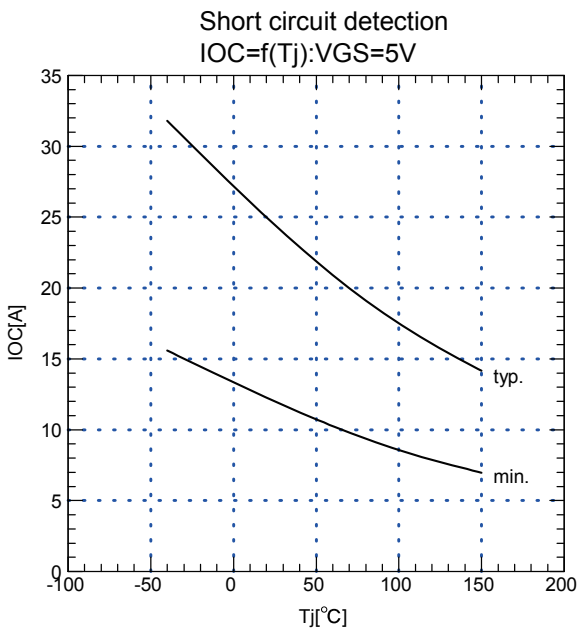
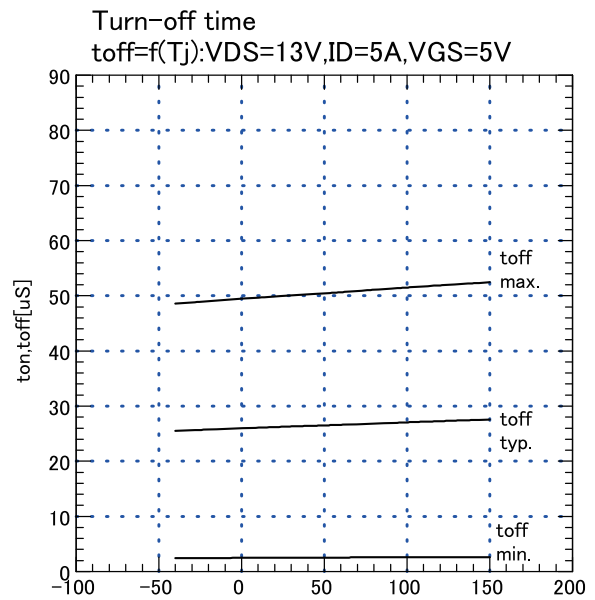
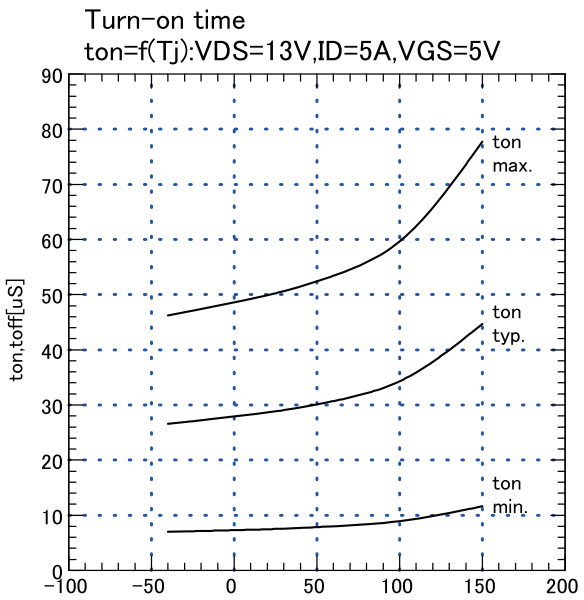
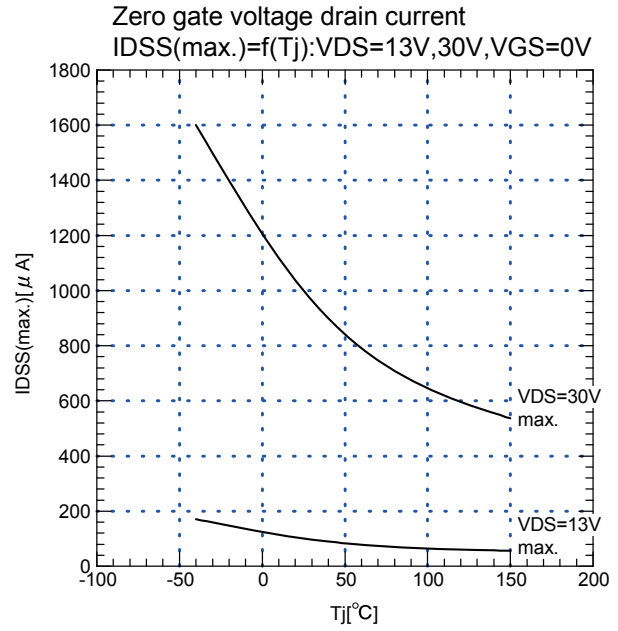
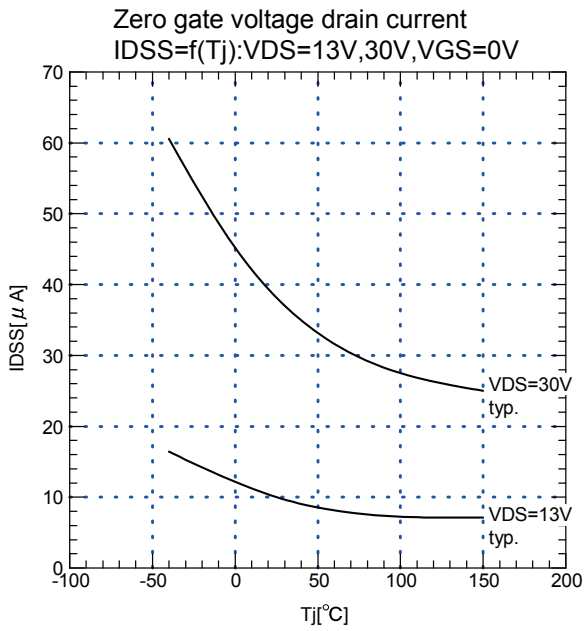
■ Timing chart

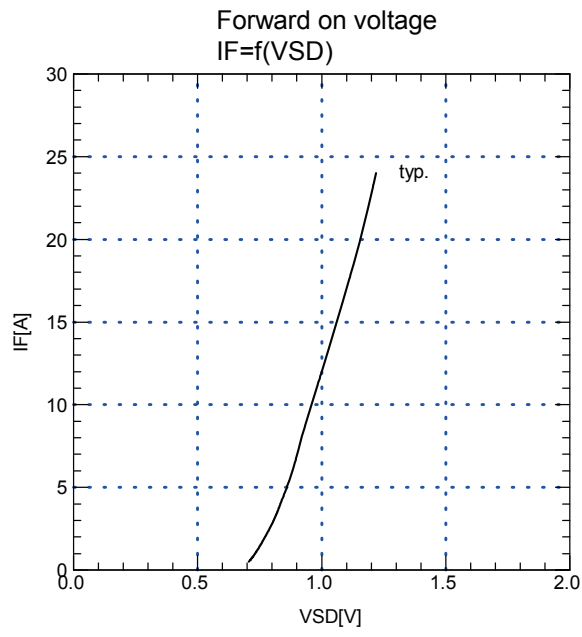


■ Circuit block diagram









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