

RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

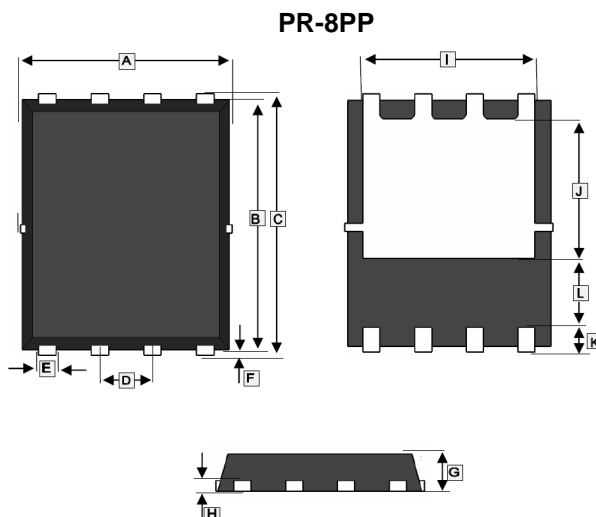
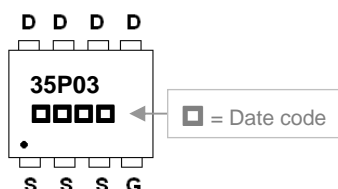
## DESCRIPTION

The SPR35P03 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness. The PR-8PP package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

## FEATURES

- Lower Gate Charge
- Simple Drive Requirement
- Fast Switching Characteristic

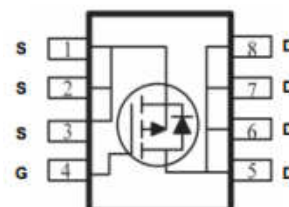
## MARKING



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 4.9        | 5.1  | G    | 0.8        | 1.0  |
| B    | 5.7        | 5.9  | H    | 0.254 Ref. |      |
| C    | 5.95       | 6.2  | I    | 4.0 Ref.   |      |
| D    | 1.27 BSC.  |      | J    | 3.4 Ref.   |      |
| E    | 0.35       | 0.49 | K    | 0.6 Ref.   |      |
| F    | 0.1        | 0.2  | L    | 1.4 Ref.   |      |

## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---------|-----|-------------|
| PR-8PP  | 3K  | 13 inch     |



## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ unless otherwise specified)

| Parameter                                                   | Symbol          | Rating                  | Unit                        |
|-------------------------------------------------------------|-----------------|-------------------------|-----------------------------|
| Drain-Source Voltage                                        | $V_{DS}$        | -30                     | V                           |
| Gate-Source Voltage                                         | $V_{GS}$        | $\pm 20$                | V                           |
| Continuous Drain Current <sup>1</sup> @ $V_{GS}=10\text{V}$ | $I_D$           | $T_C=25^\circ\text{C}$  | -35                         |
|                                                             |                 | $T_C=100^\circ\text{C}$ | -22                         |
|                                                             |                 | $T_A=25^\circ\text{C}$  | -8.5                        |
|                                                             |                 | $T_A=70^\circ\text{C}$  | -6.8                        |
| Pulsed Drain Current <sup>2</sup>                           | $I_{DM}$        | -70                     | A                           |
| Single Pulse Avalanche Energy <sup>3</sup>                  | EAS             | 135                     | mJ                          |
| Avalanche Current                                           | $I_{AS}$        | -30                     | A                           |
| Total Power Dissipation <sup>4</sup>                        | $P_D$           | 37.5                    | W                           |
| Operating Junction & Storage Temperature                    | $T_J, T_{STG}$  | -55~150                 | $^\circ\text{C}$            |
| <b>Thermal Resistance Rating</b>                            |                 |                         |                             |
| Thermal Resistance Junction-Ambient <sup>1</sup> (Max).     | $R_{\theta JA}$ | 62                      | $^\circ\text{C} / \text{W}$ |
| Thermal Resistance Junction-Case <sup>1</sup> (Max).        | $R_{\theta JC}$ | 3.33                    | $^\circ\text{C} / \text{W}$ |

