

## -30V<sub>DS</sub>/±20V<sub>GS</sub> P-Channel Enhancement Mode MOSFET

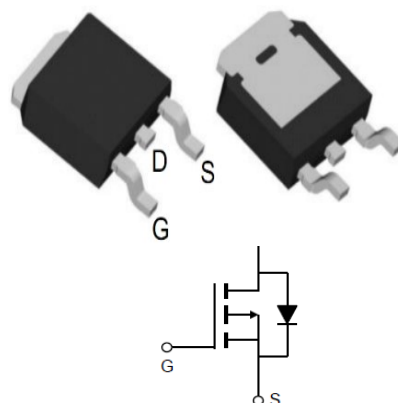
### Features

- V<sub>DS</sub>=-30V, I<sub>D</sub>=-90A
- R<sub>DS(ON)</sub>=5.5mΩ (TYP.) V<sub>GS</sub>=-10V
- R<sub>DS(ON)</sub>=9.0mΩ (TYP.) V<sub>GS</sub>=-4.5V
- Fast Switching
- Low On-Resistance

### Applications

- Switch switching
- Power management in portable/desktop PCs

TO-252



### Ordering Information

| Device        | package | Device Marking | Package Qty. |
|---------------|---------|----------------|--------------|
| IPD90P03P4-04 | TO-252  | D90P03P4       | 2500/PCS     |

### Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise noted)

| Parameter                                         | Symbol                            | Value   | Unit |
|---------------------------------------------------|-----------------------------------|---------|------|
| Drain-Source Voltage (V <sub>GS</sub> =0V)        | V <sub>DS</sub>                   | -30     | V    |
| Gate-Source Voltage (V <sub>GS</sub> =0V, static) | V <sub>GS</sub>                   | ±20     | V    |
| Continuous Drain Current (T <sub>C</sub> =25°C)   | I <sub>D</sub>                    | -90     | A    |
| Continuous Drain Current (T <sub>C</sub> =100°C)  |                                   | -55     | A    |
| Pulsed Drain Current                              | I <sub>DM</sub>                   | -120    | A    |
| Avalanche Energy, Single Pulsed                   | E <sub>AS</sub>                   | 102     | mJ   |
| Maximum Power Dissipation (T <sub>C</sub> =25°C)  | P <sub>D</sub>                    | 120     | W    |
| Maximum Power Dissipation (T <sub>C</sub> =100°C) |                                   | 30      | W    |
| Operating, Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55~150 | °C   |

### Thermal Characteristics

| Parameter                               | Symbol           | Min. | Typ. | Max. | Unit |
|-----------------------------------------|------------------|------|------|------|------|
| Thermal Resistance, Junction-to-Case    | R <sub>θJC</sub> | -    | 1.25 | -    | °C/W |
| Thermal Resistance, Junction-to-Ambient | R <sub>θJA</sub> | -    | 50   | -    | °C/W |



## Electrical Characteristics

| Parameter                        | Symbol       | Test Conditions                | Min. | Typ. | Max.     | Unit       |
|----------------------------------|--------------|--------------------------------|------|------|----------|------------|
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$     | -30  | -    | -        | V          |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS}=-30V, V_{GS}=0V$       | -    | -    | -1       | $\mu A$    |
| Gate -Source Leakage Current     | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$    | -    | -    | $\pm 10$ | nA         |
| Gate Threshold Voltage           | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1.5 | -1.9 | -2.4     | V          |
| Drain-Source On-stage Resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-1A$         | -    | 5    | 7.5      | m $\Omega$ |
|                                  |              | $V_{GS}=-4.5V, I_D=-1A$        | -    | 9    | 13       |            |

