

## 30V N-ch Power MOSFET, Logic Drive

### General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}=1.8m\Omega@V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

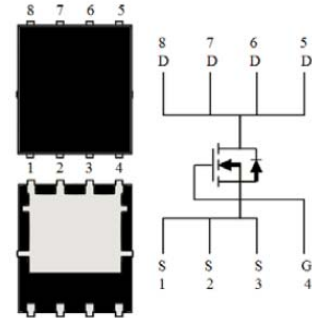
|            |                   |             |
|------------|-------------------|-------------|
| $BV_{DSS}$ | $R_{DS(ON),max.}$ | $I_D^{[2]}$ |
| 30V        | 2.2m $\Omega$     | 152A        |

### Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- UPS Inverter

### Ordering Information

| Part Number | Package    | Marking    |
|-------------|------------|------------|
| MXP3003AGL  | MaxPAK 5x6 | MXP3003AGL |



### Absolute Maximum Ratings

$T_C=25^\circ\text{C}$  unless otherwise specified

| Symbol            | Parameter   | Value      | Unit                |
|-------------------|---|------------|---------------------|
| $V_{DSS}$         | Drain-to-Source Voltage <sup>[1]</sup>  | 30         | V                   |
| $V_{GSS}$         | Gate-to-Source Voltage  | $\pm 20$   |                     |
| $I_D$             | Continuous Drain Current <sup>[2]</sup>   | 152        | A                   |
|                   | Continuous Drain Current <sup>[3]</sup>   | 130        |                     |
|                   | Continuous Drain Current at $T_C=100^\circ\text{C}$   | 107        |                     |
| $I_{DM}$          | Pulsed Drain Current at $V_{GS}=10V^{[2,4]}$  | 607        |                     |
| $E_{AS}$          | Single Pulse Avalanche Energy<br>( $V_{DD}=30V$ , $V_{GS}=10V$ , $R_G=25\Omega$ , $L=1mH$ ) | 378        | mJ                  |
| $P_D$             | Power Dissipation   | 87         | W                   |
|                   | Derating Factor above $25^\circ\text{C}$  | 0.6        | W/ $^\circ\text{C}$ |
| $T_L$             | Soldering Temperature   | 300        | $^\circ\text{C}$    |
|                   | Distance of 1.6mm from case for 10 seconds  |            |                     |
| $T_J$ & $T_{STG}$ | Operating and Storage Temperature Range   | -55 to 175 |                     |

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

### Thermal Characteristics

| Symbol          | Parameter                               | Min. | Typ. | Max. | Unit                      |
|-----------------|---|------|------|------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    |      |      | 1.73 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient |      |      | 72   |                           |

## Electrical Characteristics

### OFF Characteristics

 $T_J = 25^\circ\text{C}$  unless otherwise specified

| Symbol     | Parameter                         | Min. | Typ. | Max.      | Unit    | Test Conditions             |
|------------|-----------------------------------|------|------|-----------|---------|-----------------------------|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 30   |      |           | V       | $V_{GS}=0V, I_D=250\mu A$   |
| $I_{DSS}$  | Drain-to-Source Leakage Current   |      |      | 1         | $\mu A$ | $V_{DS}=24V, V_{GS}=0V$     |
| $I_{GSS}$  | Gate-to-Source Leakage Current    |      |      | $\pm 100$ | nA      | $V_{GS}=\pm 20V, V_{DS}=0V$ |

### ON Characteristics

 $T_J = 25^\circ\text{C}$  unless otherwise specified

| Symbol       | Parameter   | Min. | Typ. | Max. | Unit       | Test Conditions                 |
|--------------|---|------|------|------|------------|---------------------------------|
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance <sup>[4]</sup> | --   | 1.8  | 2.2  | m $\Omega$ | $V_{GS}=10V, I_D=80A^{[5]}$     |
|              |   | --   | 2.4  | 3.1  | m $\Omega$ | $V_{GS}=4.5V, I_D=80A^{[5]}$    |
| $V_{GS(TH)}$ | Gate Threshold Voltage                              | 1.0  | --   | 3.0  | V          | $V_{DS} = V_{GS}, I_D=250\mu A$ |

