

# TM06P03I

## P-Channel Enhancement Mosfet

### General Description

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

### Applications

- Load switch
- PWM

### General Features

$V_{DS} = -30V$   $I_D = -6.0A$

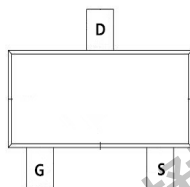
$R_{DS(ON)} = 26m\Omega$  (Typ.) @  $V_{GS} = -10V$

100% UIS Tested

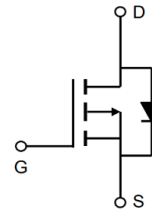
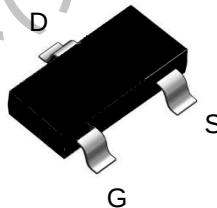
100%  $R_g$  Tested



I: SOT-23



Marking: 30P06



### Absolute Maximum Ratings $T_A = 25^\circ C$ un (less otherwise noted)

| Symbol                   | Parameter                                  | Rating     | Units      |
|--------------------------|--------------------------------------------|------------|------------|
| $V_{DS}$                 | Drain-Source Voltage                       | -30        | V          |
| $V_{GS}$                 | Gate-Source Voltage                        | $\pm 20$   | V          |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ -4.5V$ | -6.0       | A          |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ -4.5V$ | -4.5       | A          |
| $I_{DM}$                 | Pulsed Drain Current <sup>2</sup>          | -28        | A          |
| $P_D @ T_A = 25^\circ C$ | Total Power Dissipation <sup>3</sup>       | 1.5        | W          |
| $T_{STG}$                | Storage Temperature Range                  | -55 to 150 | $^\circ C$ |
| $T_J$                    | Operating Junction Temperature Range       | -55 to 150 | $^\circ C$ |

### Thermal Data

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

**TM06P03I**
**P-Channel Enhancement Mosfet**
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

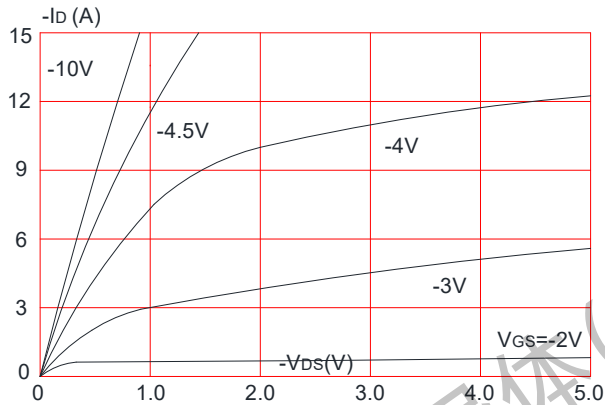
| Symbol                                                 | Parameter                                                 | Test Condition                                                 | Min. | Typ. | Max.      | Units      |
|--------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------|------|------|-----------|------------|
| Off Characteristic                                     |                                                           |                                                                |      |      |           |            |
| $V_{(BR)DSS}$                                          | Drain-Source Breakdown Voltage                            | $V_{GS}=0V, I_D= -250\mu A$                                    | -30  | -    | -         | V          |
| $I_{DSS}$                                              | Zero Gate Voltage Drain Current                           | $V_{DS}= -30V, V_{GS}=0V,$                                     | -    | -    | -1        | $\mu A$    |
| $I_{GSS}$                                              | Gate to Body Leakage Current                              | $V_{DS}=0V, V_{GS}= \pm 20V$                                   | -    | -    | $\pm 100$ | nA         |
| On Characteristics                                     |                                                           |                                                                |      |      |           |            |
| $V_{GS(th)}$                                           | Gate Threshold Voltage                                    | $V_{DS}=V_{GS}, I_D= -250\mu A$                                | -1.0 | -1.5 | -2.5      | V          |
| $R_{DS(on)}$                                           | Static Drain-Source on-Resistance<br><small>note3</small> | $V_{GS}= -10V, I_D= -7A$                                       | -    | 26   | 33        | m $\Omega$ |
|                                                        |                                                           | $V_{GS}= -4.5V, I_D= -4A$                                      | -    | 34   | 44        |            |
| Dynamic Characteristics                                |                                                           |                                                                |      |      |           |            |
| $C_{iss}$                                              | Input Capacitance                                         | $V_{DS}= -15V, V_{GS}=0V,$<br>$f=1.0MHz$                       | -    | 782  | -         | pF         |
| $C_{oss}$                                              | Output Capacitance                                        |                                                                | -    | 135  | -         | pF         |
| $C_{rss}$                                              | Reverse Transfer Capacitance                              |                                                                | -    | 109  | -         | pF         |
| $Q_g$                                                  | Total Gate Charge                                         | $V_{DS}= -15V, I_D= -4A,$<br>$V_{GS}= -10V$                    | -    | 10   | -         | nC         |
| $Q_{gs}$                                               | Gate-Source Charge                                        |                                                                | -    | 2    | -         | nC         |
| $Q_{gd}$                                               | Gate-Drain(“Miller”) Charge                               |                                                                | -    | 2.7  | -         | nC         |
| Switching Characteristics                              |                                                           |                                                                |      |      |           |            |
| $t_{d(on)}$                                            | Turn-on Delay Time                                        | $V_{DD}= -15V, I_D= -7A,$<br>$V_{GS}= -10V, R_{GEN}=2.5\Omega$ | -    | 11   | -         | ns         |
| $t_r$                                                  | Turn-on Rise Time                                         |                                                                | -    | 19   | -         | ns         |
| $t_{d(off)}$                                           | Turn-off Delay Time                                       |                                                                | -    | 45   | -         | ns         |
| $t_f$                                                  | Turn-off Fall Time                                        |                                                                | -    | 26   | -         | ns         |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                |      |      |           |            |
| $I_S$                                                  | Maximum Continuous Drain to Source Diode Forward Current  |                                                                | -    | -    | -6        | A          |
| $I_{SM}$                                               | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                | -    | -    | -28       | A          |
| $V_{SD}$                                               | Drain to Source Diode Forward Voltage                     | $V_{GS}=0V, I_S= -7A$                                          | -    | -0.8 | -1.2      | V          |

