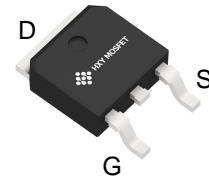




## General Description

The IPD90N06S4L03ATMA1 use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness.



TO-252-2L

## General Features

$V_{DS} = 60V$   $I_D = 130A$

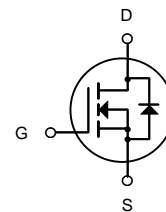
$R_{DS(ON)} < 3.5m\Omega @ V_{GS} = 10V$

## Applications

Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



N-Channel MOSFET

## Ordering Information

| Product ID         | Pack      | Brand      | Qty(PCS) |
|--------------------|-----------|------------|----------|
| IPD90N06S4L03ATMA1 | TO-252-2L | HXY MOSFET | 2500     |

## Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

| Symbol                   | Parameter  | Rating     | Units |
|--------------------------|--|------------|-------|
| $V_{DS}$                 | Drain-Source Voltage                             | 60         | V     |
| $V_{GS}$                 | Gate-Source Voltage                              | $\pm 20$   | V     |
| $I_D @ T_C = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$         | 130        | A     |
| $I_D @ T_C = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$         | 85         | A     |
| $I_{DM}$                 | Pulsed Drain Current <sup>2</sup>                | 390        | A     |
| EAS                      | Single Pulse Avalanche Energy <sup>3</sup>       | 80         | mJ    |
| $P_D @ T_C = 25^\circ C$ | Total Power Dissipation <sup>4</sup>             | 140        | W     |
| $T_{STG}$                | Storage Temperature Range                        | -55 to 175 | °C    |
| $T_J$                    | Operating Junction Temperature Range             | -55 to 175 | °C    |
| $R_{\theta JC}$          | Thermal Resistance Junction-Ambient <sup>1</sup> | 0.89       | °C/W  |



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

| Symbol  | Parameter   | Test Condition   | Min. | Typ. | Max. | Units |
|---|---|--|------|------|------|-------|
| <b>Off Characteristic</b>                                     |   |  |      |      |      |       |
| V <sub>(BR)DSS</sub>  | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 60   | -    | -    | V     |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V,   | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>  | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V  | -    | -    | ±100 | nA    |
| <b>On Characteristics</b>                                     |   |  |      |      |      |       |
| V <sub>GS(th)</sub>   | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 1.0  | 1.6  | 2.5  | V     |
| R <sub>DS(on)</sub>   | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A  | -    | 3    | 3.5  | mΩ    |
|   |   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A   | -    | 3.5  | 4.5  |       |
| <b>Dynamic Characteristics</b>                                |   |  |      |      |      |       |
| C <sub>iss</sub>  | Input Capacitance   | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                 | -    | 5377 | -    | pF    |
| C <sub>oss</sub>  | Output Capacitance  |  | -    | 1666 | -    | pF    |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                              |  | -    | 77.7 | -    | pF    |
| Q <sub>g</sub>  | Total Gate Charge   | V <sub>DS</sub> =30V, I <sub>D</sub> =25A,<br>V <sub>GS</sub> =10V                     | -    | 66.1 | -    | nC    |
| Q <sub>gs</sub>   | Gate-Source Charge  |  | -    | 10.7 | -    | nC    |
| Q <sub>gd</sub>   | Gate-Drain("Miller") Charge                               |  | -    | 10.9 | -    | nC    |
| <b>Switching Characteristics</b>                              |   |  |      |      |      |       |
| t <sub>d(on)</sub>  | Turn-on Delay Time  | V <sub>DD</sub> =30V, I <sub>D</sub> =25A,<br>R <sub>G</sub> =3Ω, V <sub>GS</sub> =10V | -    | 20   | -    | ns    |
| t <sub>r</sub>  | Turn-on Rise Time   |  | -    | 55   | -    | ns    |
| t <sub>d(off)</sub>   | Turn-off Delay Time                                       |  | -    | 100  | -    | ns    |
| t <sub>f</sub>  | Turn-off Fall Time  |  | -    | 24   | -    | ns    |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |   |  |      |      |      |       |
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current  |  | -    | -    | 125  | A     |
| I <sub>SM</sub>   | Maximum Pulsed Drain to Source Diode Forward Current      |  | -    | -    | 390  | A     |
| V <sub>SD</sub>   | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A   | -    | 0.8  | 1.3  | V     |
| t <sub>rr</sub>   | Body Diode Reverse Recovery Time                          | T <sub>J</sub> =25°C,<br>I <sub>F</sub> =25A, di/dt=100A/μs                            | -    | 68.3 | -    | ns    |
| Q <sub>rr</sub>   | Body Diode Reverse Recovery Charge                        |  | -    | 73   | -    | nC    |

