



# SPC1810

## N & P Pair Enhancement Mode MOSFET

### DESCRIPTION

The SPC1810 is the N- and P-Channel enhancement mode power field effect transistors are produced using high cell density , DMOS trench technology. This high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as notebook computer power management and other battery powered circuits where high-side switching , low in-line power loss, and resistance to transients are needed.

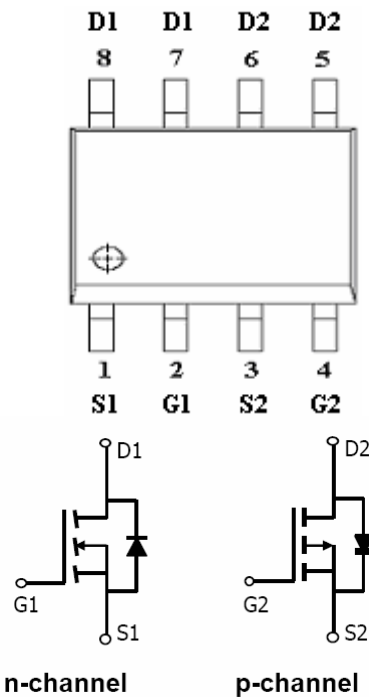
### FEATURES

- ◆ N-Channel  
100V/5A,  $R_{DS(ON)} = 160m\Omega @ V_{GS} = 10V$
- ◆ P-Channel  
-100V/-8A,  $R_{DS(ON)} = 160m\Omega @ V_{GS} = -10V$   
-100V/-4A,  $R_{DS(ON)} = 200m\Omega @ V_{GS} = -4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ SOP – 8P package design

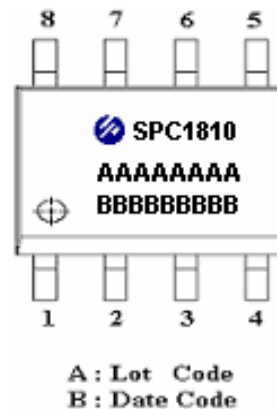
### APPLICATIONS

- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch
- DSC
- LCD Display inverter

### PIN CONFIGURATION(SOP – 8P)



### PART MARKING





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### PIN DESCRIPTION

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | S1     | Source 1    |
| 2   | G1     | Gate 1      |
| 3   | S2     | Source 2    |
| 4   | G2     | Gate 2      |
| 5   | D2     | Drain 2     |
| 6   | D2     | Drain 2     |
| 7   | D1     | Drain 1     |
| 8   | D1     | Drain 1     |

### ORDERING INFORMATION

| Part Number  | Package | Part Marking |
|--------------|---------|--------------|
| SPC1810S8RGB | SOP- 8P | SPC1810      |

※ SPC1810S8RGB 13" Tape Reel ; Pb – Free ; Halogen – Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

| Parameter                                       | Symbol           | Typical      |           | Unit |
|---|------------------|--------------|-----------|------|
|   |                  | N-Channel    | P-Channel |      |
| Drain-Source Voltage                            | V <sub>DSS</sub> | 100          | -100      | V    |
| Gate –Source Voltage                            | V <sub>GSS</sub> | ±20          | ±20       | V    |
| Continuous Drain Current(T <sub>J</sub> =150°C) | I <sub>D</sub>   | TA=25°C      | -8.0      | A    |
|   |                  | TA=70°C      | -6.0      |      |
| Pulsed Drain Current                            | I <sub>DM</sub>  | 12           | -12       | A    |
| Continuous Source Current(Diode Conduction)     | I <sub>S</sub>   | 2.3          | -2.3      | A    |
| Power Dissipation                               | P <sub>D</sub>   | TA=25°C      | 2.8       | W    |
|   |                  | TA=70°C      | 1.8       |      |
| Operating Junction Temperature                  | T <sub>J</sub>   | -55/150      |           | °C   |
| Storage Temperature Range                       | T <sub>STG</sub> | -55/150      |           | °C   |
| Thermal Resistance-Junction to Ambient          | R <sub>θJA</sub> | T ≤ 10sec    | 52        | °C/W |
|   |                  | Steady State | 80        |      |



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### ELECTRICAL CHARACTERISTICS ( NMOS )