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

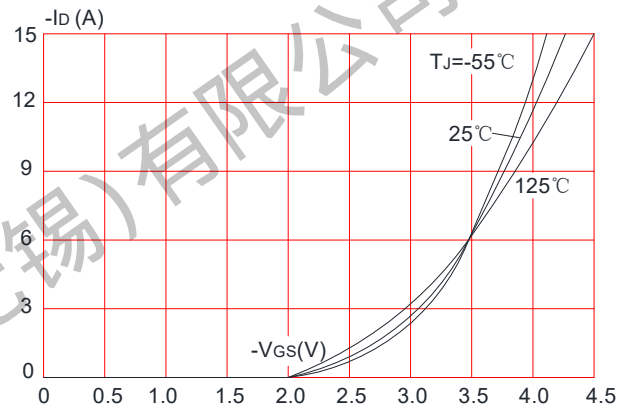
 2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycles $\leq 2\%$

## Typical Performance Characteristics

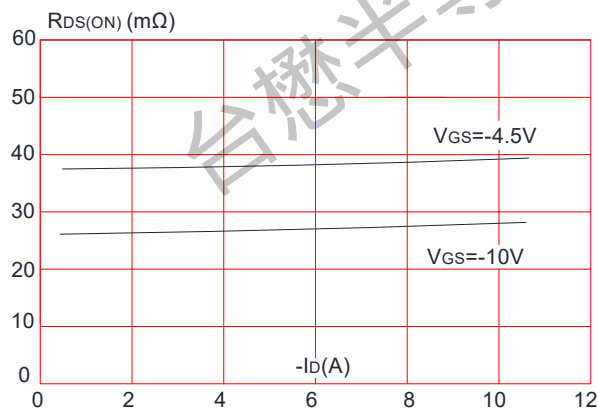
**Figure1: Output Characteristics**



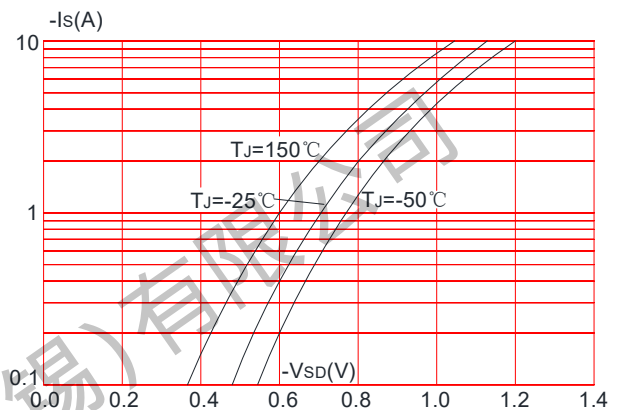
**Figure 2: Typical Transfer Characteristics**