## Dynamic Characteristics

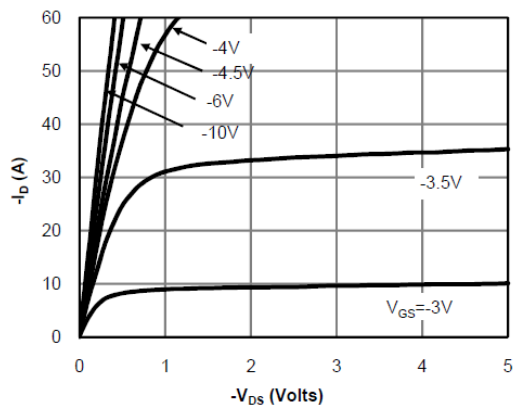
| Parameter                    | Symbol       | Test Conditions                                                  | Min. | Typ. | Max. | Unit     |
|------------------------------|--------------|------------------------------------------------------------------|------|------|------|----------|
| Input capacitance            | $C_{iss}$    | $V_{DS}=-15V$<br>$V_{GS}=0V$<br>$f=1MHz$                         | -    | 3736 | -    | pF       |
| Output capacitance           | $C_{oss}$    |                                                                  | -    | 485  | -    |          |
| Reverse transfer capacitance | $C_{rss}$    |                                                                  | -    | 439  | -    |          |
| Gate Resistance              | $R_g$        | $f=1MHz$                                                         | -    | 6    | -    | $\Omega$ |
| Total Gate Charge            | $Q_g$        | $V_{DS}=-15V$<br>$V_{GS}=-10V$<br>$I_D=-15A$                     | -    | 36   | -    | nC       |
| Gate Source Charge           | $Q_{gs}$     |                                                                  | -    | 3    | -    |          |
| Gate Drain Charge            | $Q_{gd}$     |                                                                  | -    |      | -    |          |
| Turn-on delay Time           | $t_{d(on)}$  | $V_{GS}=-10V$<br>$V_{DS}=-15V$<br>$R_L=1\Omega$<br>$R_G=3\Omega$ | -    | 16   | -    | ns       |
| Rise time                    | $t_r$        |                                                                  | -    | 19   | -    |          |
| Turn-off delay Time          | $t_{d(off)}$ |                                                                  | -    | 70   | -    |          |
| Fall time                    | $t_f$        |                                                                  | -    | 41   | -    |          |

## Reverse Diode Characteristics

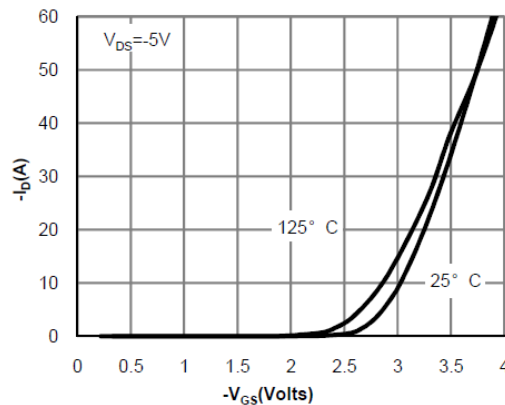
| Parameter                  | Symbol   | Test Conditions                                  | Min. | Typ.  | Max. | Unit |
|----------------------------|----------|--------------------------------------------------|------|-------|------|------|
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}=0V, I_{SD}=-1A$                          | -    | -0.75 | -1.2 | V    |
| Reverse Recovery Time      | $t_{rr}$ | $V_{GS}=0V, I_{SD}=-15A$<br>$d_i/d_t=100A/\mu s$ | -    | 90    | -    | ns   |
| Reverse Recovery Charge    | $Q_{rr}$ |                                                  | -    | 70    | -    | nC   |

## Electrical Characteristics Diagrames

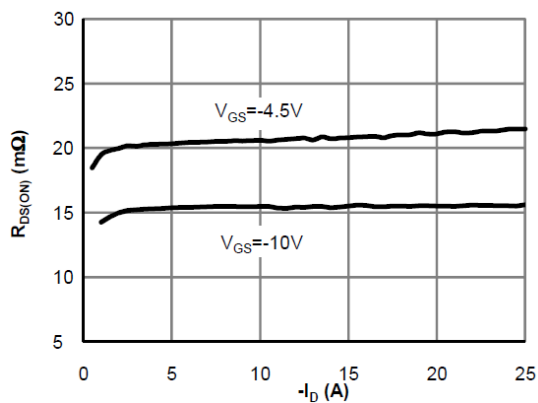
**Figure 1. On-Regin Characteristics**



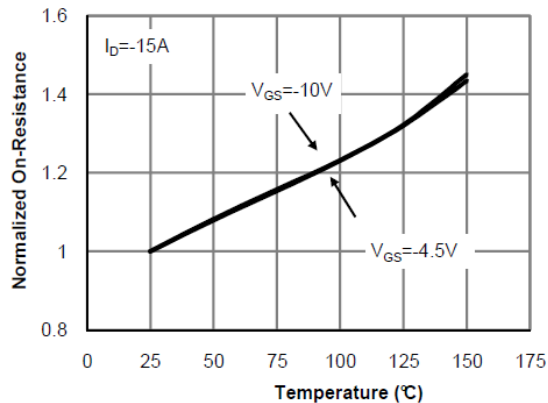
**Figure 2. Transfer Characteristics**



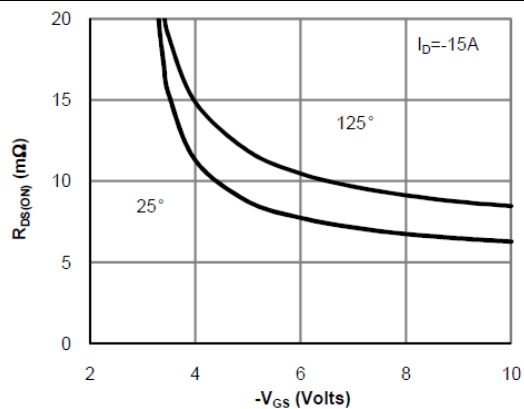
**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**