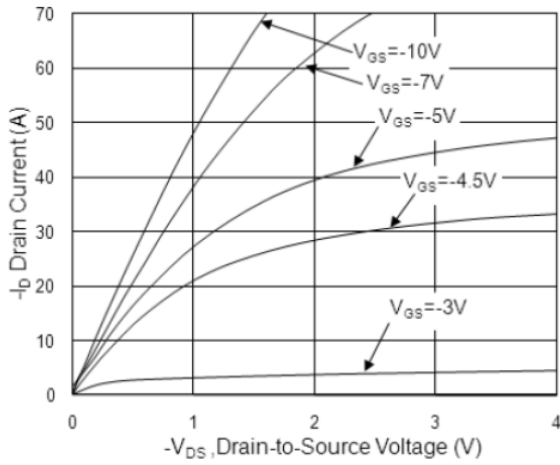
**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| Parameter                                      | Symbol       | Min. | Typ. | Max.      | Unit          | Test Conditions                                                                              |
|------------------------------------------------|--------------|------|------|-----------|---------------|----------------------------------------------------------------------------------------------|
| <b>Static</b>                                  |              |      |      |           |               |                                                                                              |
| Drain-Source Breakdown Voltage                 | $BV_{DSS}$   | -30  | -    | -         | V             | $V_{GS}=0, I_D = -250\mu\text{A}$                                                            |
| Gate-Threshold Voltage                         | $V_{GS(th)}$ | -1   | -    | -2.5      | V             | $V_{DS}=V_{GS}, I_D = -250\mu\text{A}$                                                       |
| Forward Transconductance                       | $g_{fs}$     | -    | 5    | -         | S             | $V_{DS} = -5\text{V}, I_D = -10\text{A}$                                                     |
| Gate-Source Leakage Current                    | $I_{GSS}$    | -    | -    | $\pm 100$ | nA            | $V_{GS} = \pm 20\text{V}$                                                                    |
| Drain-Source Leakage Current                   | $I_{DSS}$    | -    | -    | -1        | $\mu\text{A}$ | $V_{DS} = -24\text{V}, V_{GS} = 0, T_J = 25^\circ\text{C}$                                   |
|                                                |              | -    | -    | -5        |               | $V_{DS} = -24\text{V}, V_{GS} = 0, T_J = 55^\circ\text{C}$                                   |
| Static Drain-Source On-Resistance <sup>2</sup> | $R_{DS(ON)}$ | -    | -    | 27        | m $\Omega$    | $V_{GS} = -10\text{V}, I_D = -15\text{A}$                                                    |
|                                                |              | -    | -    | 35        |               | $V_{GS} = -4.5\text{V}, I_D = -10\text{A}$                                                   |
| Gate Resistance                                | $R_g$        | -    | 18   | 26        | $\Omega$      | $f = 1.0\text{MHz}$                                                                          |
| Total Gate Charge                              | $Q_g$        | -    | 12.5 | -         | nC            | $I_D = -15\text{A}$<br>$V_{DS} = -15\text{V}$<br>$V_{GS} = -4.5\text{V}$                     |
| Gate-Source Charge                             | $Q_{gs}$     | -    | 5.4  | -         |               |                                                                                              |
| Gate-Drain ("Miller") Charge                   | $Q_{gd}$     | -    | 5    | -         |               |                                                                                              |
| Turn-on Delay Time <sup>2</sup>                | $T_{d(on)}$  | -    | 4.4  | -         | nS            | $V_{DD} = -15\text{V}$<br>$I_D = -15\text{A}$<br>$V_{GS} = -10\text{V}$<br>$R_G = 3.3\Omega$ |
| Rise Time                                      | $T_r$        | -    | 11.2 | -         |               |                                                                                              |
| Turn-off Delay Time                            | $T_{d(off)}$ | -    | 34   | -         |               |                                                                                              |
| Fall Time                                      | $T_f$        | -    | 18   | -         |               |                                                                                              |
| Input Capacitance                              | $C_{iss}$    | -    | 1345 | -         | pF            | $V_{GS} = 0$<br>$V_{DS} = -15\text{V}$<br>$f = 1.0\text{MHz}$                                |
| Output Capacitance                             | $C_{oss}$    | -    | 194  | -         |               |                                                                                              |
| Reverse Transfer Capacitance                   | $C_{rss}$    | -    | 158  | -         |               |                                                                                              |
| <b>Guaranteed Avalanche Characteristics</b>    |              |      |      |           |               |                                                                                              |
| Single Pulse Avalanche Energy <sup>5</sup>     | EAS          | 33.7 | -    | -         | mJ            | $V_{DD} = -25\text{V}, L = 0.1\text{mH}, I_{AS} = -15\text{A}$                               |
| <b>Source-Drain Diode</b>                      |              |      |      |           |               |                                                                                              |
| Diode Forward Voltage <sup>2</sup>             | $V_{SD}$     | -    | -    | -1.2      | V             | $I_S = -1\text{A}, V_{GS} = 0\text{V}$                                                       |
| Continuous Source Current <sup>1,6</sup>       | $I_S$        | -    | -    | -35       | A             | $V_G = V_D = 0$ , Force Current                                                              |
| Pulsed Source Current <sup>2,6</sup>           | $I_{SM}$     | -    | -    | -70       | A             |                                                                                              |
| Reverse Recovery Time                          | $t_{rr}$     | -    | 12.4 | -         | nS            | $I_F = -15\text{A}, dI/dt = 100\text{A}/\mu\text{s}, T_J = 25^\circ\text{C}$                 |
| Reverse Recovery Charge                        | $Q_{rr}$     | -    | 5    | -         | nC            |                                                                                              |