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

2. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=30V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=12A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%



## Typical Performance Characteristics

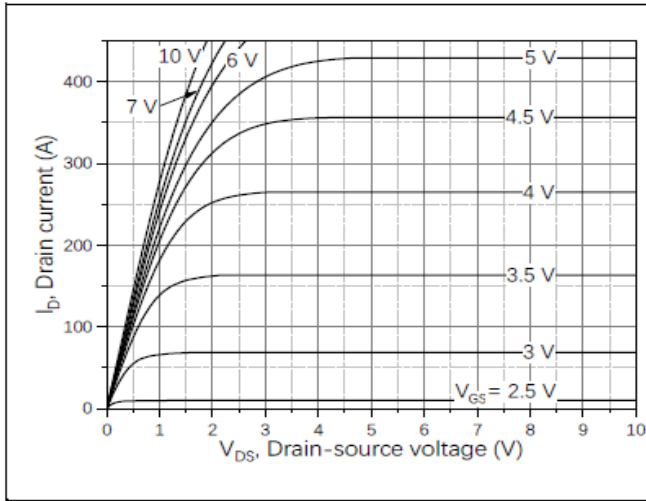


Figure 1, Typ. output characteristics

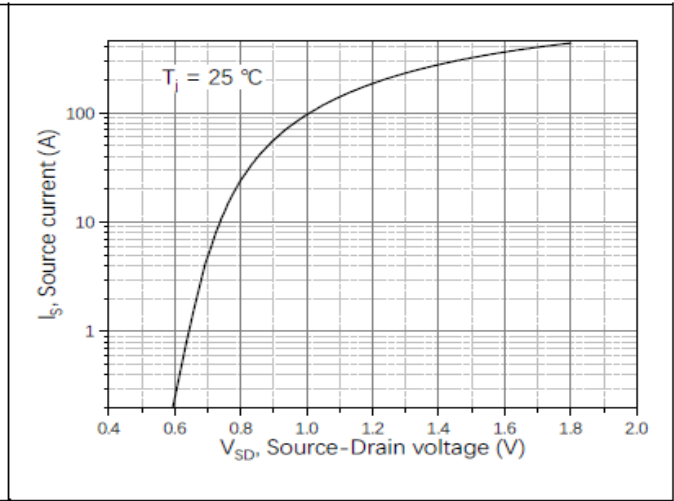


