

# GJ405

## P-CHANNEL ENHANCEMENT MODE POWER MOSFET

|         |      |
|---------|------|
| BVDSS   | -30V |
| RDS(ON) | 32mΩ |
| ID      | -18A |

### Description

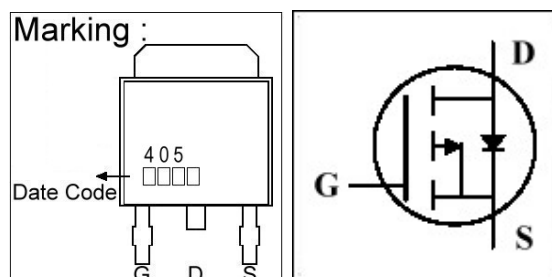
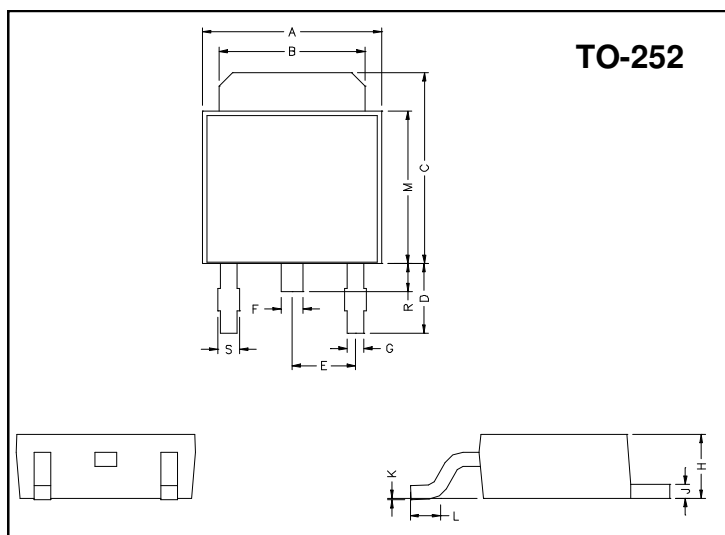
The GJ405 uses advanced trench technology to provide excellent on-resistance, low gate charge and low gate resistance.

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for high current load applications.

### Features

- \*Simple Drive Requirement
- \*Lower On-resistance
- \*Fast Switching Characteristic

### Package Dimensions



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 6.40       | 6.80 | G    | 0.50       | 0.70 |
| B    | 5.20       | 5.50 | H    | 2.20       | 2.40 |
| C    | 6.80       | 7.20 | J    | 0.45       | 0.55 |
| D    | 2.40       | 3.00 | K    | 0          | 0.15 |
| E    | 2.30 REF.  |      | L    | 0.90       | 1.50 |
| F    | 0.70       | 0.90 | M    | 5.40       | 5.80 |
| S    | 0.60       | 0.90 | R    | 0.80       | 1.20 |

### Absolute Maximum Ratings

| Parameter  | Symbol                  | Ratings    | Unit |
|--|-------------------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$                | -30        | V    |
| Gate-Source Voltage                              | $V_{GS}$                | ±20        | V    |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_C=25^{\circ}C$  | -18        | A    |
| Continuous Drain Current, $V_{GS}@10V$           | $I_D @T_C=100^{\circ}C$ | -14        | A    |
| Pulsed Drain Current <sup>1</sup>                | $I_{DM}$                | -40        | A    |
| Total Power Dissipation                          | $P_D @T_C=25^{\circ}C$  | 60         | W    |
| Linear Derating Factor                           |                         | 0.4        | W/°C |
| Single Pulse Avalanche Energy <sup>2</sup>       | $E_{AS}$                | 61         | mJ   |
| Single Pulse Avalanche Current                   | $I_{AS}$                | -35        | A    |
| Operating Junction and Storage Temperature Range | $T_j, T_{stg}$          | -55 ~ +175 | °C   |

### Thermal Data

| Parameter                                | Symbol      | Value | Unit |
|--|-------------|-------|------|
| Thermal Resistance Junction-case Max.    | $R_{thj-c}$ | 2.5   | °C/W |
| Thermal Resistance Junction-ambient Max. | $R_{thj-a}$ | 50    | °C/W |

**Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)**

| Parameter  | Symbol              | Min. | Typ. | Max. | Unit | Test Conditions   |
|--|---------------------|------|------|------|------|---|
| Drain-Source Breakdown Voltage                     | BV <sub>DSS</sub>   | -30  | -    | -    | V    | V <sub>GS</sub> =0, I <sub>D</sub> =-250uA  |
| Gate Threshold Voltage                             | V <sub>GS(th)</sub> | -1.2 | -    | -2.4 | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA                                     |
| Forward Transconductance                           | g <sub>fs</sub>     | -    | 17   | -    | S    | V <sub>DS</sub> =-5V, I <sub>D</sub> =-18A  |
| Gate-Source Leakage Current                        | I <sub>GSS</sub>    | -    | -    | ±100 | nA   | V <sub>GS</sub> = ±20V  |
| Drain-Source Leakage Current(T <sub>j</sub> =25°C) | I <sub>DSS</sub>    | -    | -    | -1   | uA   | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0   |
| Drain-Source Leakage Current(T <sub>j</sub> =55°C) |                     | -    | -    | -5   | uA   | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0   |
| Static Drain-Source On-Resistance <sup>3</sup>     | R <sub>DS(ON)</sub> | -    | -    | 32   | mΩ   | V <sub>GS</sub> =-10V, I <sub>D</sub> =-18A   |
|  |                     | -    | -    | 60   |      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A  |
| Total Gate Charge <sup>3</sup>                     | Q <sub>g</sub>      | -    | 18.7 | 23   | nC   | I <sub>D</sub> =-18A<br>V <sub>DS</sub> =-15V<br>V <sub>GS</sub> =-10V                        |
| Gate-Source Charge                                 | Q <sub>gs</sub>     | -    | 2.54 | -    |      |   |
| Gate-Drain ("Miller") Change                       | Q <sub>gd</sub>     | -    | 5.4  | -    |      |   |
| Turn-on Delay Time <sup>3</sup>                    | T <sub>d(on)</sub>  | -    | 9    | 13   | ns   | V <sub>DS</sub> =-15V<br>V <sub>GS</sub> =-10V<br>R <sub>G</sub> =3Ω<br>R <sub>L</sub> =0.82Ω |
| Rise Time  | T <sub>r</sub>      | -    | 25   | -    |      |   |
| Turn-off Delay Time                                | T <sub>d(off)</sub> | -    | 20   | -    |      |   |
| Fall Time  | T <sub>f</sub>      | -    | 12   | -    |      |   |
| Input Capacitance                                  | C <sub>iss</sub>    | -    | 920  | 1100 | pF   | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =-15V<br>f=1.0MHz                                      |
| Output Capacitance                                 | C <sub>oss</sub>    | -    | 190  | -    |      |   |
| Reverse Transfer Capacitance                       | C <sub>rss</sub>    | -    | 122  | -    |      |   |

**Source-Drain Diode**

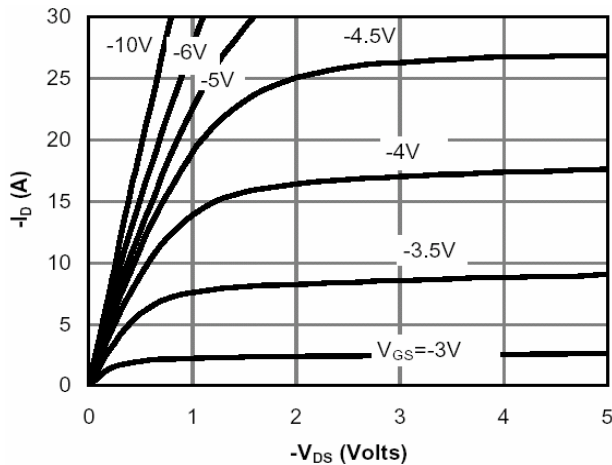
| Parameter                              | Symbol          | Min. | Typ. | Max. | Unit | Test Conditions  |
|--|-----------------|------|------|------|------|--|
| Forward On Voltage <sup>3</sup>        | V <sub>SD</sub> | -    | -    | -1.0 | V    | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V                   |
| Continuous Source Current (Body Diode) | I <sub>S</sub>  | -    | -    | -18  | A    | V <sub>D</sub> = V <sub>G</sub> =0V, V <sub>S</sub> =-1.0V |
| Reverse Recovery Time <sup>3</sup>     | T <sub>rr</sub> | -    | 21.4 | -    | ns   | I <sub>S</sub> =-18A, V <sub>GS</sub> =0V<br>di/dt=100A/μs |
| Reverse Recovery Charge                | Q <sub>rr</sub> | -    | 13   | -    | nC   |  |