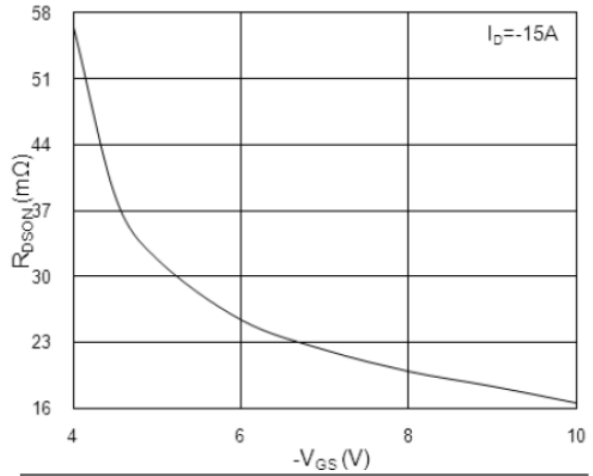
Note:

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper ,  $\leq 10\text{sec}$  ,  $125^\circ\text{C}/\text{W}$  at steady state
- The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating . The test condition is  $V_{DD} = -25\text{V}, V_{GS} = -10\text{V}, L = 0.1\text{mH}, I_{AS} = -30\text{A}$
- The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

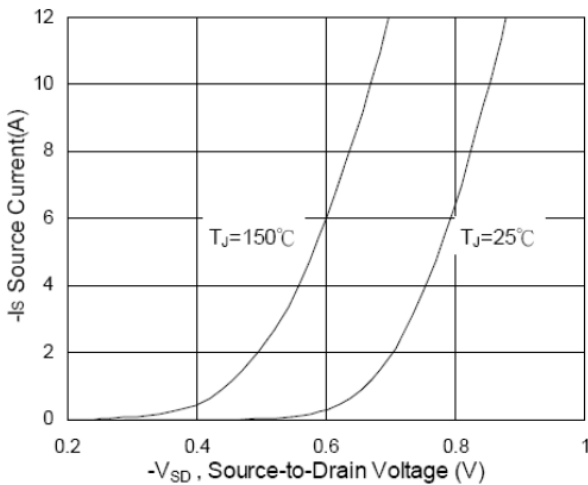
**CHARACTERISTIC CURVES**



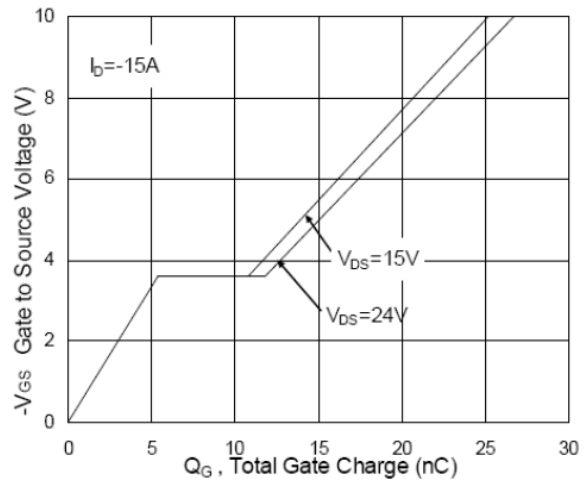
**Fig.1 Typical Output Characteristics**



