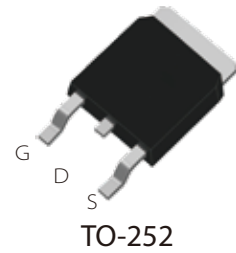


FEATURES

$V_{DS} = 12V, I_D = 90A$

$R_{DS(ON)} < 4.5m\Omega @ V_{GS} = 4.5V$ (Typ. : 3.5m Ω)

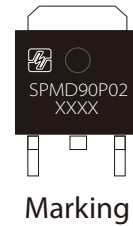


APPLICATION

Battery protection

Load switch

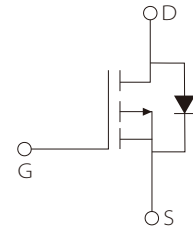
Uninterruptible power supply



APPROVALS

RoHS Compliance with 2011/65/EU

HF Compliance with IEC61249-2-21:2003



Schematic Symbol

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$)

| Parameter | Symbol | Value | Unit | |
|--|-----------------|---------------------|--------------|---|
| Drain-Source Voltage | V_{DS} | -12 | V | |
| Gate-Source Voltage | V_{GS} | ± 12 | V | |
| Continuous Drain Current, $V_{GS} @ 10V^1$ | I_D | $T_C = 25^\circ C$ | -90 | A |
| | | $T_C = 100^\circ C$ | -54 | A |
| Drain Current – Pulsed1 | I_{DM} | -240 | A | |
| Avalanche Current | IAS | 50 | A | |
| Single Pulsed Avalanche Energy | EAS | 560 | mJ | |
| Operating Junction Temperature & Storage Temperature | T_{STG}, T_J | -55 to +150 | $^\circ C$ | |
| Thermal Resistance Junction to ambient | $R_{\theta JA}$ | 62.5 | $^\circ C/W$ | |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | 3 | $^\circ C/W$ | |

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|-------------------------------------|---|------|--------|------|-------|
| Drain-source Breakdown Voltage | V _{(BR)DSS} | V _{GS} =0V, I _D =-250μA | -12 | -18 | | V |
| BVDSS Temperature Coefficient | ΔBV _{DSS} /ΔT _J | Reference to 25°C, I _D =-1mA | | -0.008 | | V/°C |
| Static Drain-Source On-Resistance | R _{DS(ON)} | V _{GS} =-4.5V, I _D =-20A | | 3.5 | 4.5 | mΩ |
| | | V _{GS} =-2.5V, I _D =-20A | | 4.8 | 6.0 | mΩ |
| Gate Threshold Voltage | V _{GS(th)} | V _{GS} =V _{DS} , I _D =-250μA | -0.4 | -0.6 | -1.0 | V |
| VGS(th) Temperature Coefficient | ΔV _{GS} | | | -3.44 | | mV/°C |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =-20V, V _{GS} =0V, T _J =25°C | | | -1 | μA |
| | | V _{DS} =-16V, V _{GS} =0V, T _J =125°C | | | -30 | μA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} = ±12V, V _{DS} = 0V | | | ±500 | nA |
| Forward Transconductance | gfs | V _{DS} = -10V, I _S = -3A | | 30 | | S |
| Turn-on Delay Time | td(on) | V _{DD} =-15V, I _D =-1A, R _G =25Ω V _{GS} =-4.5V | | 21.2 | 42 | ns |
| Rising time | tf | | | 20.6 | 40 | ns |
| Turn-off Delay Time | td(off) | | | 26 | 52 | ns |
| Input capacitance | tf | | | 400 | 600 | ns |
| Total gate charge | Q _g | V _{DS} =-16V, I _D =-5A, V _{GS} =-4.5V | | 149 | 225 | nC |
| Gate-source charge | Q _{gs} | | | 14.4 | 22 | nC |
| Gate-drain charge | Q _{gd} | | | 42.8 | 65 | nC |
| Input Capacitance | C _{iss} | V _{DS} =-15V, V _{GS} =0V, F=1MHz | | 6800 | | pF |
| Output Capacitance | C _{oss} | | | 769 | | pF |
| Reverse Transfer Capacitance | C _{rss} | | | 726 | | pF |
| Gate resistance | Rg | V _{DS} =0V, V _{GS} =0V, F=1MHz | | 2.6 | | Ω |
| Contineous Source Current | I _s | V _g =V _d =0V, Force Current | | | -90 | A |
| Pulsed Source Current | Qrr | | | | -180 | A |
| Diode Forward Voltage | V _{SD} | V _{gs} =0V, I _s =1A, T _J =25°C | | | -1 | V |