(TA=25°C Unless otherwise noted)

| Parameter                       | Symbol        | Conditions   | Min. | Typ | Max.      | Unit     |
|---------------------------------|---------------|--|------|-----|-----------|----------|
| <b>Static</b>                   |               |  |      |     |           |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$  | 100  |     |           | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$  | 1.0  |     | 3.0       |          |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$  |      |     | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=80V, V_{GS}=0V$  |      |     | 25        | uA       |
|                                 |               | $V_{DS}=80V, V_{GS}=0V$<br>$T_J=80^\circ C$                          |      |     | 250       |          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=5A$   |      |     | 0.16      | $\Omega$ |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=10V, I_D=5.0A$   |      | 5.6 |           | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=8.0A, V_{GS}=0V$  |      |     | 1.3       | V        |
| <b>Dynamic</b>                  |               |  |      |     |           |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=80V, V_{GS}=5V$<br>$I_D=5A$                                  |      | 10  | 16        | nC       |
| Gate-Source Charge              | $Q_{gs}$      |  |      | 2.5 |           |          |
| Gate-Drain Charge               | $Q_{gd}$      |  |      | 4.5 |           |          |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=25V, V_{GS}=0V$<br>$f=1MHz$                                  |      | 425 | 680       | pF       |
| Output Capacitance              | $C_{oss}$     |  |      | 55  |           |          |
| Reverse Transfer Capacitance    | $C_{rss}$     |  |      | 33  |           |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=50V, R_D=10\Omega$<br>$I_D=5.0A, V_G=10V$<br>$R_G=3.3\Omega$ |      | 6.5 |           | nS       |
|                                 | $t_r$         |  |      | 10  |           |          |
| Turn-Off Time                   | $t_{d(off)}$  |  |      | 13  |           |          |
|                                 | $t_f$         |  |      | 3.4 |           |          |



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### ELECTRICAL CHARACTERISTICS ( PMOS )

(TA=25°C Unless otherwise noted)

| Parameter                       | Symbol        | Conditions  | Min. | Typ  | Max.      | Unit     |
|---------------------------------|---------------|---|------|------|-----------|----------|
| <b>Static</b>                   |               |   |      |      |           |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$  | -100 |      |           | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$  | -1.0 |      | -3.0      |          |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$   |      |      | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=-10V, V_{GS}=0V$  |      |      | -1        | uA       |
|                                 |               | $V_{DS}=-80V, V_{GS}=0V$<br>$T_J=85^\circ C$                              |      |      | -25       |          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=-10V, I_D=-8A$  |      |      | 0.16      | $\Omega$ |
|                                 |               | $V_{GS}=-4.5V, I_D=-6A$   |      |      | 0.20      |          |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=-10V, I_D=-8A$  |      | 8    |           | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=-12A, V_{GS}=0V$   |      |      | -1.3      | V        |
| <b>Dynamic</b>                  |               |   |      |      |           |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=-80V, V_{GS}=-4.5V$<br>$I_D=-8.0A$                                |      | 16   | 25        | nC       |
| Gate-Source Charge              | $Q_{gs}$      |   |      | 4.4  |           |          |
| Gate-Drain Charge               | $Q_{gd}$      |   |      | 8.7  |           |          |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=-25V, V_{GS}=0V$<br>$f=1MHz$                                      |      | 1590 | 2550      | pF       |
| Output Capacitance              | $C_{oss}$     |   |      | 110  |           |          |
| Reverse Transfer Capacitance    | $C_{rss}$     |   |      | 70   |           |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=-50V, R_D=6.25\Omega$<br>$I_D=-8.0A, V_G=-10V$<br>$R_G=3.3\Omega$ |      | 9    |           | nS       |
|                                 | $t_r$         |   |      | 14   |           |          |
| Turn-Off Time                   | $t_{d(off)}$  |   |      | 45   |           |          |
|                                 | $t_f$         |   |      | 40   |           |          |



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## TYPICAL CHARACTERISTICS (NMOS)