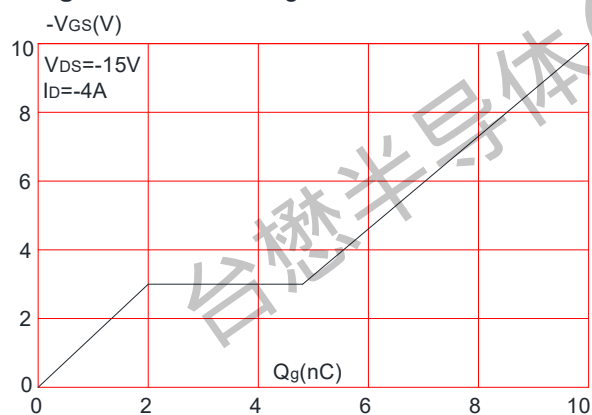
**Figure 3: On-resistance vs. Drain Current**



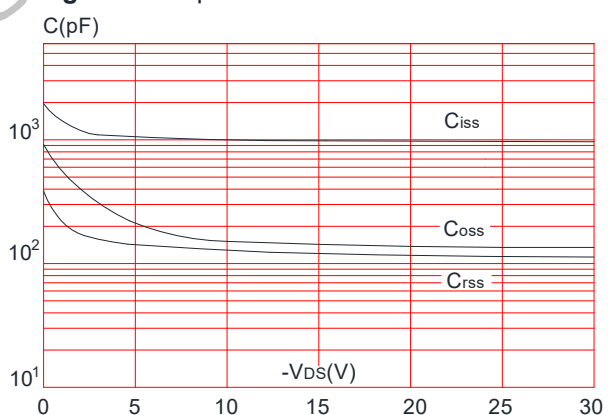
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



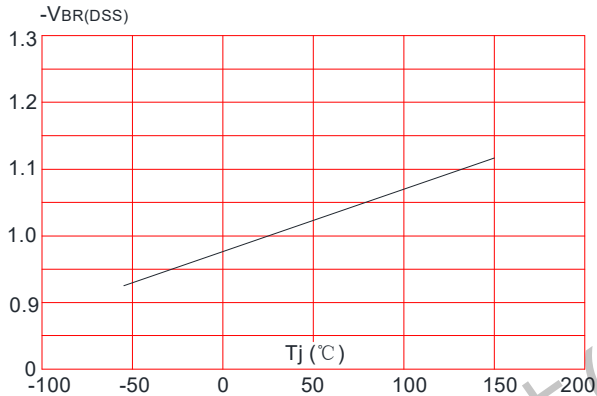
**Figure 6: Capacitance Characteristics**



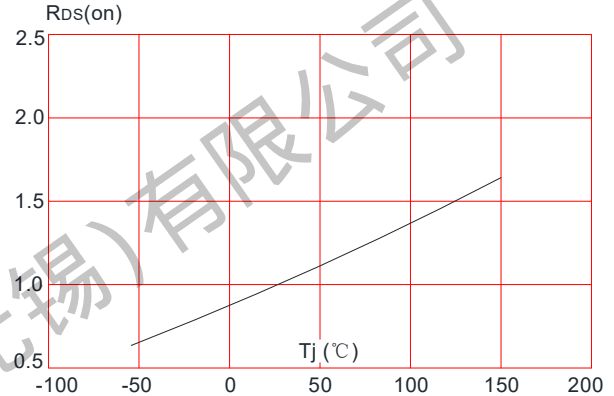
# TM06P03I

# P-Channel Enhancement Mosfet

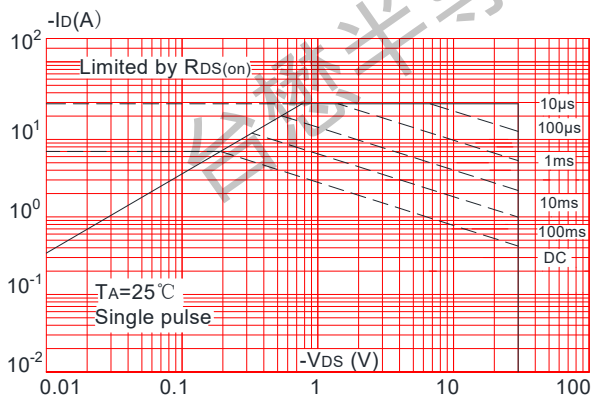
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