Notes: 1. Pulse width limited by safe operating area.

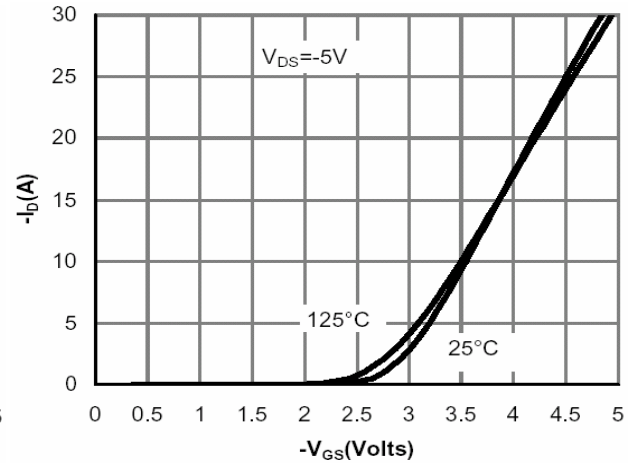
2. Staring T<sub>j</sub>=25°C, V<sub>DD</sub>=25V, L=0.1mH, R<sub>G</sub>=25Ω.

3. Pulse width ≤ 300us, duty cycle ≤ 2%.

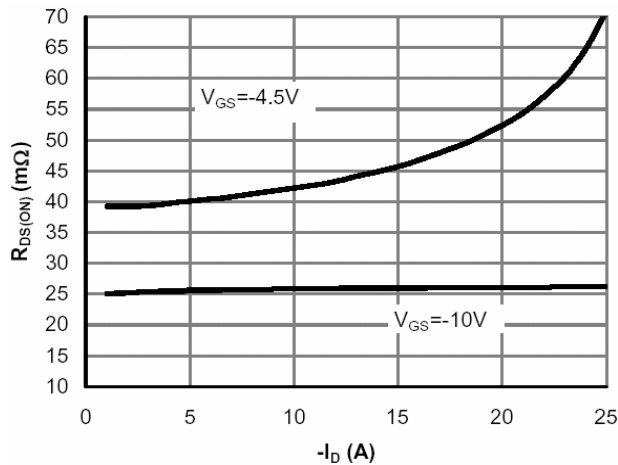
**Characteristics Curve**



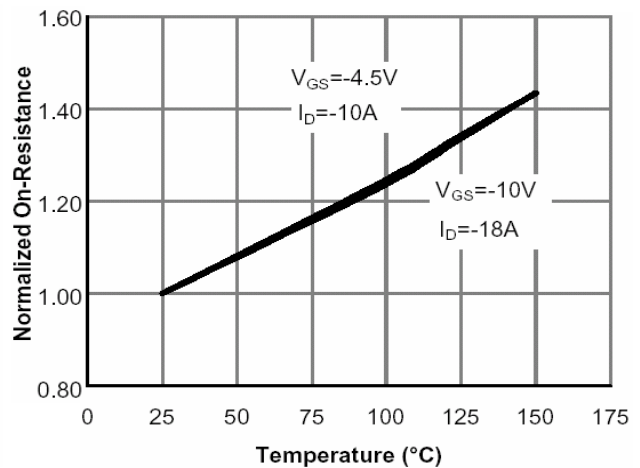
**Fig 1. Typical Output Characteristics**