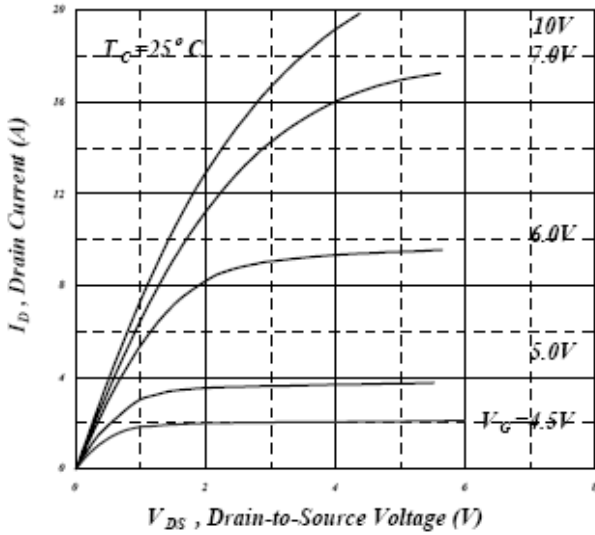


Fig 1. Typical Output Characteristics

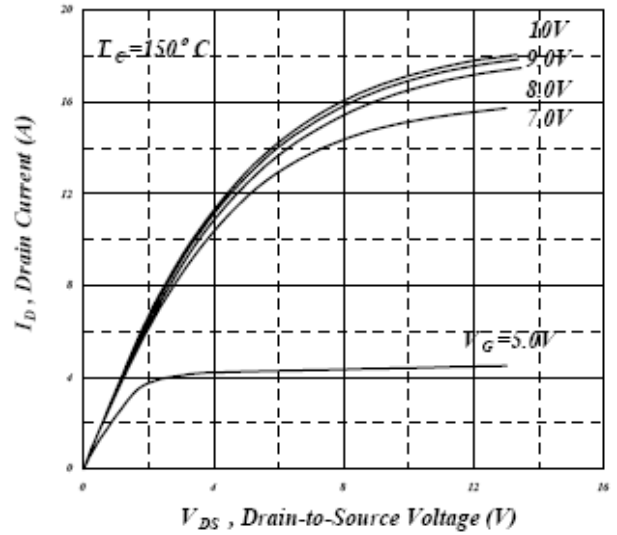


Fig 2. Typical Output Characteristics

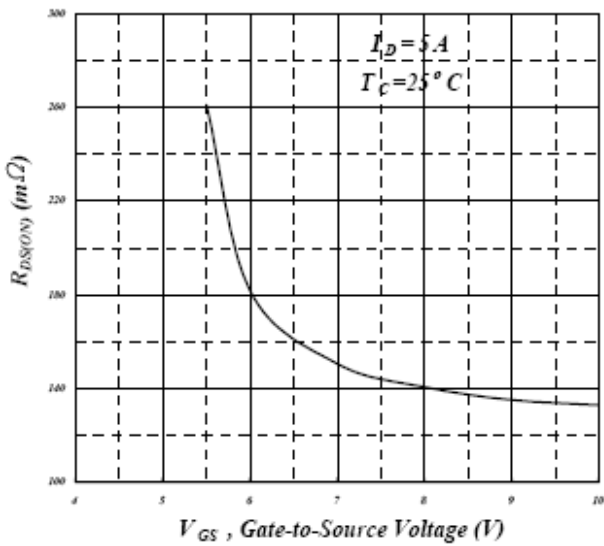


Fig 3. On-Resistance v.s. Gate Voltage

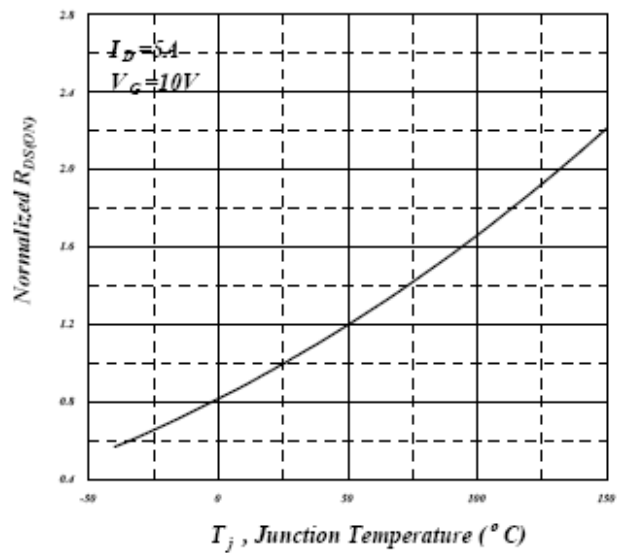


Fig 4. Normalized On-Resistance v.s. Junction Temperature



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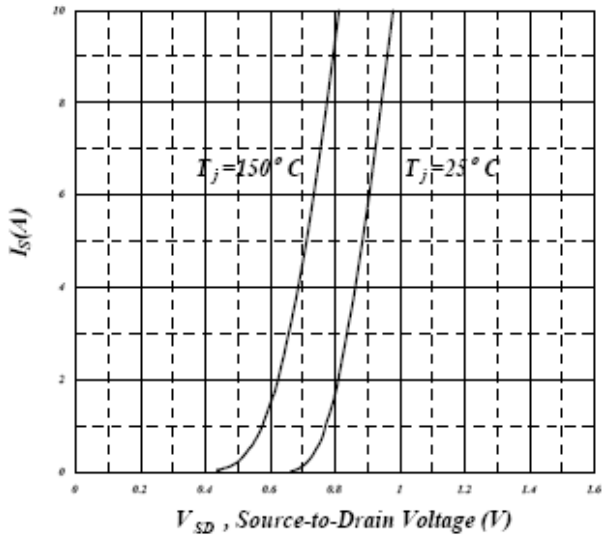


