



# SPC4539B

## N & P Pair Enhancement Mode MOSFET

### DESCRIPTION

The SPC4539B 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.

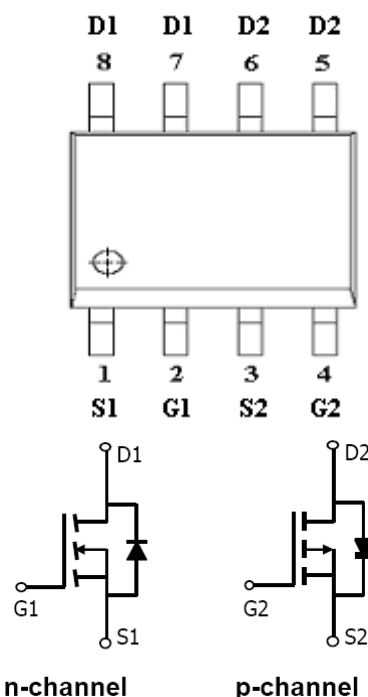
### FEATURES

- ◆ N-Channel  
30V/6.8A,  $R_{DS(ON)} = 35m\Omega @ V_{GS} = 10V$   
30V/5.6A,  $R_{DS(ON)} = 46m\Omega @ V_{GS} = 4.5V$
- ◆ P-Channel  
-30V/-6.2A,  $R_{DS(ON)} = 70m\Omega @ V_{GS} = -10V$   
-30V/-4.8A,  $R_{DS(ON)} = 100m\Omega @ V_{GS} = -4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ SOP – 8P package design

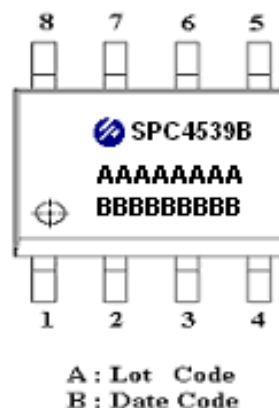
### APPLICATIONS

- 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 |
|---------------|---------|--------------|
| SPC4539BS8RGB | SOP- 8P | SPC4539B     |

※ SPC4539BS8RGB 13" Tape Reel ; Pb – Free ; Halogen – Free  
e

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

| Parameter                                       | Symbol           | Typical          |           | Unit |
|-------------------------------------------------|------------------|------------------|-----------|------|
|                                                 |                  | N-Channel        | P-Channel |      |
| Drain-Source Voltage                            | V <sub>DSS</sub> | 30               | -30       | V    |
| Gate –Source Voltage                            | V <sub>GSS</sub> | ±20              | ±20       | V    |
| Continuous Drain Current(T <sub>J</sub> =150°C) | I <sub>D</sub>   | 6.8              | -6.2      | A    |
|                                                 |                  | 5.6              | -4.8      |      |
| Pulsed Drain Current                            | I <sub>DM</sub>  | 30               | -30       | A    |
| Continuous Source Current(Diode Conduction)     | I <sub>S</sub>   | 2.3              | -2.3      | A    |
| Power Dissipation                               | P <sub>D</sub>   | 2.5              | 2.8       | W    |
|                                                 |                  | 1.6              | 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          | T ≤ 10sec        | R <sub>θJA</sub> | 50        | °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  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                                              | 30   |       |           | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                                          | 0.6  |       | 1.8       |          |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                                            |      |       | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=30V, V_{GS}=0V$                                                |      |       | 1         | uA       |
|                                 |               | $V_{DS}=30V, V_{GS}=0V$<br>$T_J=85^\circ C$                            |      |       | 5         |          |
| On-State Drain Current          | $I_{D(on)}$   | $V_{DS}\geq 5V, V_{GS}=10V$                                            | 25   |       |           | A        |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=6.8A$                                                 |      | 0.030 | 0.035     | $\Omega$ |
|                                 |               | $V_{GS}=4.5V, I_D=5.6A$                                                |      | 0.038 | 0.046     |          |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=15V, I_D=6.2A$                                                 |      | 13    |           | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=2.3A, V_{GS}=0V$                                                  |      | 0.8   | 1.2       | V        |
| <b>Dynamic</b>                  |               |                                                                        |      |       |           |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=15V, V_{GS}=10V$<br>$I_D=2A$                                   |      | 16    | 24        | nC       |
| Gate-Source Charge              | $Q_{gs}$      |                                                                        |      | 3     |           |          |
| Gate-Drain Charge               | $Q_{gd}$      |                                                                        |      | 2.5   |           |          |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=15V, V_{GS}=0V$<br>$f=1MHz$                                    |      | 450   |           | pF       |
| Output Capacitance              | $C_{oss}$     |                                                                        |      | 240   |           |          |
| Reverse Transfer Capacitance    | $C_{rss}$     |                                                                        |      | 38    |           |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=15V, R_L=15\Omega$<br>$I_D=1.0A, V_{GEN}=10V$<br>$R_G=6\Omega$ |      | 15    | 20        | nS       |
|                                 | $t_r$         |                                                                        |      | 6     | 12        |          |
| Turn-Off Time                   | $t_{d(off)}$  |                                                                        |      | 10    | 20        |          |
|                                 | $t_f$         |                                                                        |      | 40    | 80        |          |