### Dynamic Characteristics

Essentially independent of operating temperature

| Symbol    | Parameter                     | Min. | Typ. | Max. | Unit     | Test Conditions                    |
|-----------|-------------------------------|------|------|------|----------|------------------------------------|
| $C_{iss}$ | Input Capacitance             |      | 3.6  |      | nF       | $V_{GS}=0V, V_{DS}=25V, f=1.0MHz$  |
| $C_{rss}$ | Reverse Transfer Capacitance  |      | 0.34 |      |          |                                    |
| $C_{oss}$ | Output Capacitance            |      | 0.75 |      |          |                                    |
| $R_g$     | Gate Series Resistance        |      | 1.6  |      | $\Omega$ | $f=1.0MHz$                         |
| $Q_g$     | Total Gate Charge             |      | 36   |      | nC       | $V_{DD}=15V, I_D=80A, V_{GS}=4.5V$ |
| $Q_{gs}$  | Gate-to-Source Charge         |      | 12   |      |          |                                    |
| $Q_{gd}$  | Gate-to-Drain (Miller) Charge |      | 14   |      |          |                                    |

### Resistive Switching Characteristics

Essentially independent of operating temperature

| Symbol       | Parameter           | Min. | Typ. | Max. | Unit | Test Conditions                                   |
|--------------|---------------------|------|------|------|------|---|
| $t_{d(on)}$  | Turn-on Delay Time  |      | 18   |      | ns   | $V_{DD}=15V, I_D=80A, V_{GS}=4.5V, R_G=2.5\Omega$ |
| $t_{rise}$   | Rise Time           |      | 5    |      |      |   |
| $t_{d(off)}$ | Turn-off Delay Time |      | 68   |      |      |   |
| $t_{fall}$   | Fall Time           |      | 13   |      |      |   |

### Source-Drain Body Diode Characteristics

 $T_J = 25^\circ\text{C}$  unless otherwise specified

| Symbol   | Parameter                                | Min. | Typ. | Max. | Unit | Test Conditions                        |
|----------|--|------|------|------|------|--|
| $I_{SD}$ | Continuous Source Current <sup>[2]</sup> |      |      | 152  | A    | Maximum Ratings                        |
| $V_{SD}$ | Diode Forward Voltage                    |      | 0.9  | 1.2  | V    | $I_S=80A, V_{GS}=0V$                   |
| $t_{rr}$ | Reverse Recovery Time                    |      | 42   |      | ns   | $V_{GS}=0V, I_F=20A, di/dt=100A/\mu s$ |
| $Q_{rr}$ | Reverse Recovery Charge                  |      | 4.6  |      | nC   |  |

Note:

 [1]  $T_J = +25^\circ\text{C}$  to  $+175^\circ\text{C}$ 

[2] Silicon limited current only

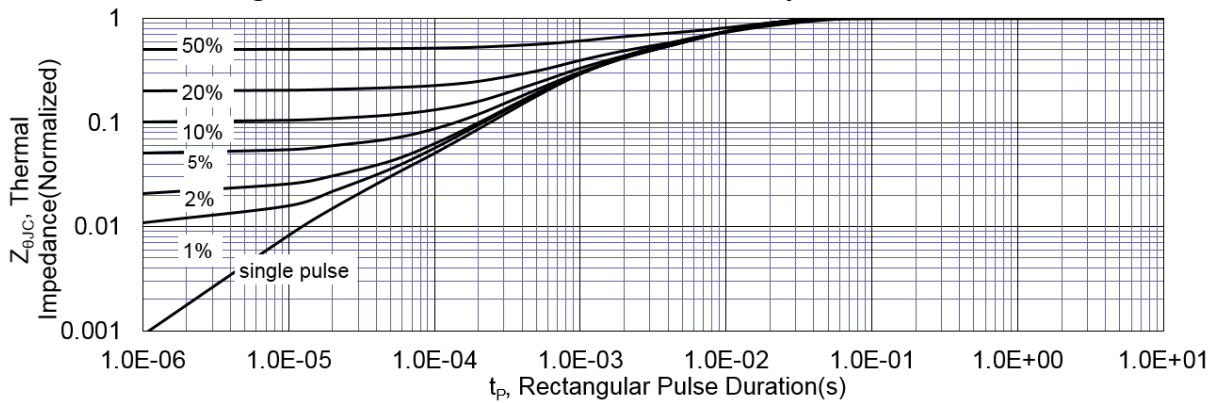
[3] Package limited current

[4] Repetitive rating, pulse width limited by both maximum junction temperature.