Fig 5. Forward Characteristic of Reverse Diode

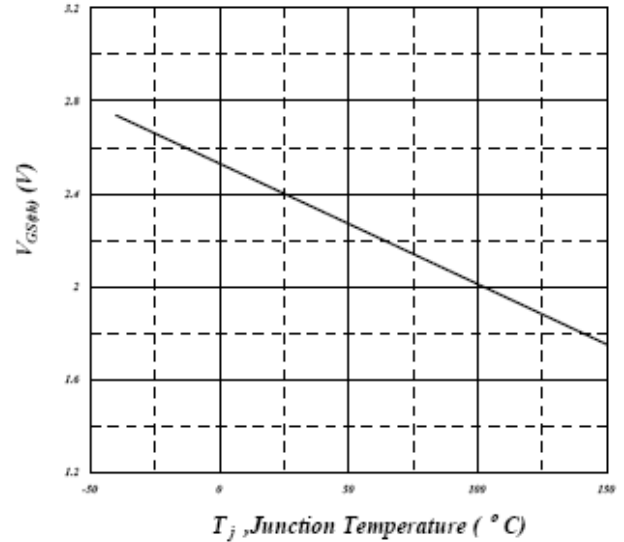


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

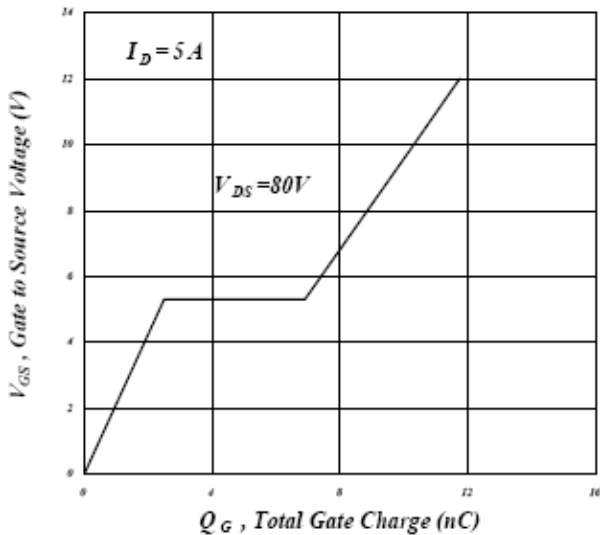


Fig 7. Gate Charge Characteristics

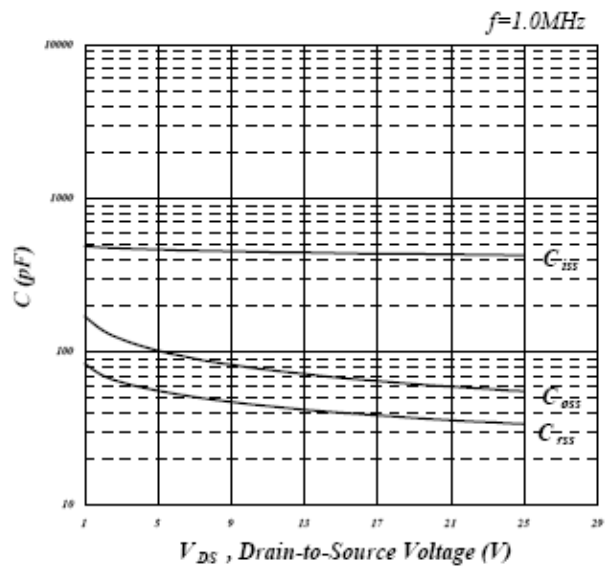


Fig 8. Typical Capacitance Characteristics



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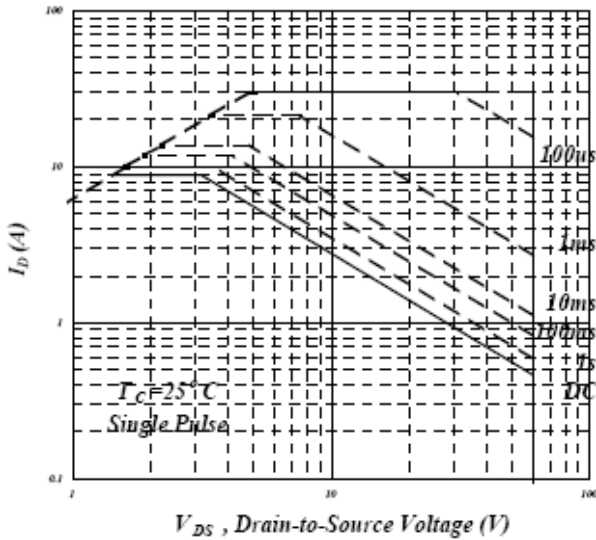