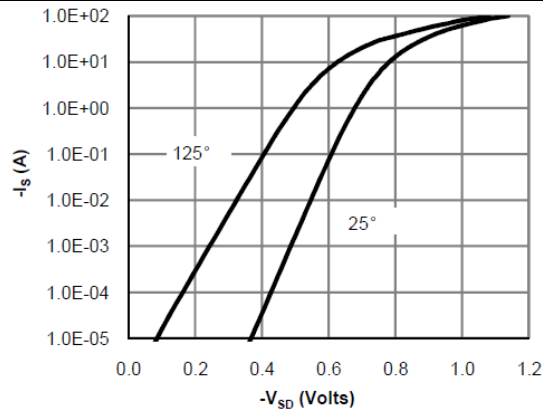
**Figure 4. On-Resistance vs. Junction Temperature**



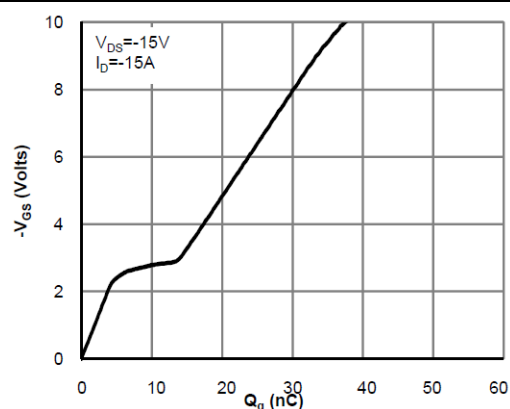
**Figure 5. On-Resistance vs. Gate-Source Voltage**



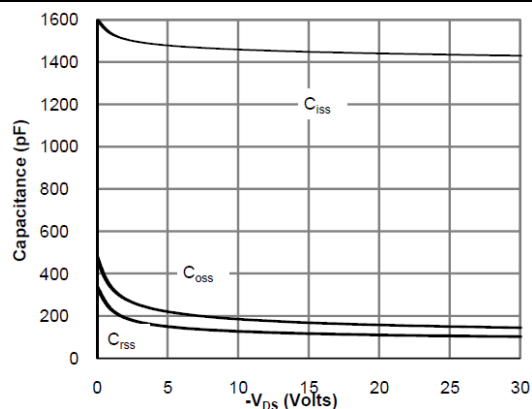
**Figure 6. Body-Diode Characteristics**



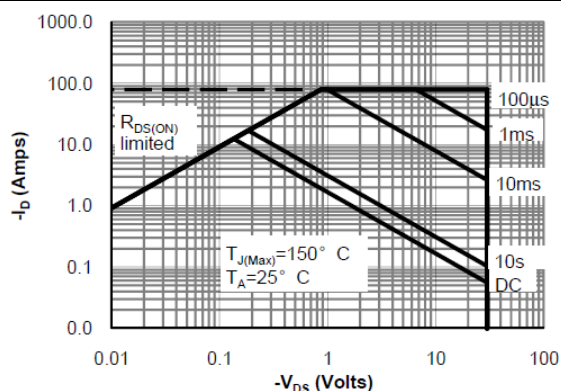
**Figure 7. Gate-Charge Characteristics**



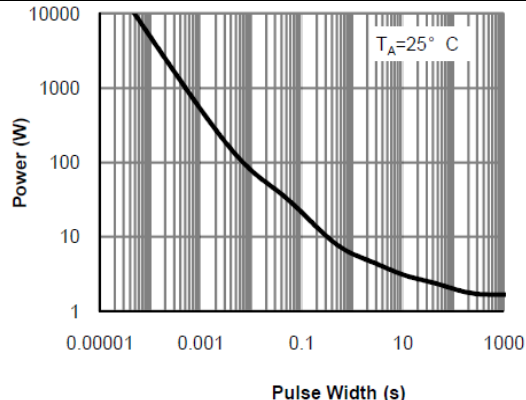
**Figure 8. Capacitance Characteristics**



