

# TMG05N10I

## N-Channel Enhancement Mosfet

### General Description

- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

### Applications

- Load switch
- PWM

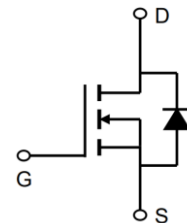
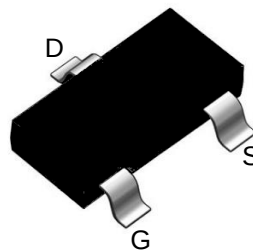
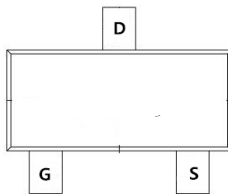
### General Features

$V_{DS} = 100V$   $I_D = 5A$   
 $R_{DS(ON)} = 95m\Omega @ V_{GS} = 10V$

100% UIS Tested  
100%  $R_g$  Tested



I:SOT-23



Marking: 05N10 OR 1005S

### Absolute Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise noted)

| Symbol                         | Parameter                                  | Rating     | Units            |
|--------------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                       | Drain-Source Voltage                       | 100        | V                |
| $V_{GS}$                       | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5          | A                |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 3.6        | A                |
| $I_{DM}$                       | Pulsed Drain Current <sup>2</sup>          | 28         | A                |
| $P_D @ T_A = 25^\circ\text{C}$ | Total Power Dissipation <sup>3</sup>       | 1          | W                |
| $T_{STG}$                      | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                          | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

### Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit               |
|-----------------|--------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | 125  | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 80   | $^\circ\text{C/W}$ |

**TMG05N10I**
**N-Channel Enhancement Mosfet**
**Electrical Characteristics**  $T_C=25^{\circ}\text{C}$  unless otherwise specified

| Symbol                                                 | Parameter                                                                 | Test Condition                                                                                | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                                           |                                                                                               |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                                            | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                  | 100  | 110  | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                                           | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                                  | -    | -    | 1    | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                                              | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                                  | -    | -    | ±100 | nA    |
| On Characteristics <sup>note3</sup>                    |                                                                           |                                                                                               |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                    | 1.0  | 1.95 | 3.0  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source On-Resistance <sup>note2</sup>                        | V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A                                                    | -    | 95   | 120  | mΩ    |
| Dynamic Characteristics <sup>note4</sup>               |                                                                           |                                                                                               |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                                         | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                    | -    | 196  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                                        |                                                                                               | -    | 25.9 | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                                              |                                                                                               | -    | 21.4 | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                                         | V <sub>DS</sub> = 50V, I <sub>D</sub> = 3A,<br>V <sub>GS</sub> = 10V                          | -    | 4.3  | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                                        |                                                                                               | -    | 3.5  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                                               |                                                                                               | -    | 3.1  | -    | nC    |
| Switching Characteristics <sup>note4</sup>             |                                                                           |                                                                                               |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-On Delay Time                                                        | V <sub>DD</sub> = 50V, I <sub>DS</sub> =3A<br><br>R <sub>G</sub> = 2Ω, V <sub>GEN</sub> = 10V | -    | 14.7 | -    | ns    |
| t <sub>r</sub>                                         | Turn-On Rise Time                                                         |                                                                                               | -    | 3.5  | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-Off Delay Time                                                       |                                                                                               | -    | 20.9 | -    | ns    |
| t <sub>f</sub>                                         | Turn-Off Fall Time                                                        |                                                                                               | -    | 2.7  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                                           |                                                                                               |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current <sup>note2</sup> |                                                                                               | -    | -    | 4.5  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current                      |                                                                                               | -    | -    | 12   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage <sup>note3</sup>                    | V <sub>GS</sub> = 0V, I <sub>S</sub> =3A                                                      | -    | -    | 1.3  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                                          | V <sub>GS</sub> = 0V, I <sub>F</sub> = 3A,<br><br>di/dt =100A/μs                              | -    | 32.1 | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Time Charge                                   |                                                                                               | -    | 39.4 | -    | nC    |
| I <sub>rrm</sub>                                       | Peak Reverse Recovery Current                                             |                                                                                               | -    | 2.1  | -    | A     |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $V_{DD}=50V$ ,  $R_G=50\Omega$ ,  $L=0.3mH$ , starting  $T_J=25^{\circ}\text{C}$