Fig 9. Maximum Safe Operating Area

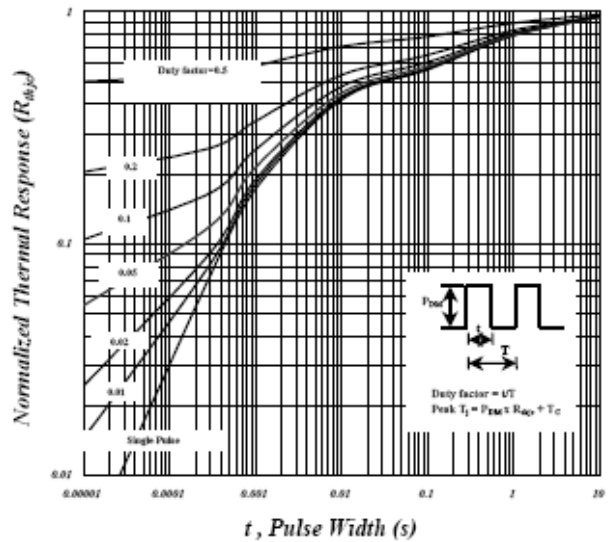


Fig 10. Effective Transient Thermal Impedance

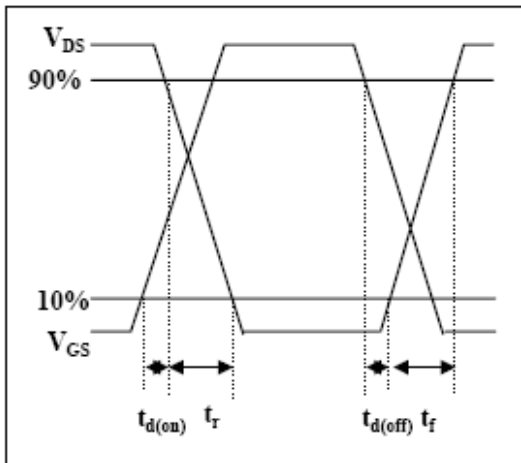


Fig 11. Switching Time Waveform

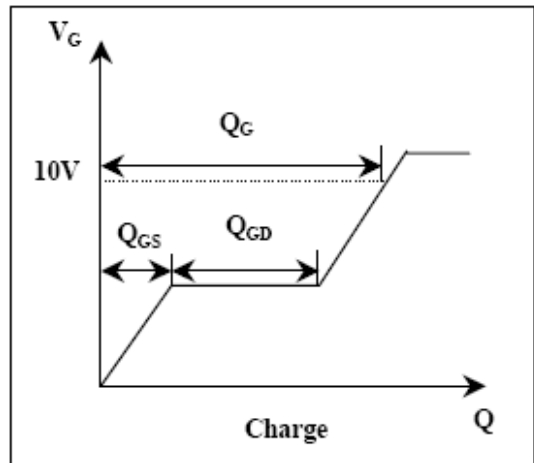


Fig 12. Gate Charge Waveform



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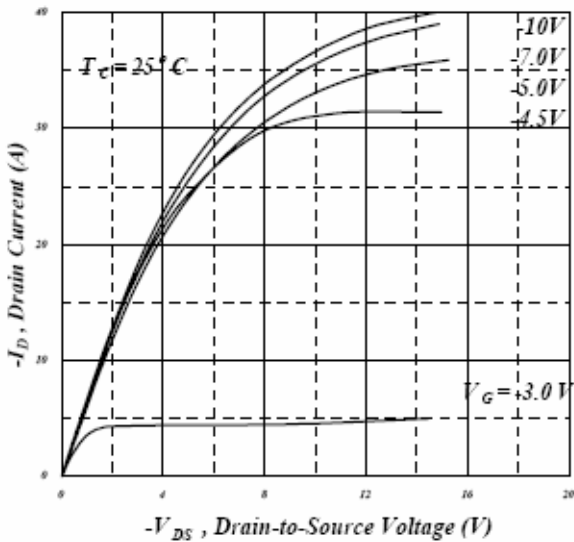


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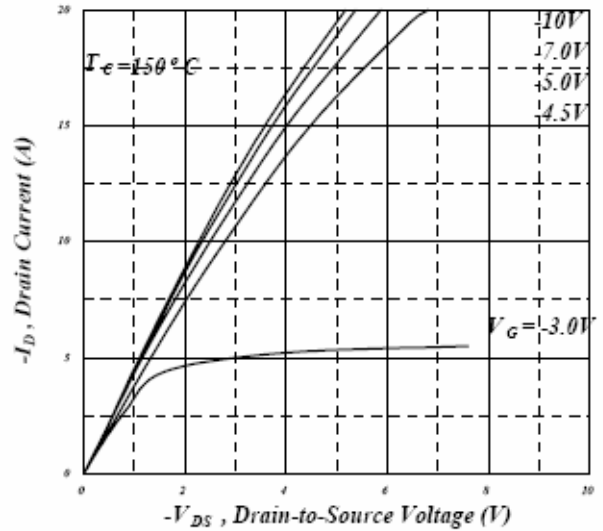