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
- 3、 The EAS data shows Max. rating . The test condition is VDD=8V, VGS=4.5V, L=0.1mH, IAS =50A
- 4、 The power dissipation is limited by 150°C junction temperature
- 5、 The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

CHARACTERISTIC CURVES

Fig.1 Power Dissipation

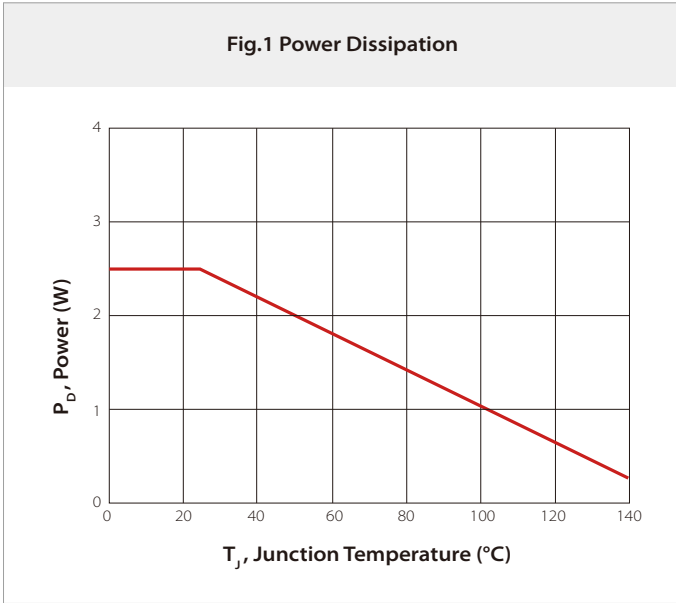