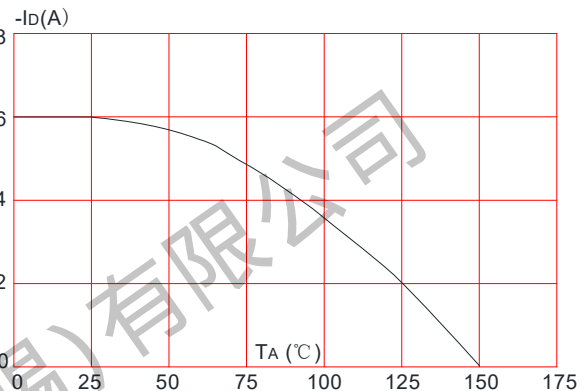
**Figure 8:** Normalized on Resistance vs. Junction Temperature



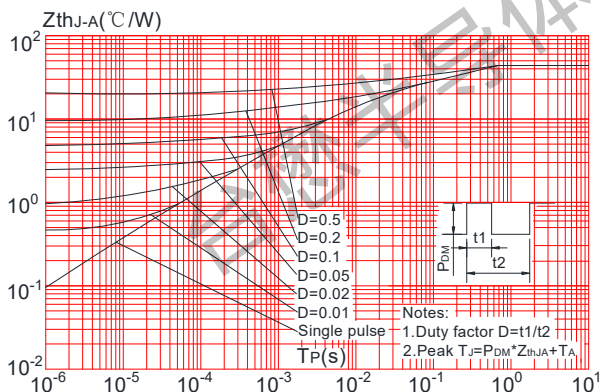
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



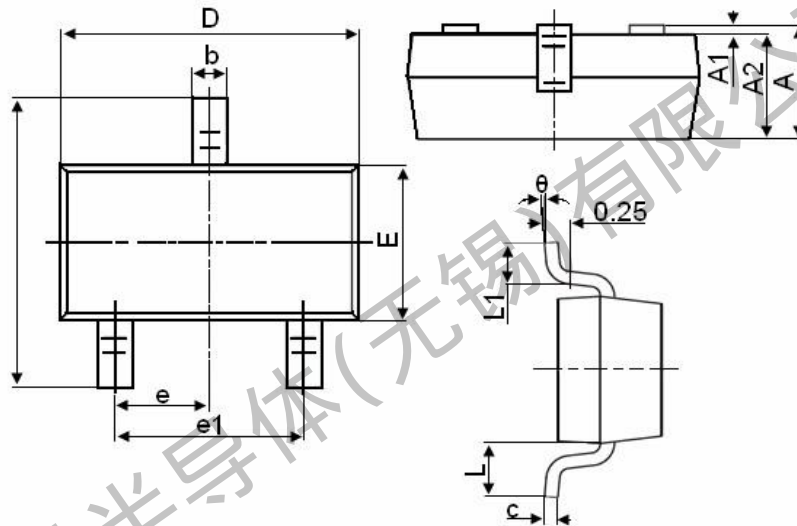
**Maximum Effective Transient Thermal Impedance, Junction-to-Ambient**



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## P-Channel Enhancement Mosfet

### Package Mechanical Data: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 |
| θ      | 0°                        | 8°    |