Fig 2. Typical Output Characteristics

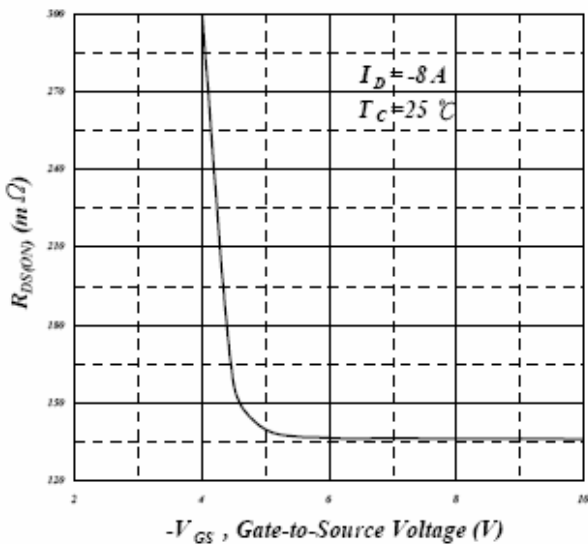


Fig 3. On-Resistance v.s. Gate Voltage

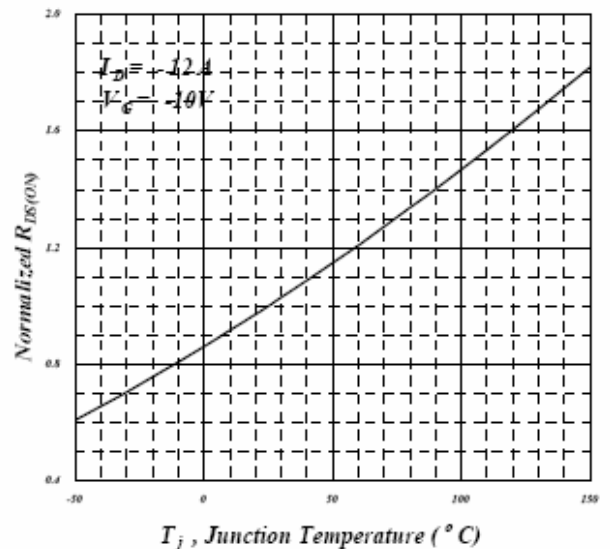


Fig 4. Normalized On-Resistance v.s. Junction Temperature





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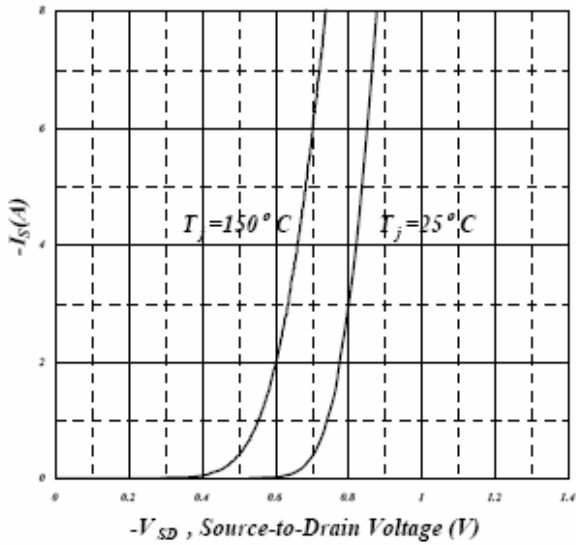