Fig.2 Drain Current

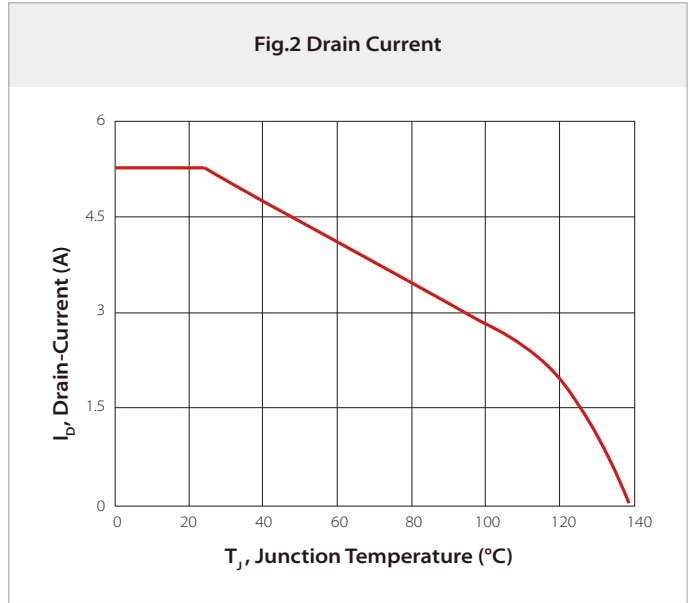


Fig.3 Output Characteristics

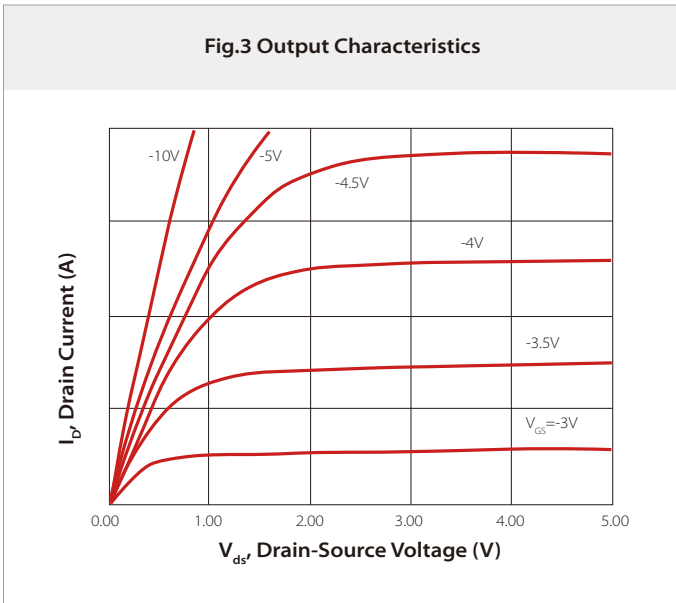


Fig.4 Drain-Source On-Resistance

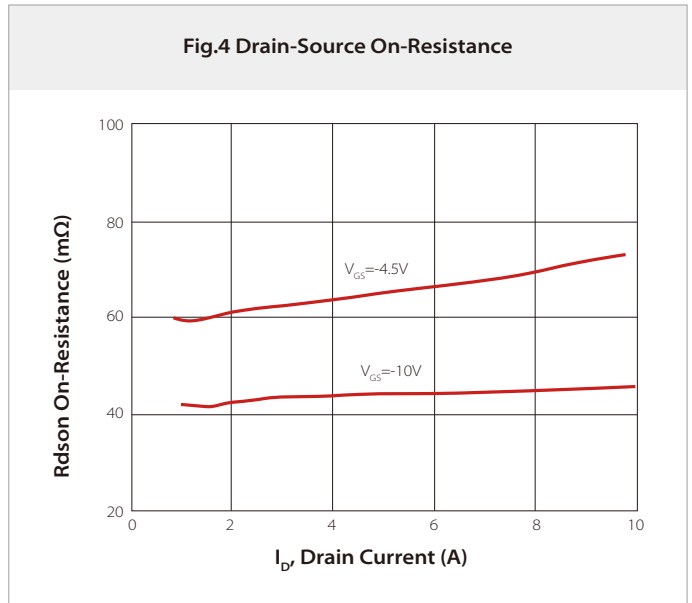


Fig.5 Transfer Characteristics

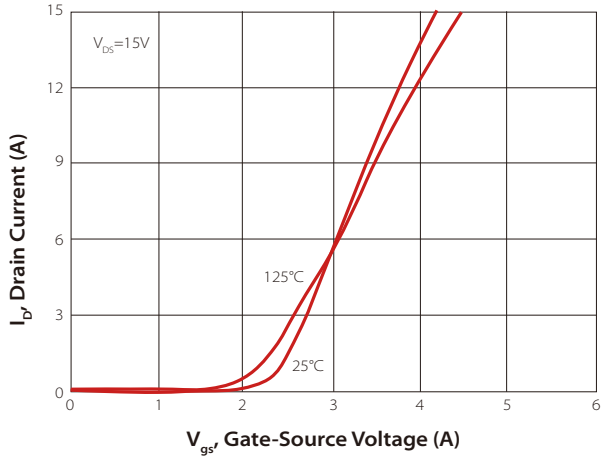


Fig. 6 Drain-Source On-Resistance

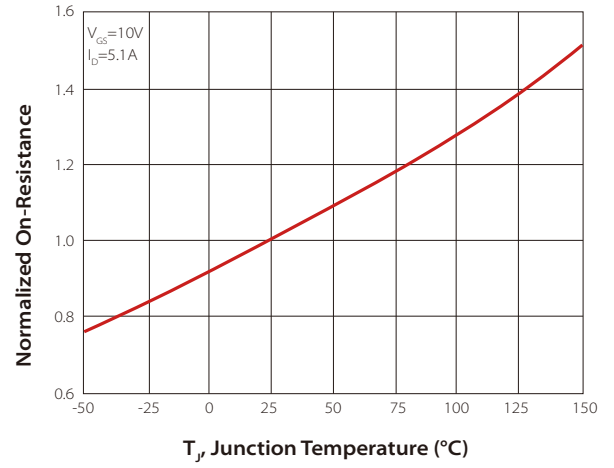