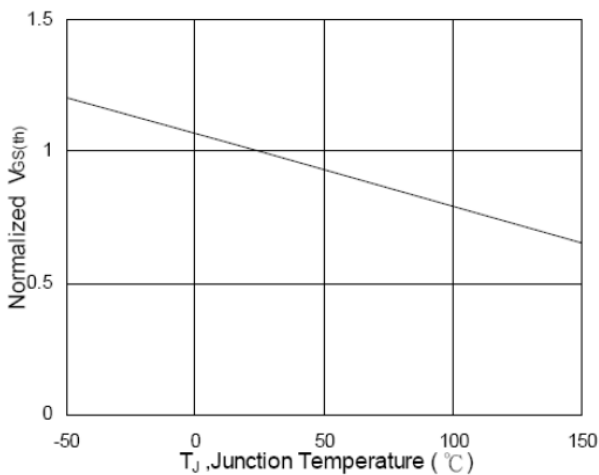
**Fig.2 On-Resistance v.s Gate-Source**



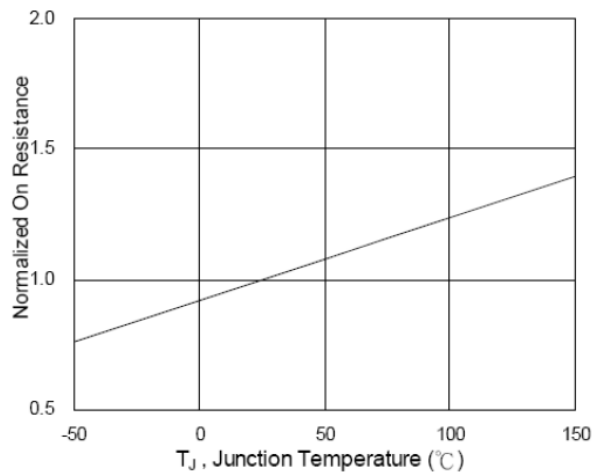
**Fig.3 Forward Characteristics of Reverse**