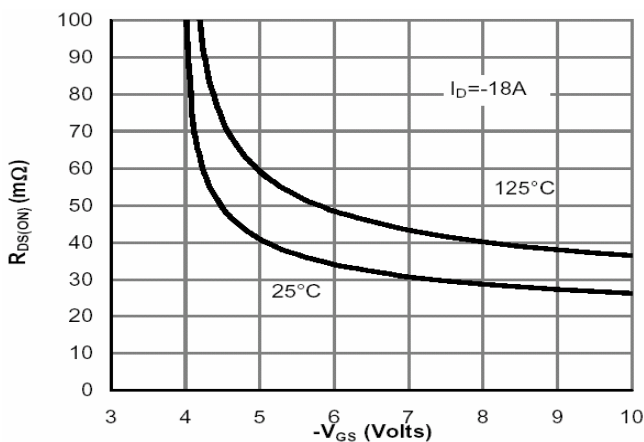
**Fig 2. Transfer Characteristics**



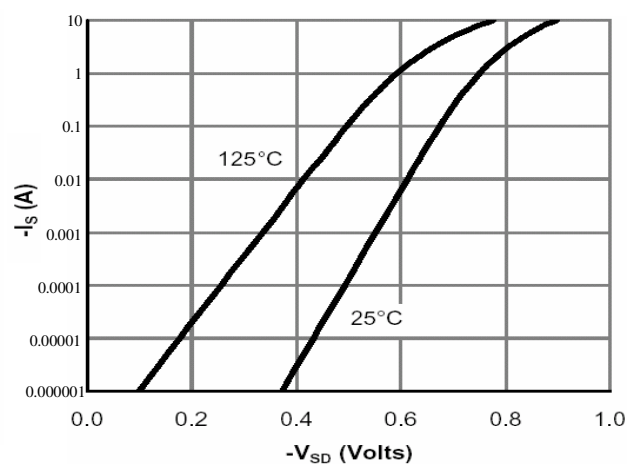
**Fig 3. On-Resistance v.s. Drain Current and Gate Voltage**



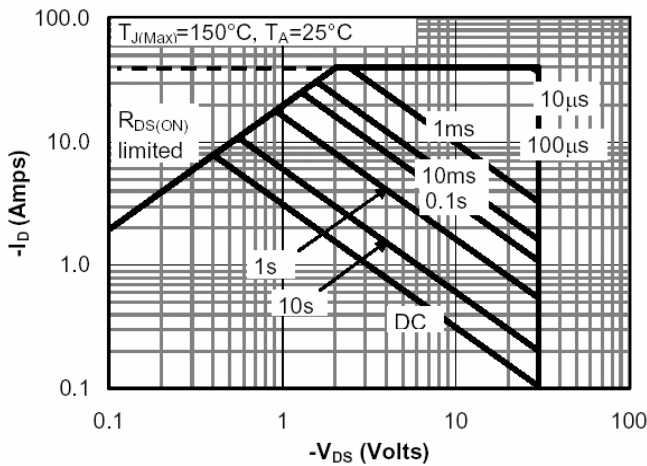
**Fig 4. On-Resistance v.s. Junction Temperature**



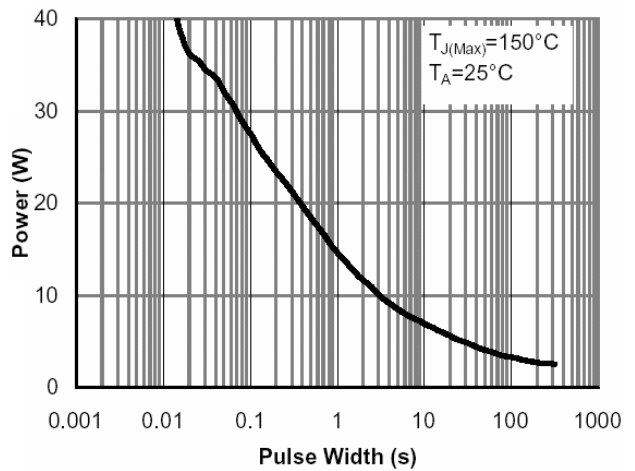
**Fig 5. On-Resistance v.s. Gate-Source Voltage**