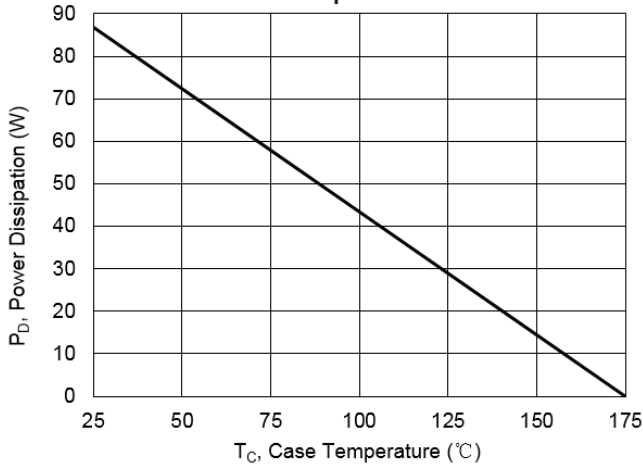
 [5] Pulse width  $\leq 380\mu s$ ; duty cycle  $\leq 2\%$ .

**Typical Characteristics**

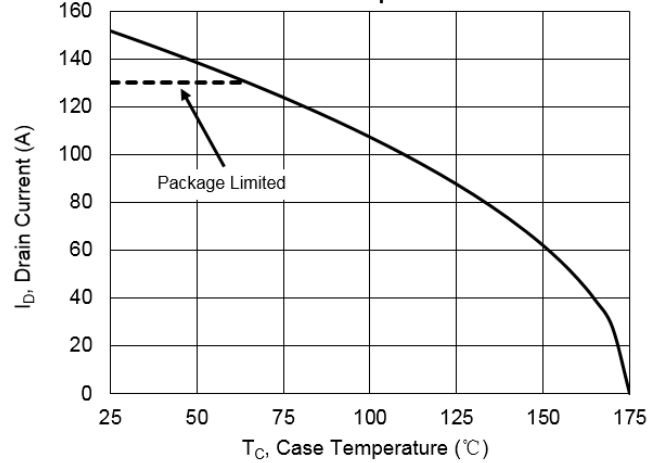
**Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case**



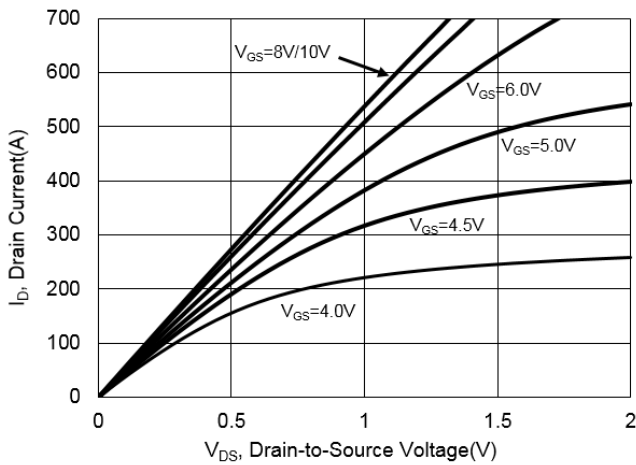
**Figure 2. Maximum Power Dissipation vs. Case Temperature**