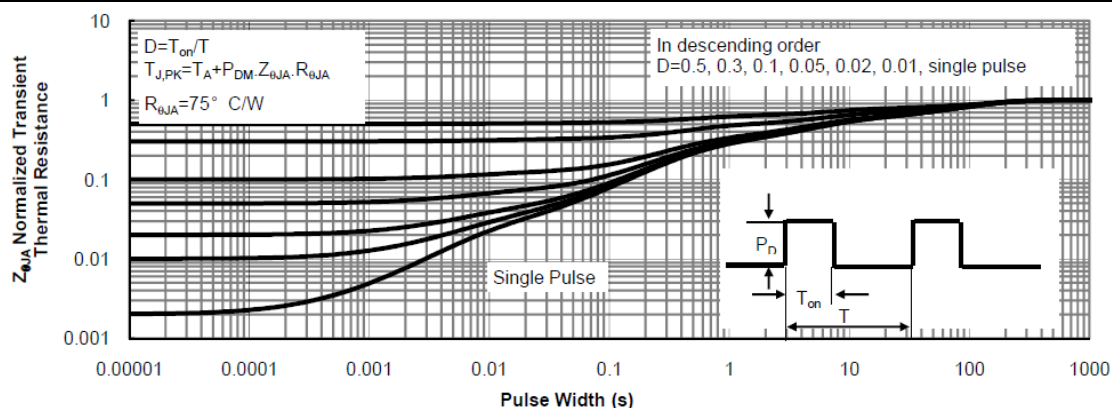
**Figure 9. Maximum Forward Biased Safe Operating Area**



**Figure 10. Single Pulse Power Rating Junction-to-Ambient**

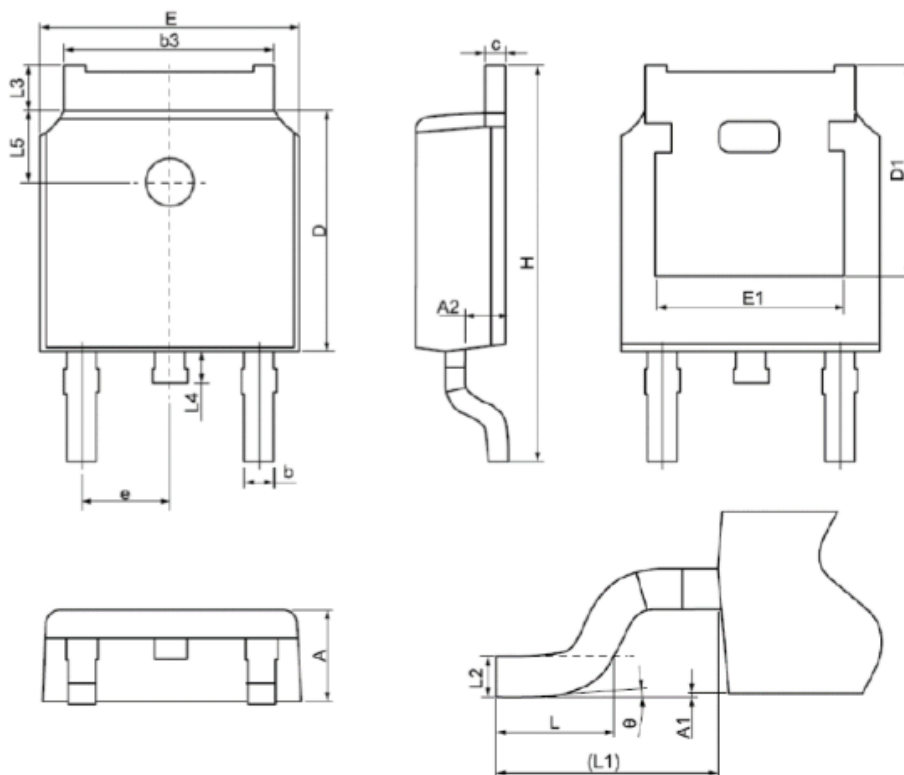


**Figure 11. Normalized Maximum Transient Thermal Impedance**



## Physical Dimensions

### TO-252



| Symbol | Dimension (mm) |      |      | Symbol | Dimension (mm) |       |       |
|--------|----------------|------|------|--------|----------------|-------|-------|
|        | Min            | Nom  | Max  |        | Min            | Nom   | Max   |
| A      | 2.20           | 2.30 | 2.40 | e      | 2.286(BSC)     |       |       |
| A1     | 0.00           | -    | 0.20 | H      | 9.40           | 10.10 | 10.50 |
| A2     | 0.97           | 1.07 | 1.17 | L      | 1.38           | 1.50  | 1.75  |
| b      | 0.68           | 0.78 | 0.90 | L1     | 2.90(REF)      |       |       |
| b3     | 5.20           | 5.33 | 5.50 | L2     | 0.51(BSC)      |       |       |
| c      | 0.43           | 0.53 | 0.63 | L3     | 0.88           | -     | 1.28  |
| D      | 5.98           | 6.10 | 6.22 | L4     | 0.50           | -     | 1.00  |
| D1     | 5.30(REF)      |      |      | L5     | 1.65           | 1.80  | 1.95  |
| E      | 6.40           | 6.60 | 6.80 | θ      | 0°             | -     | 8°    |
| E1     | 4.63           | -    | -    | -      | -              | -     | -     |

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