**Fig.4 Gate-Charge Characteristics**

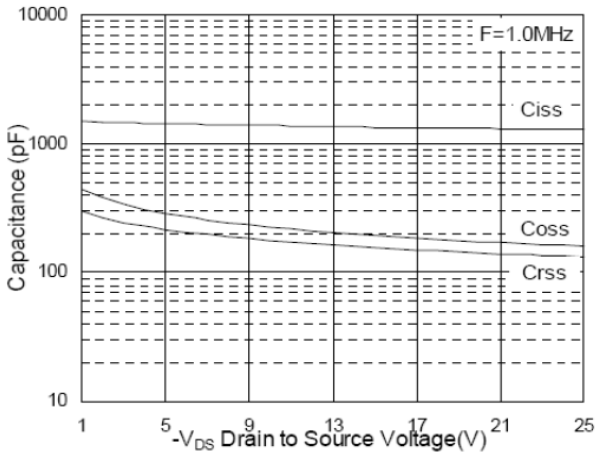


**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**

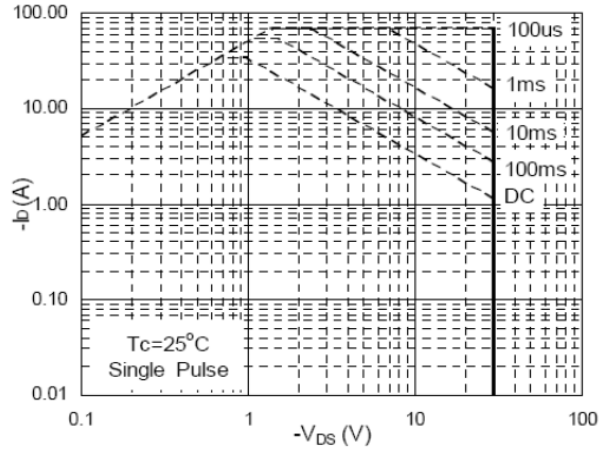


**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**

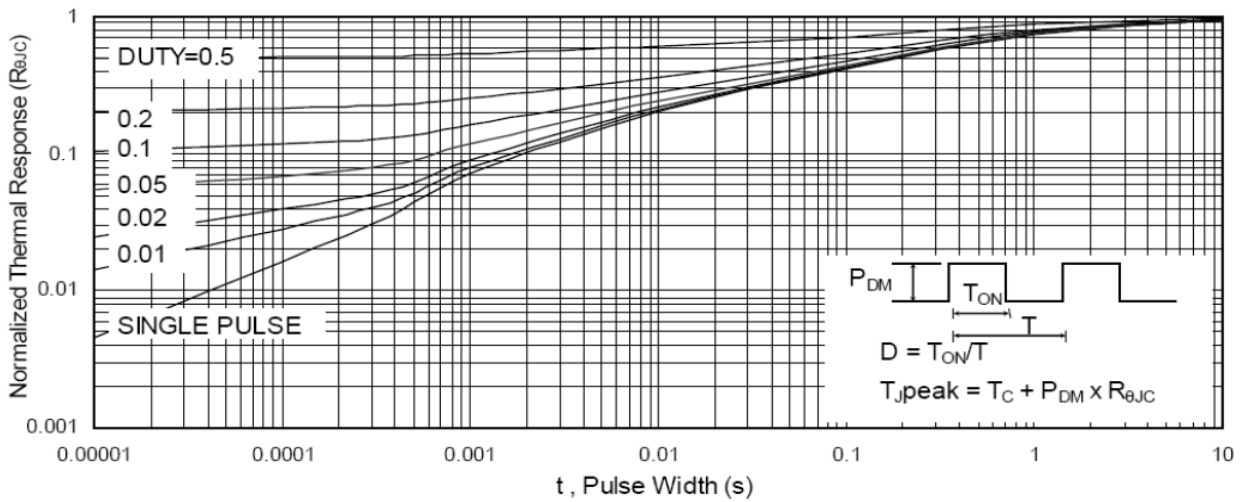
**CHARACTERISTIC CURVES**



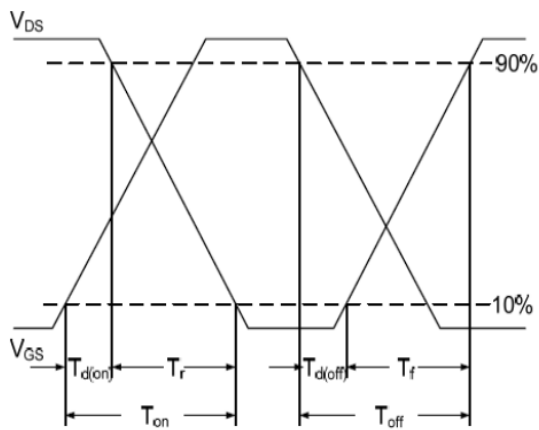
**Fig.7 Capacitance**



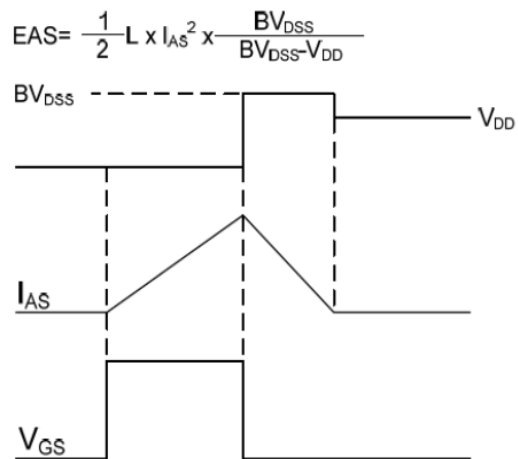
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**