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



**Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage**

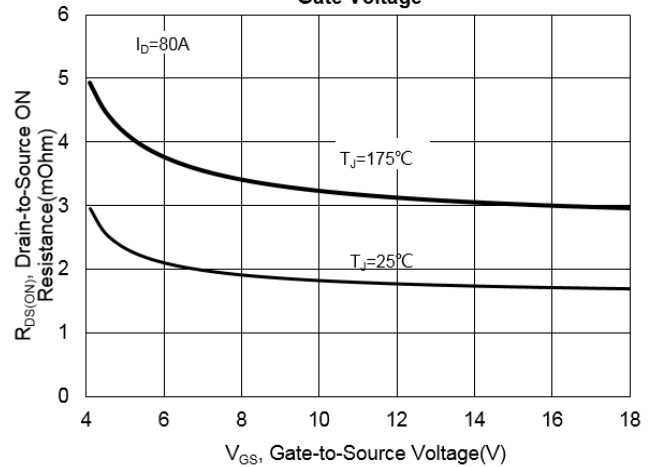


Figure 6. Maximum Peak Current Capability

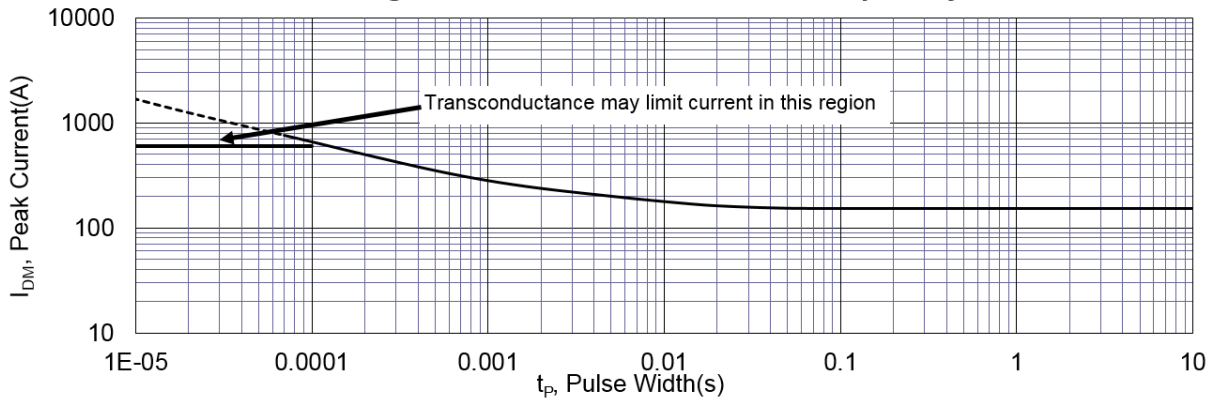


Figure 7. Typical Transfer Characteristics