Figure 2, Typ. transfer characteristics

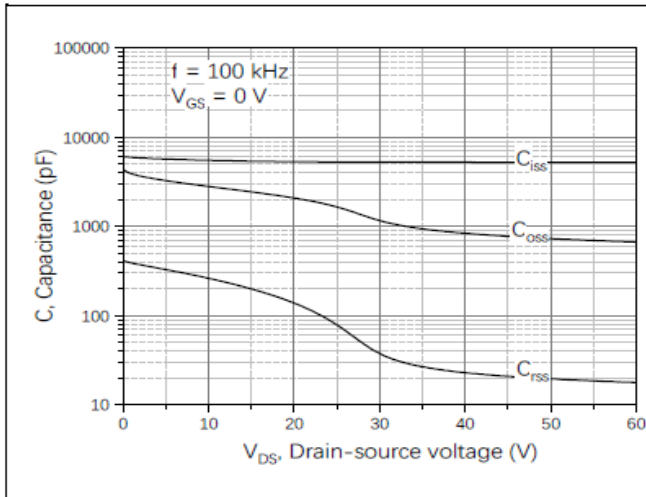


Figure 3, Typ. capacitances

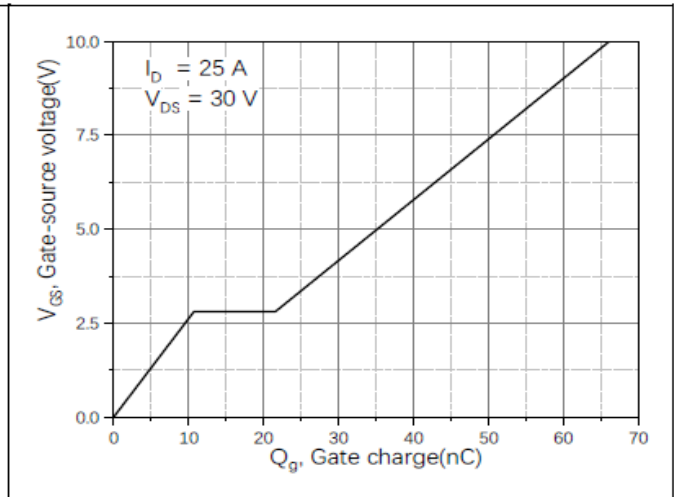


Figure 4, Typ. gate charge

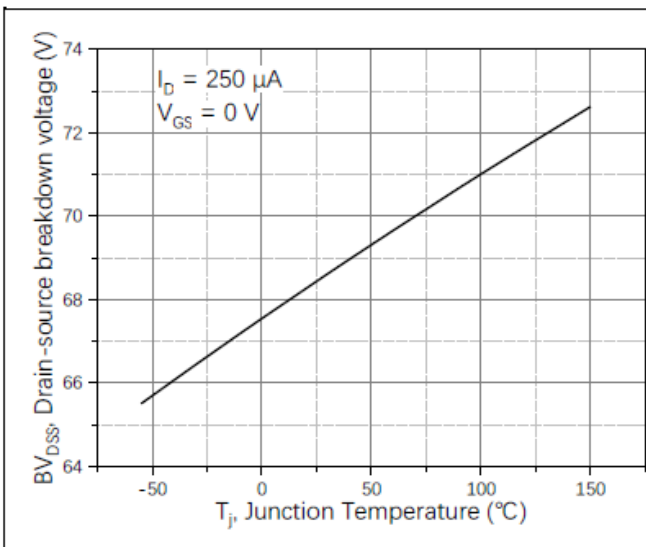


Figure 5, Drain-source breakdown voltage

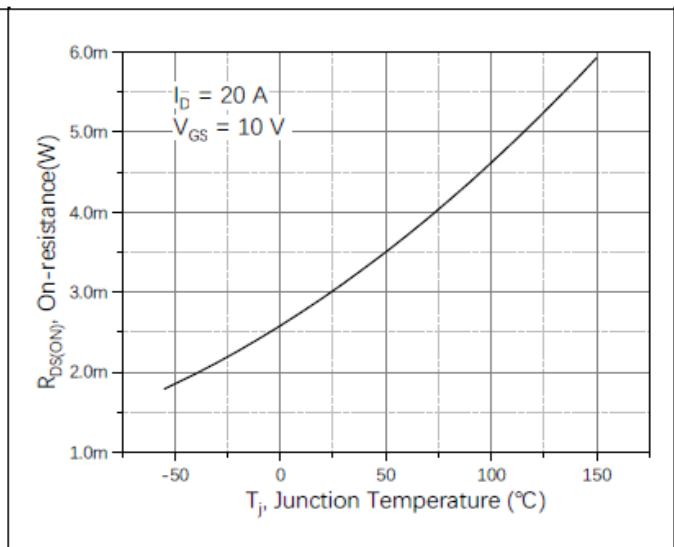


Figure 6, Drain-source on-state resistance

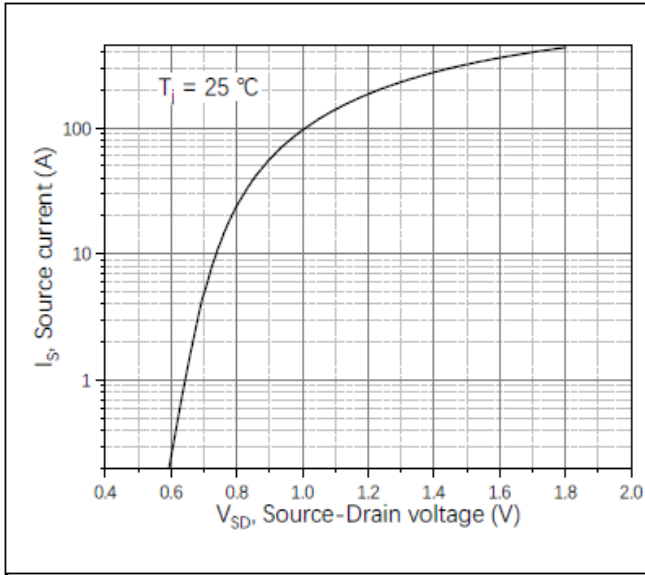