Fig.7 Rdson vs Vgs

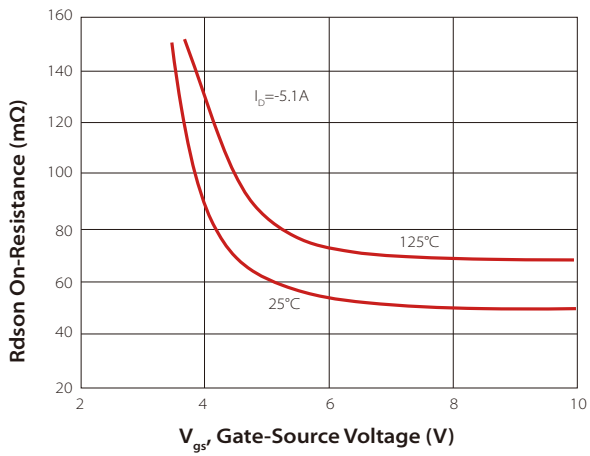


Fig.8 Capacitance vs Vds

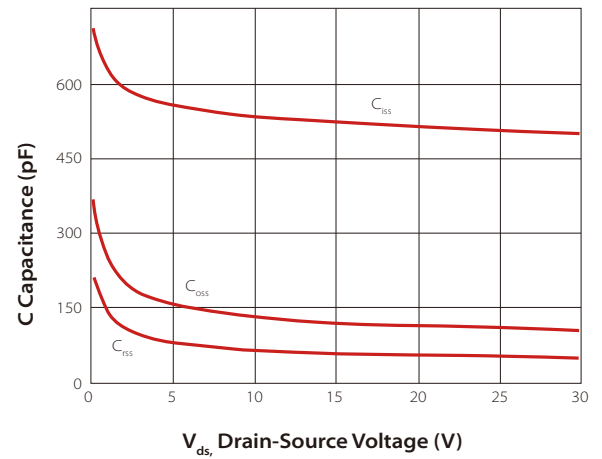


Fig.9 Gate Charge

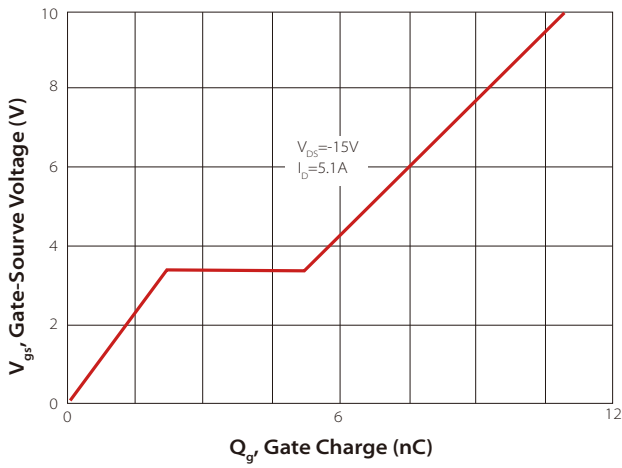


Fig. 10 Source-Drain Diode Forward

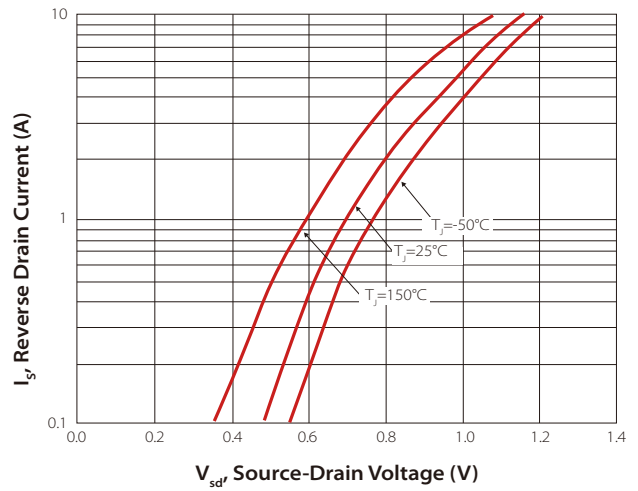
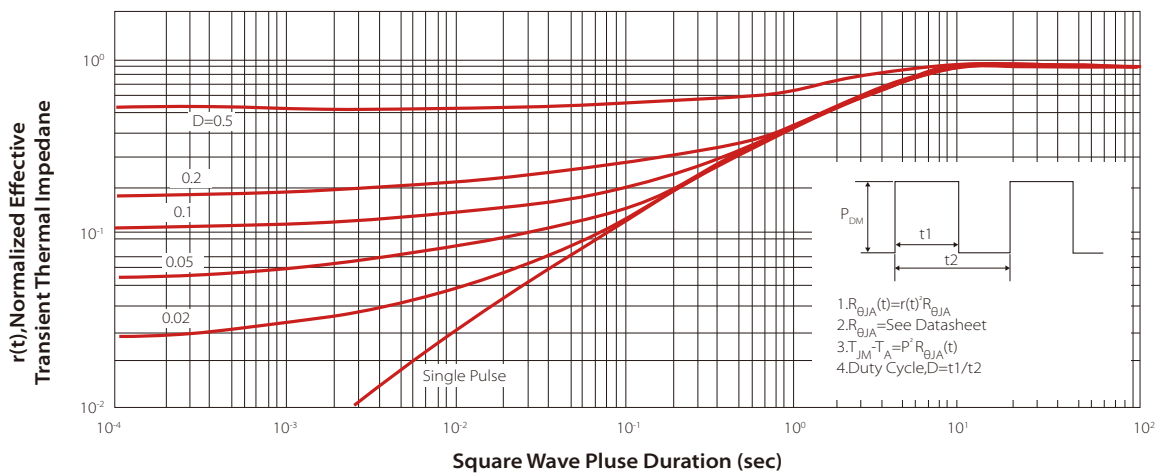
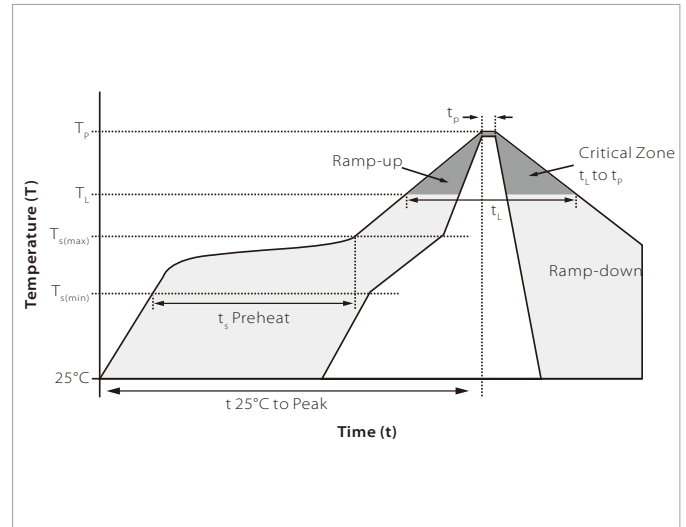