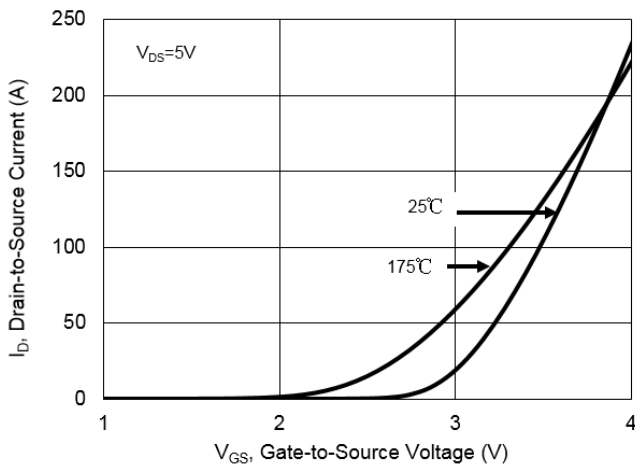


Figure 8. Unclamped Inductive Switching Capability

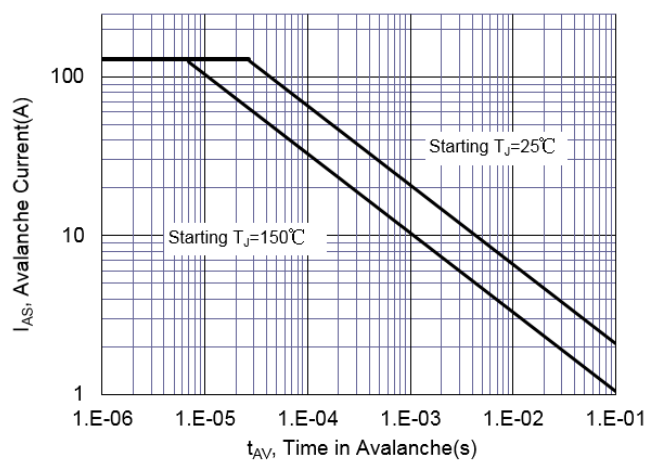


Figure 9. Typical Drain-to-Source ON Resistance

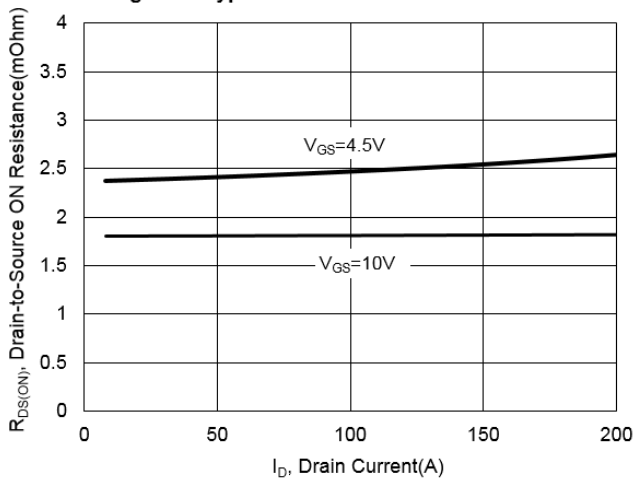
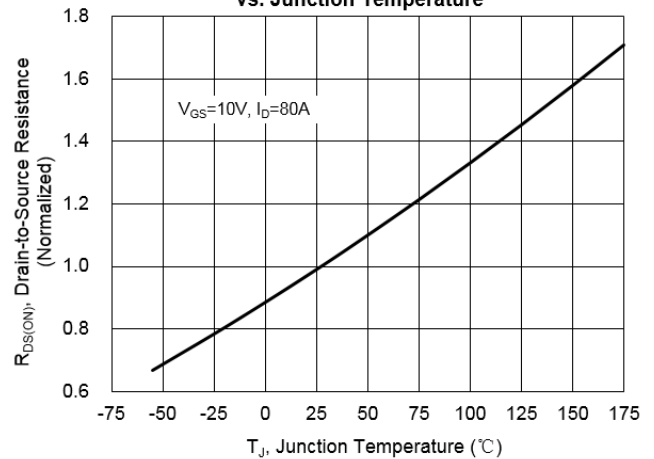
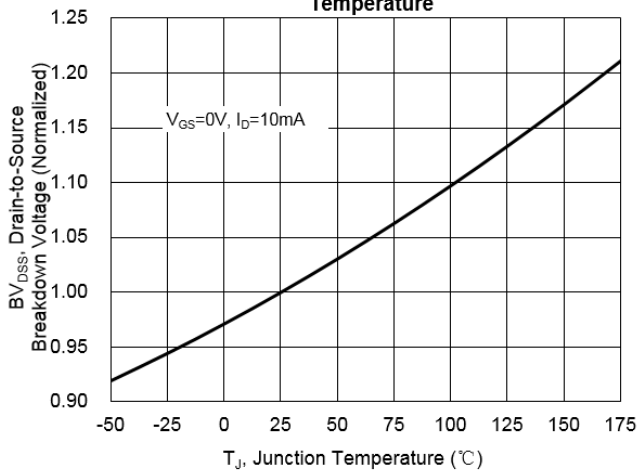