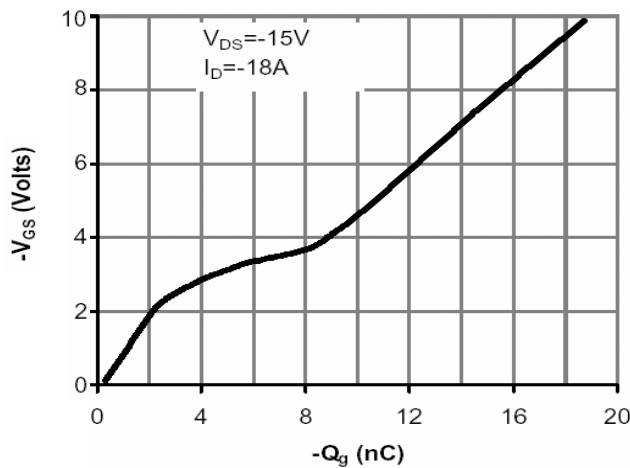
**Fig 6. Body Diode Characteristics**



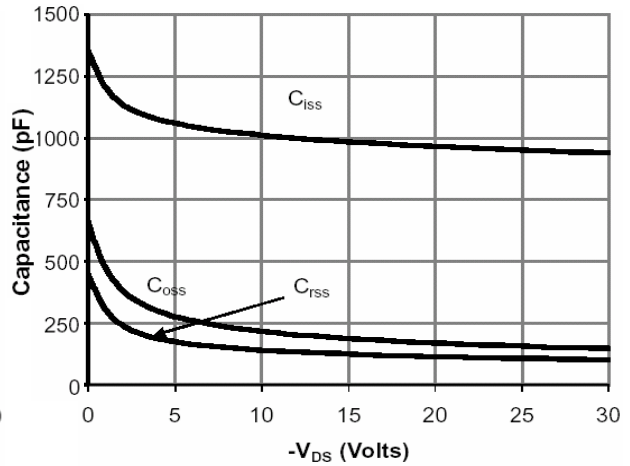
**Fig 7. Maximum Safe Operating Area**



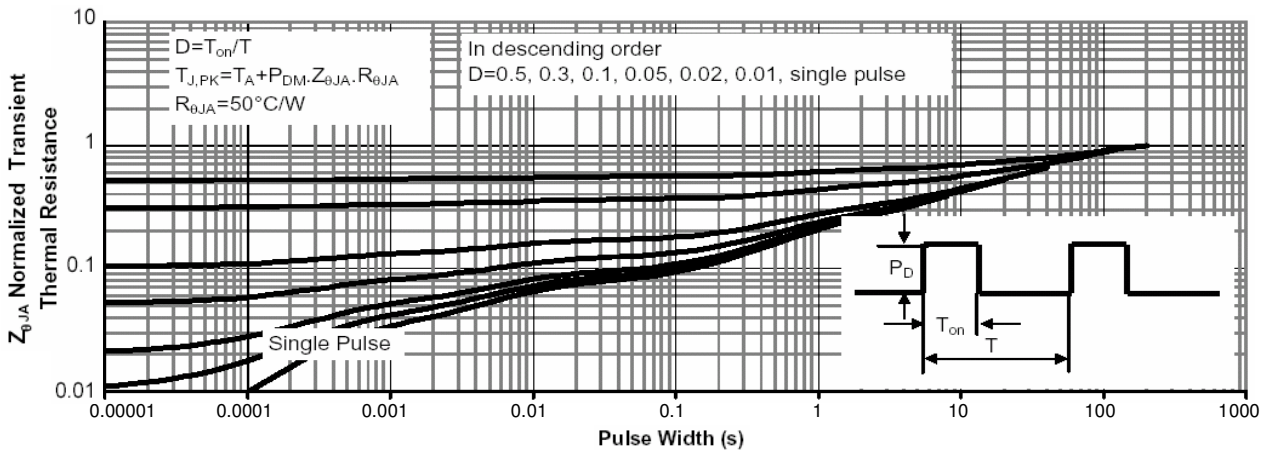
**Fig 8. Single Pulse Power Rating Junction-to-Ambient**



**Fig 9. Gate Charge Characteristics**



**Fig 10. Typical Capacitance Characteristics**



**Fig 11. Normalized Maximum Transient Thermal Impedance**

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