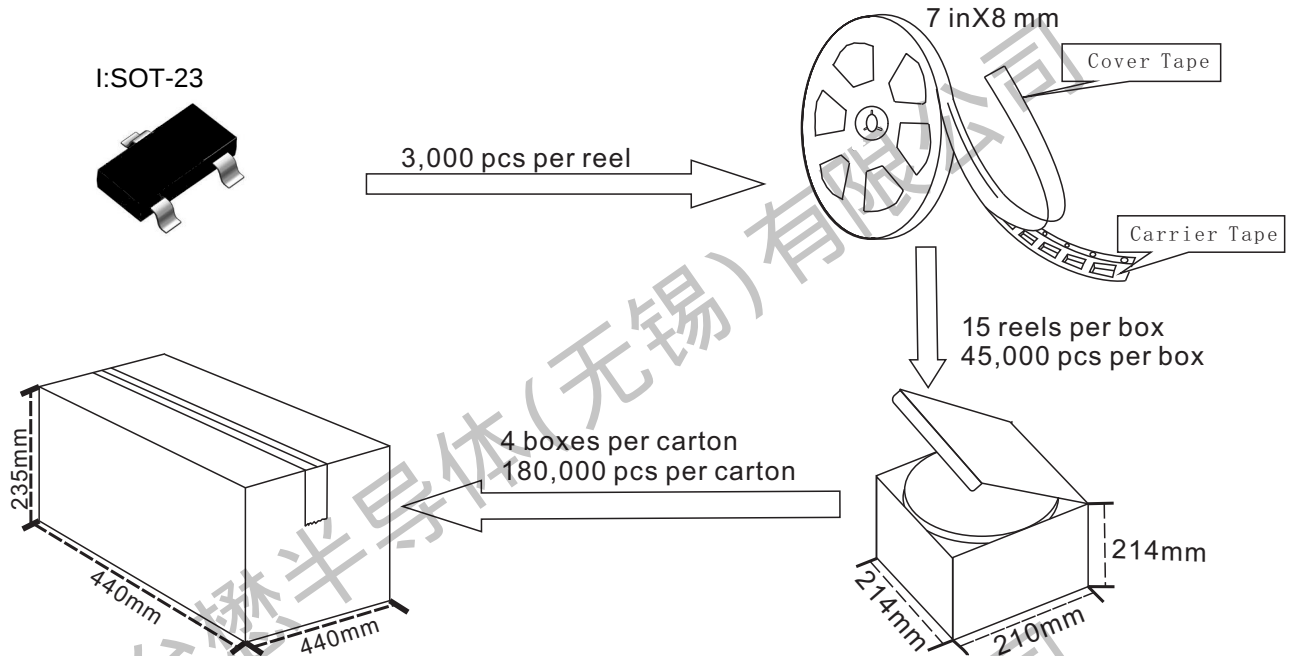


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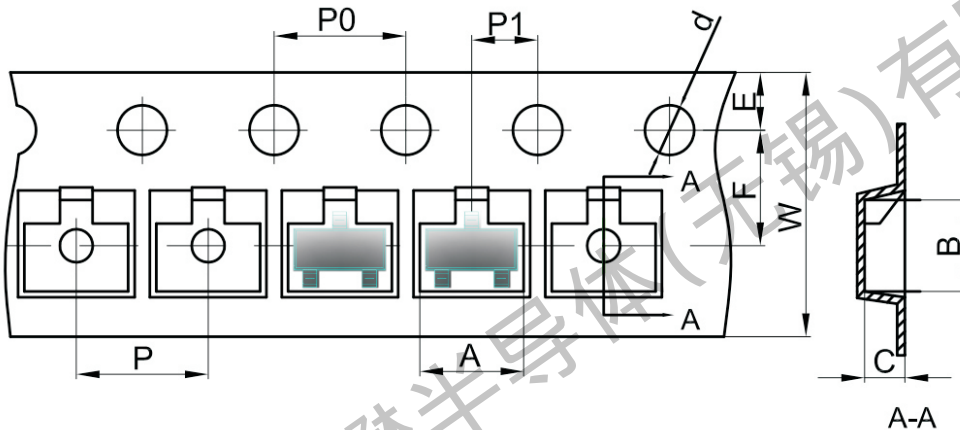
## P-Channel Enhancement Mosfet

### SOT-23 Packing

1. The method of packaging and dimension are shown as below figure. (Dimension in mm)

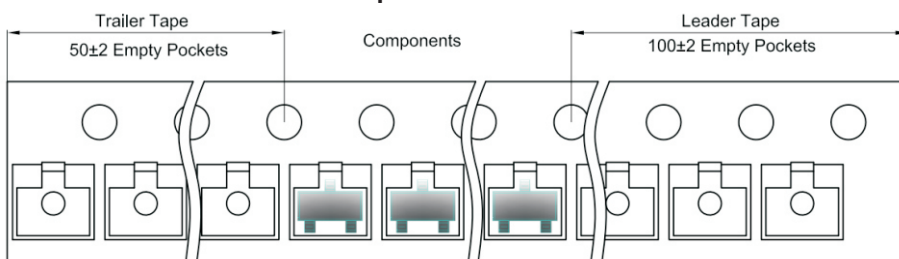


### SOT-23 Embossed Carrier Tape



| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |      |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type                     | A    | B    | C    | d     | E    | F    | P0   | P    | P1   | W    |
| SOT-23                       | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

### SOT-23 Tape Leader and Trailer



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#### Revision history:

| Date       | Rev   | Description | Page |
|------------|-------|-------------|------|
| 2023.07.09 | 23.07 | Original    |      |