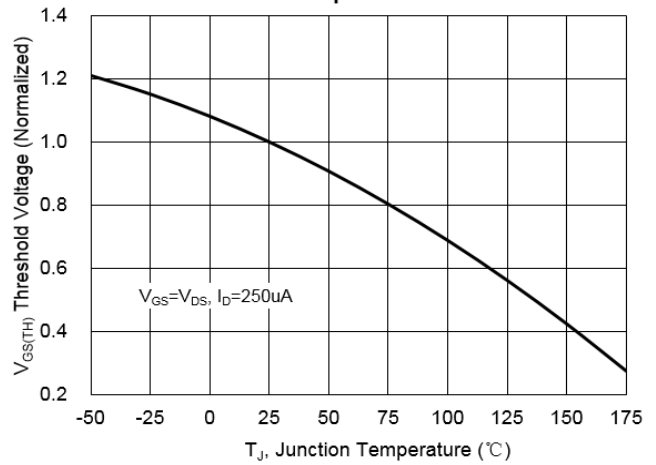
Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature



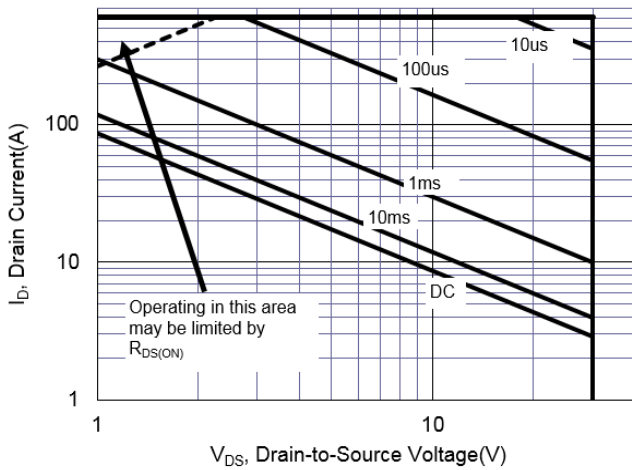
**Figure 11. Typical Breakdown Voltage vs. Junction Temperature**



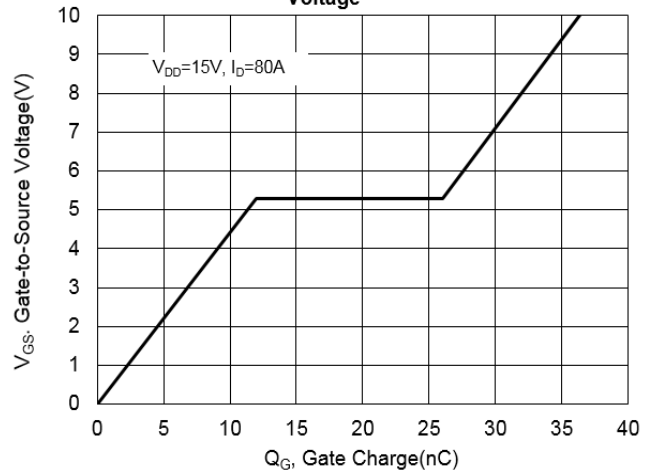
**Figure 12. Typical Threshold Voltage vs. Junction Temperature**



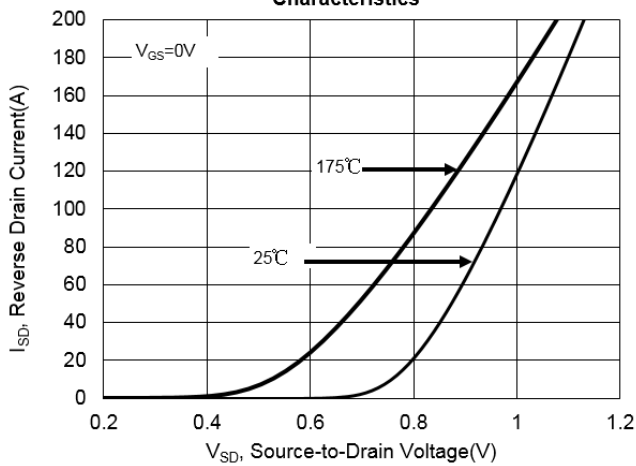
**Figure 13. Maximum Forward Safe Operation Area**