Fig 5. Forward Characteristic of Reverse Diode

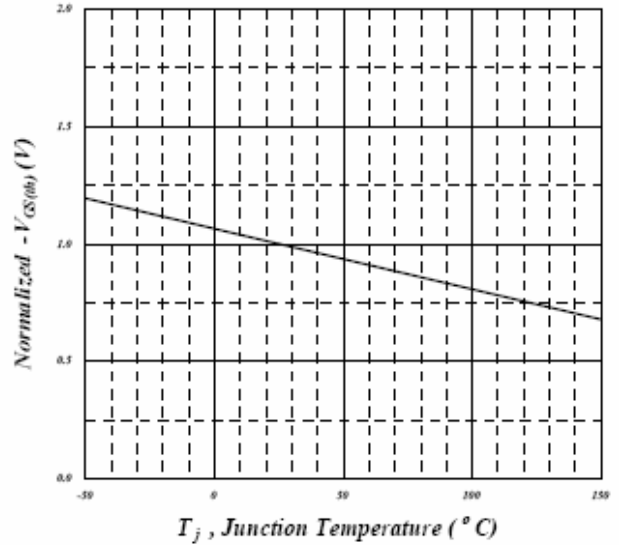


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

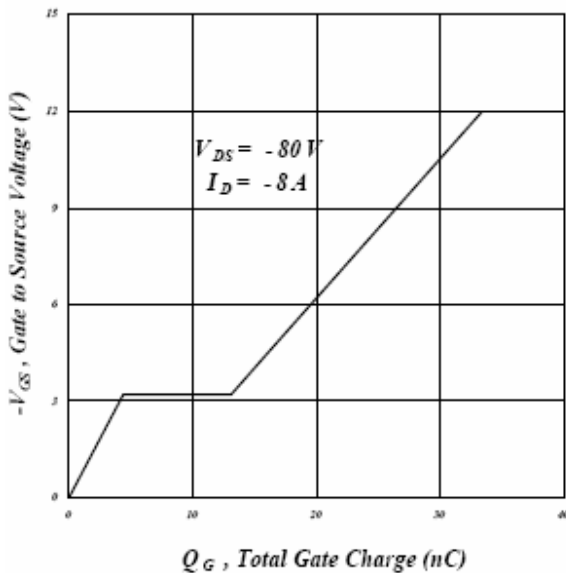


Fig 7. Gate Charge Characteristics

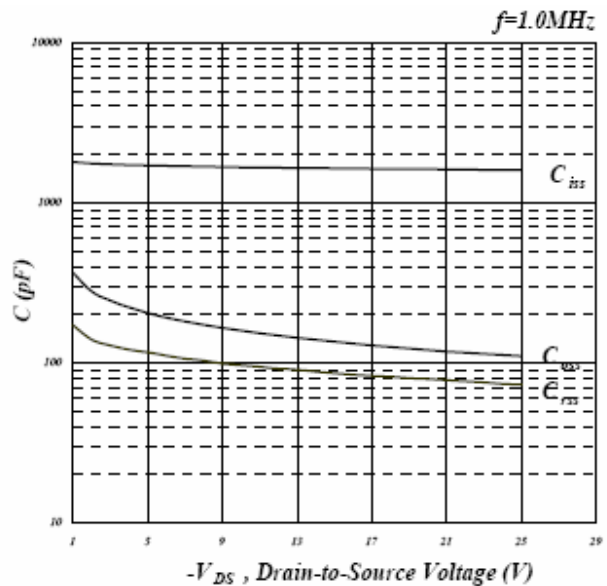


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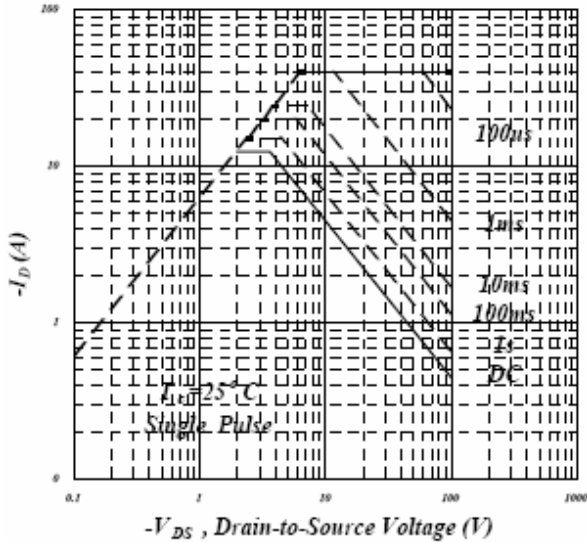


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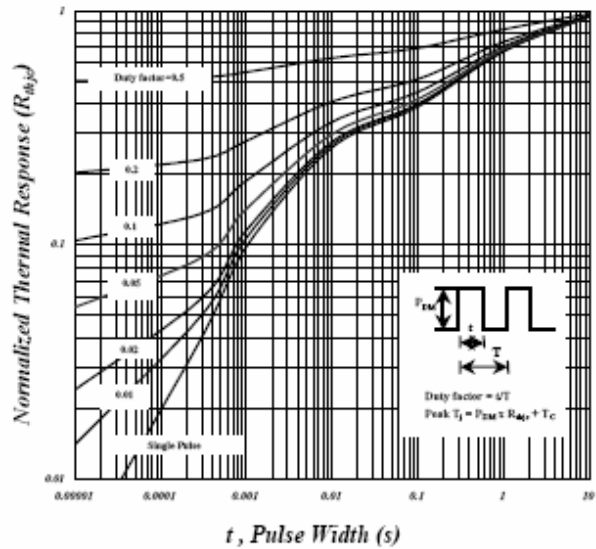