## Typical Characteristics

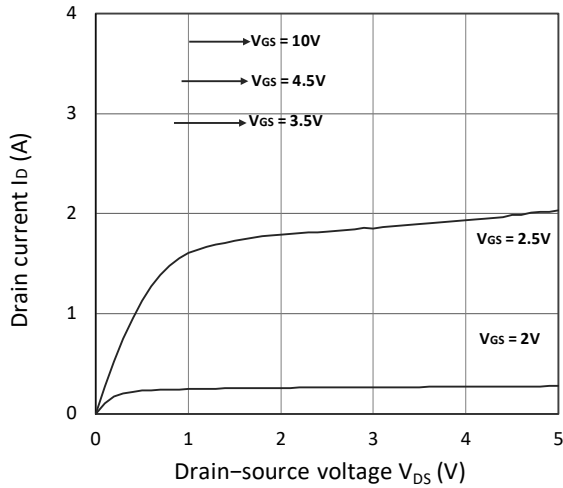


Figure 1. Output Characteristics

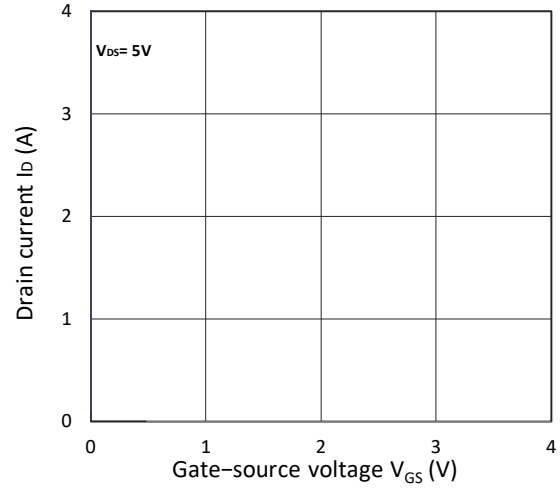


Figure 2. Transfer Characteristics

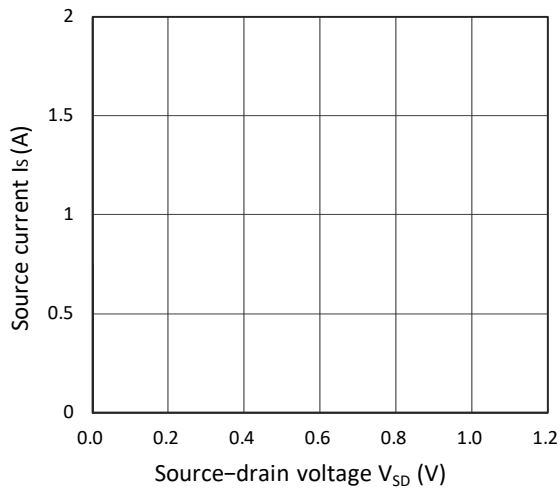


Figure 3. Forward Characteristics of Reverse

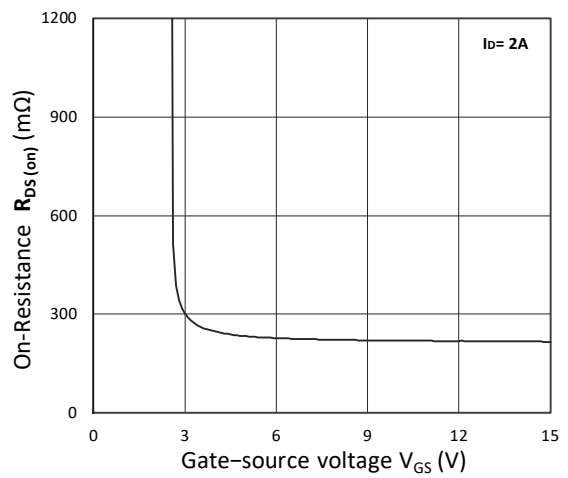


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

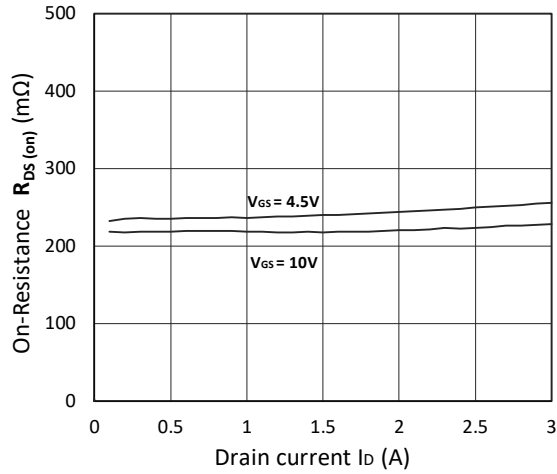


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

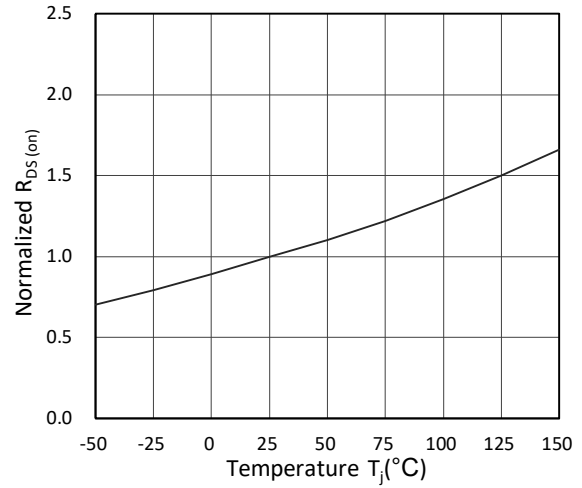


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

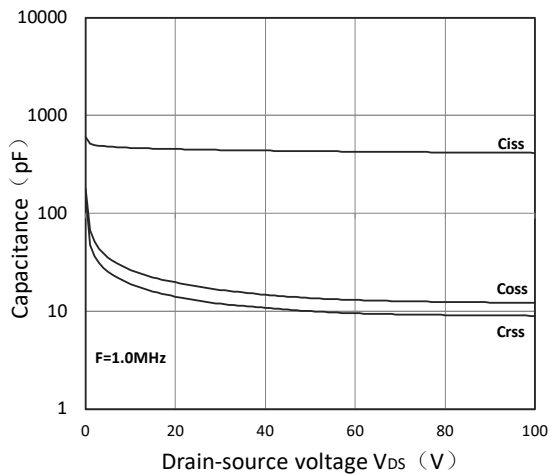


Figure 7. Capacitance Characteristics

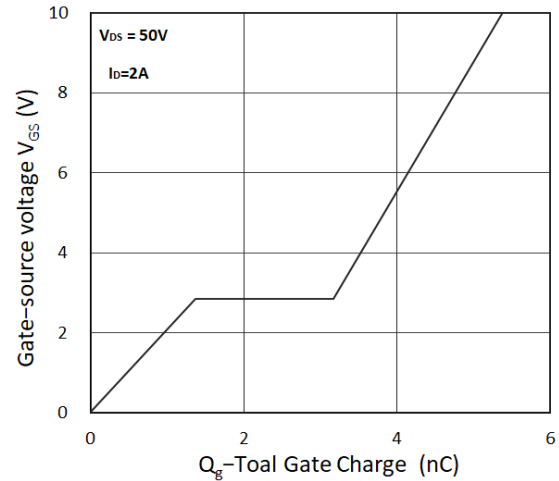
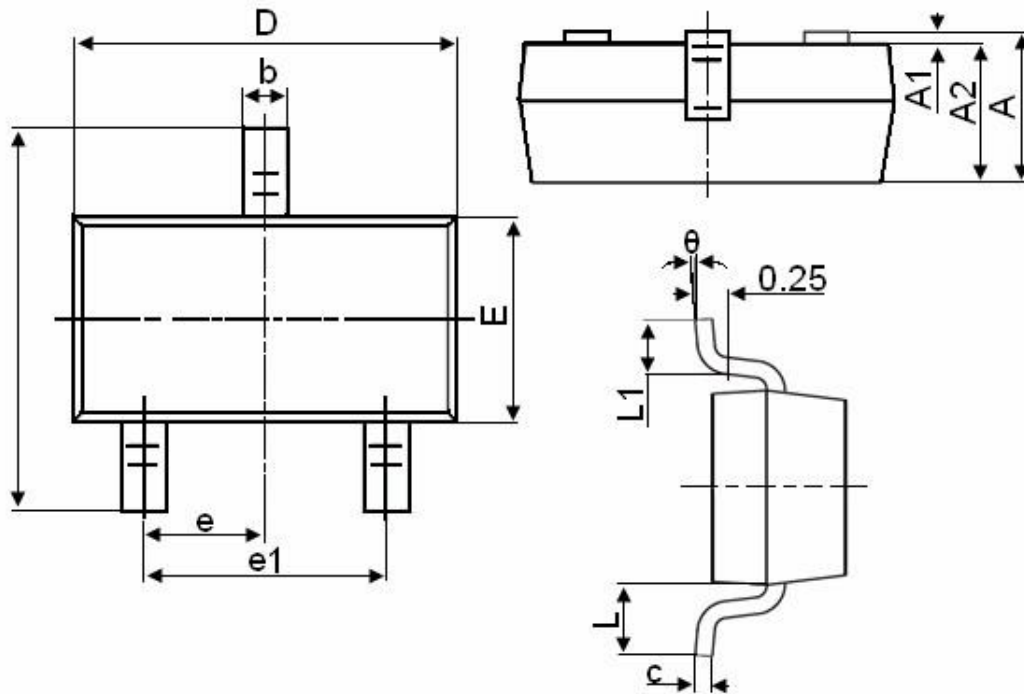


Figure 8. Gate Charge Characteristics

## Package Information: SOT-23



| Symbol   | Dimensions in Millimeters |       |
|----------|---------------------------|-------|
|          | MIN.                      | MAX.  |
| A        | 0.900                     | 1.150 |
| A1       | 0.000                     | 0.100 |
| A2       | 0.900                     | 1.050 |
| b        | 0.300                     | 0.500 |
| c        | 0.080                     | 0.150 |
| D        | 2.800                     | 3.000 |
| E        | 1.200                     | 1.400 |
| E1       | 2.250                     | 2.550 |
| e        | 0.950TYP                  |       |
| e1       | 1.800                     | 2.000 |
| L        | 0.550REF                  |       |
| L1       | 0.300                     | 0.500 |
| $\theta$ | 0°                        | 8°    |