Figure 7, Forward characteristic of body diode

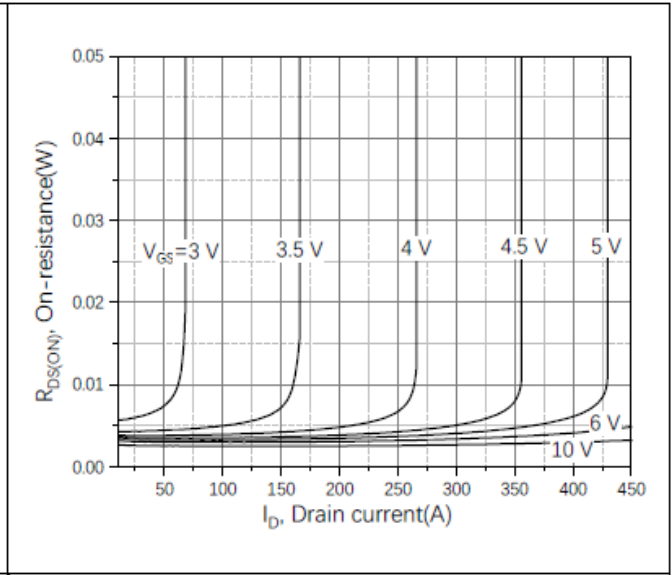


Figure 8, Drain-source on-state resistance

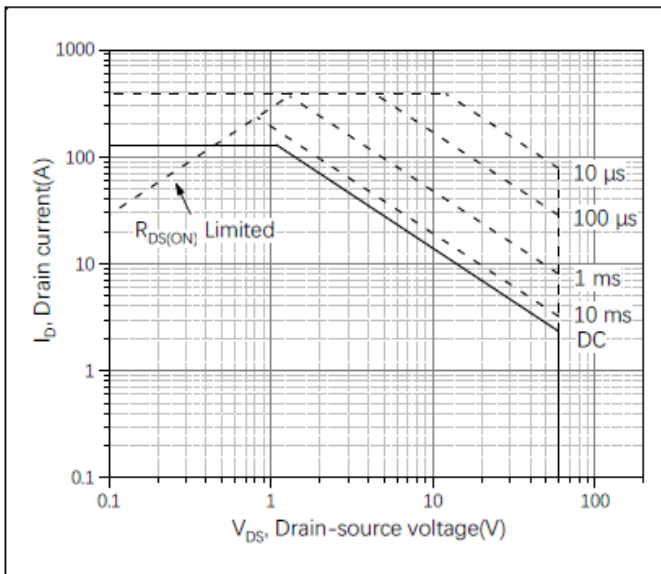
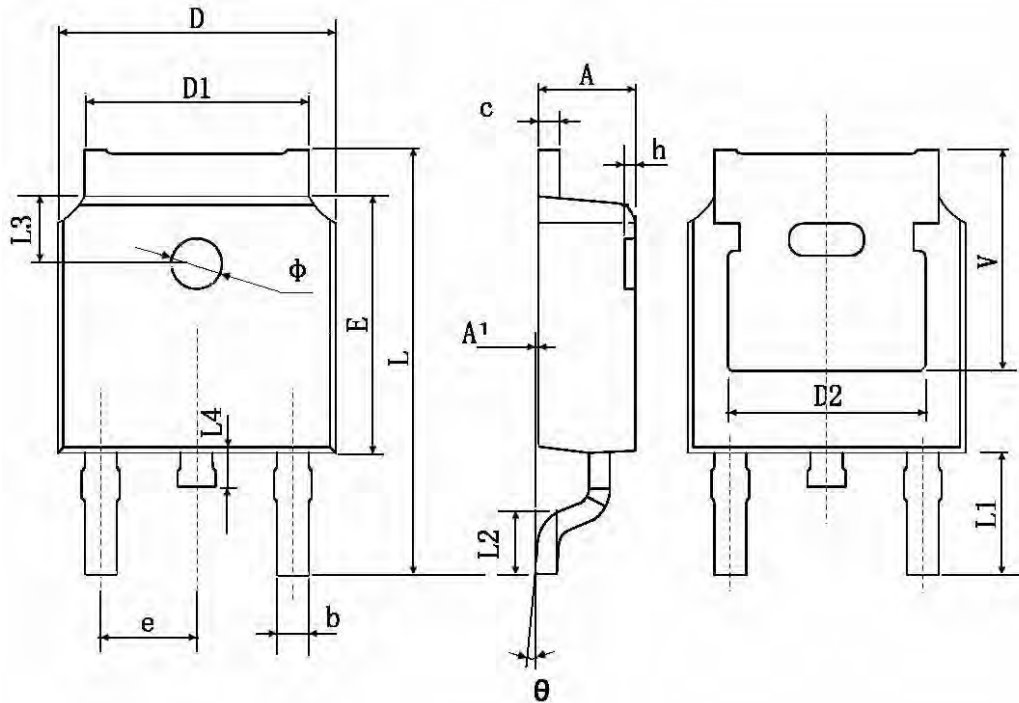


Figure 9, Safe operation area  $T_C=25\text{ }^\circ\text{C}$



**TO-252-2L Package Information**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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