Fig 10. Effective Transient Thermal Impedance

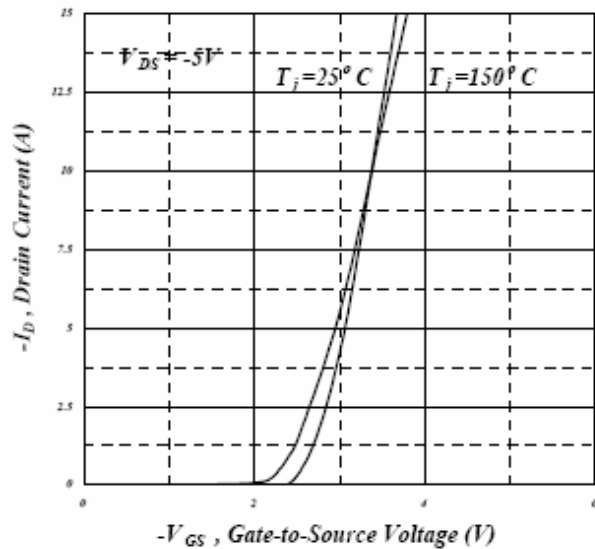


Fig 11. Transfer Characteristics

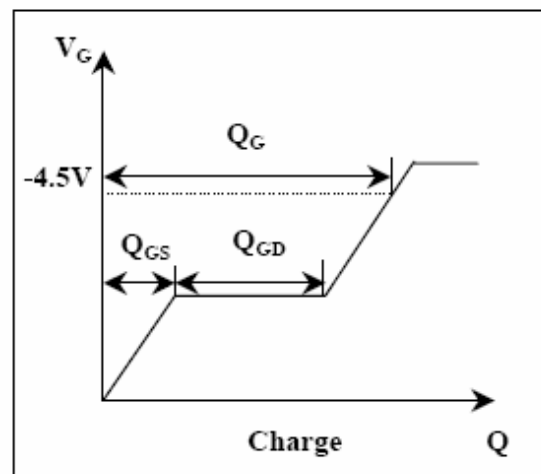
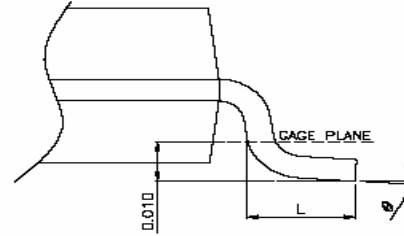
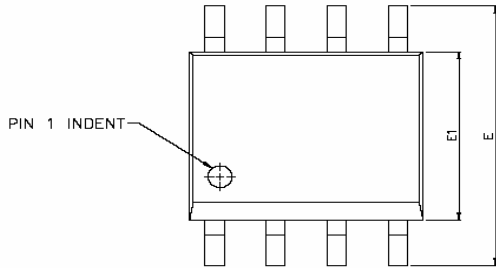


Fig 12. Gate Charge Waveform

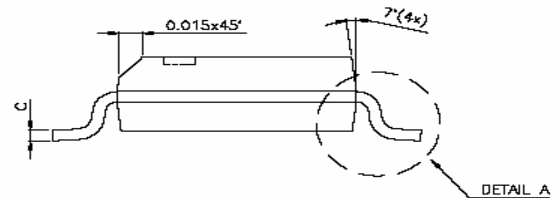
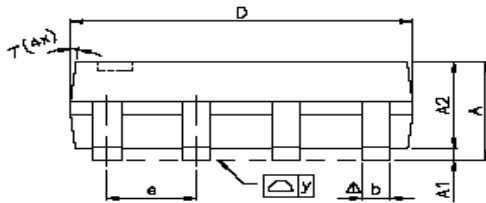


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## SOP- 8 PACKAGE OUTLINE



DETAIL A



| SYMBOLS    | DIMENSIONS IN MILLIMETERS |      |       | DIMENSIONS IN INCHES |       |        |
|------------|---------------------------|------|-------|----------------------|-------|--------|
|            | MIN                       | NOM  | MAX   | MIN                  | NOM   | MAX    |
| A          | 1.47                      | 1.60 | 1.73  | 0.058                | 0.063 | 0.068  |
| A1         | 0.10                      | —    | 0.25  | 0.004                | —     | 0.010  |
| A2         | —                         | 1.45 | —     | —                    | 0.057 | —      |
| b          | 0.33                      | 0.41 | 0.51  | 0.013                | 0.016 | 0.020  |
| C          | 0.19                      | 0.20 | 0.25  | 0.0075               | 0.008 | 0.0098 |
| D          | 4.80                      | 4.85 | 4.95  | 0.189                | 0.191 | 0.195  |
| E          | 5.80                      | 6.00 | 6.20  | 0.228                | 0.236 | 0.244  |
| E1         | 3.80                      | 3.90 | 4.00  | 0.150                | 0.154 | 0.157  |
| e          | —                         | 1.27 | —     | —                    | 0.050 | —      |
| L          | 0.38                      | 0.71 | 1.27  | 0.015                | 0.028 | 0.050  |
| $\Delta y$ | —                         | —    | 0.076 | —                    | —     | 0.003  |
| $\theta$   | 0°                        | —    | 8°    | 0°                   | —     | 8°     |



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SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan 115

Phone: 886-2-2655-8178

Fax: 886-2-2655-8468

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