Fig.11 Maximum Effective Transient Thermal Impedance, Junction-to-Case

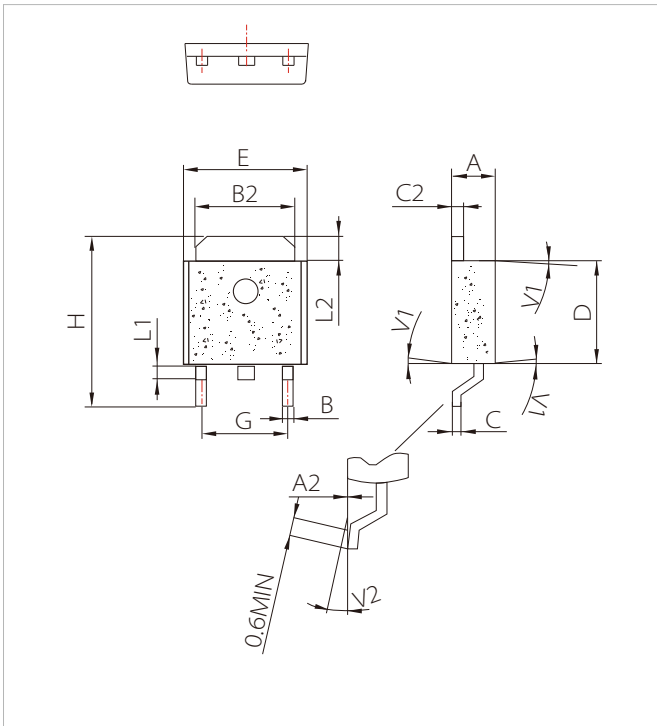


SOLDERING PARAMETERS

| Reflow Condition | | Lead-free assembly |
|--|----------------------------------|--------------------|
| Pre Heat | Temperature Max ($T_{s(min)}$) | 150°C |
| | Temperature Max ($T_{s(max)}$) | 200°C |
| | Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (T_L) to peak) | | 3°C/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/second max |
| Reflow | Temperature (T_L) (Liquidus) | 217°C |
| | Time (min to max) (t_r) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260°C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (T_p) | | 8 minutes max. |
| Do not exceed | | 260°C |



TO-252 PACKAGE MECHANICAL DATA



| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.20 | | 2.40 | 0.086 | | 0.095 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.55 | | 0.65 | 0.022 | | 0.026 |
| B2 | 5.10 | | 5.40 | 0.200 | | 0.213 |
| C | 0.45 | | 0.62 | 0.018 | | 0.024 |
| C2 | 0.48 | | 0.62 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.70 | 0.252 | | 0.264 |
| G | 4.40 | | 4.70 | 0.173 | 0.1 | 0.185 |
| H | 9.35 | | 10.6 | 0.368 | | 0.417 |
| L1 | 1.30 | | 1.70 | 0.051 | 0.143 | 0.067 |
| L2 | 1.37 | | 1.50 | 0.054 | | 0.059 |
| L1 | | 4° | | | 0.130 | |
| V2 | 0° | | 8° | 0° | | 8° |

ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SPMD90P02 | TO-252 | 5000PCS | 13" |

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