**Figure 14. Typical Gate Charge vs. Gate-to-Source Voltage**

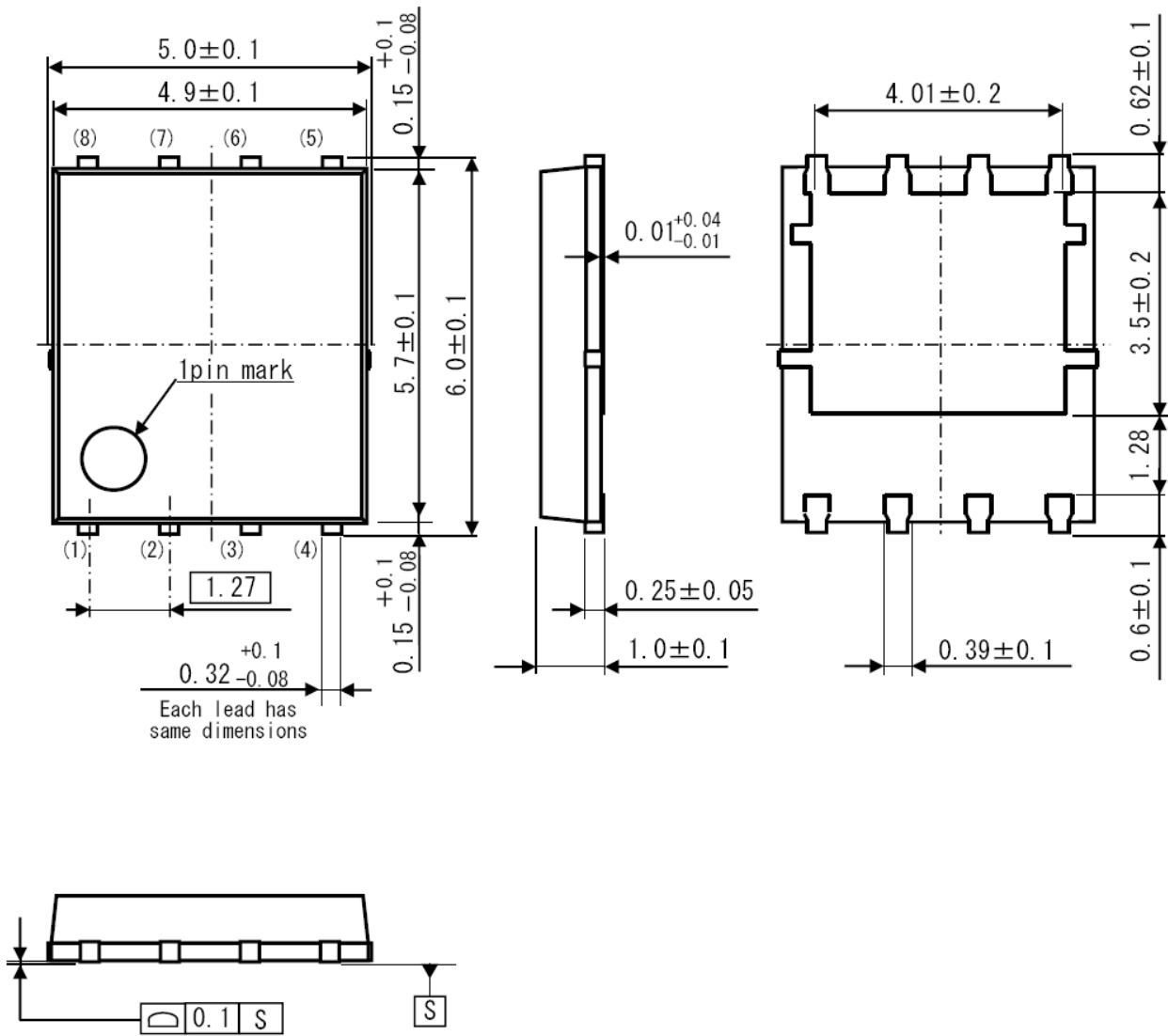


**Figure 15. Typical Body Diode Transfer Characteristics**



**Package Dimensions**

**MaxPAK 5x6**



UNIT:mm

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