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### ELECTRICAL CHARACTERISTICS ( PMOS )

(TA=25°C Unless otherwise noted)

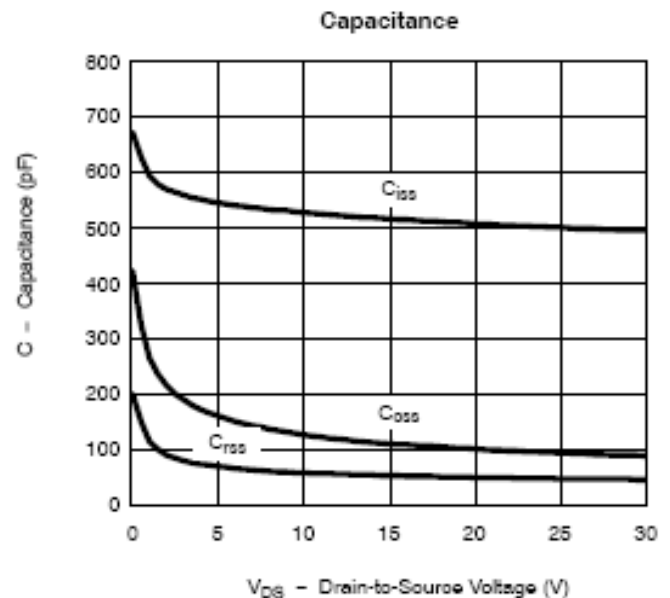
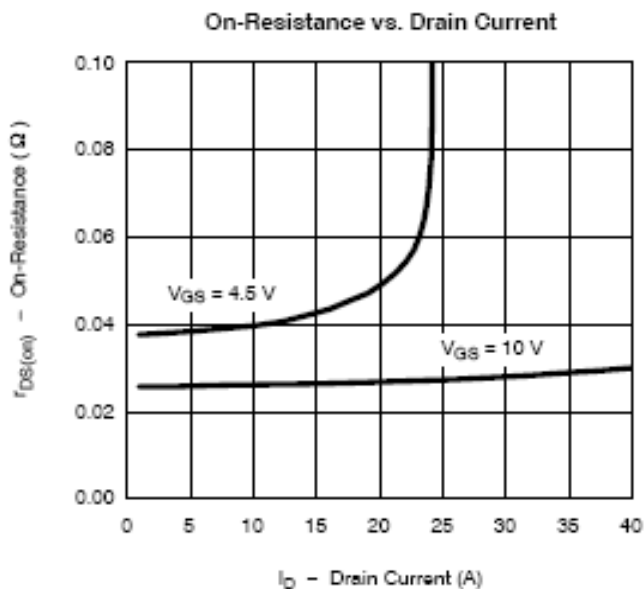
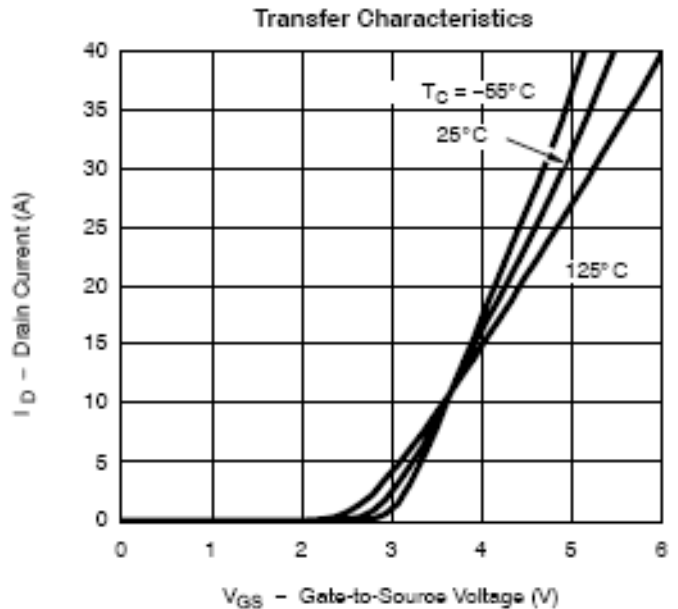
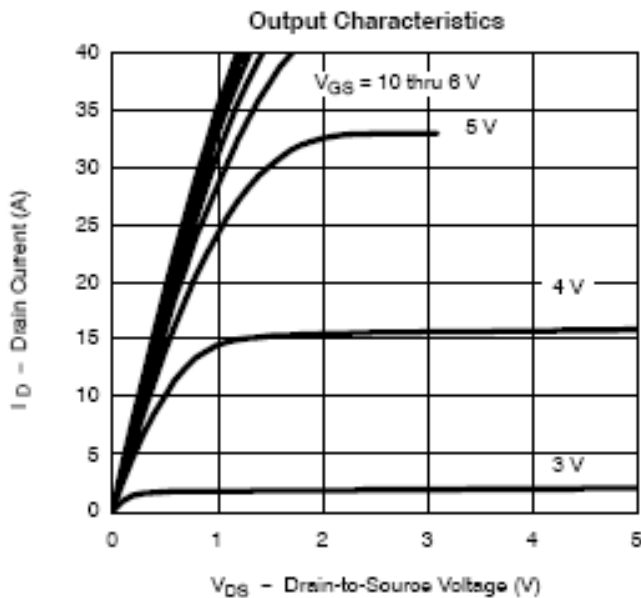
| Parameter                       | Symbol        | Conditions                                                                | Min. | Typ   | Max.      | Unit     |
|---------------------------------|---------------|---------------------------------------------------------------------------|------|-------|-----------|----------|
| <b>Static</b>                   |               |                                                                           |      |       |           |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$                                                | -30  |       |           | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                                            | -0.8 |       | -2.5      |          |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                                               |      |       | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=-30V, V_{GS}=0V$                                                  |      |       | -1        | uA       |
|                                 |               | $V_{DS}=-30V, V_{GS}=0V$<br>$T_J=85^\circ C$                              |      |       | -5        |          |
| On-State Drain Current          | $I_{D(on)}$   | $V_{DS}=-5V, V_{GS}=-4.5V$                                                | -10  |       |           | A        |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=-10V, I_D=-6.2A$                                                  |      | 0.060 | 0.070     | $\Omega$ |
|                                 |               | $V_{GS}=-4.5V, I_D=-4.8A$                                                 |      | 0.090 | 0.100     |          |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=-15V, I_D=-5.7A$                                                  |      | 13    |           | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=-1.3A, V_{GS}=0V$                                                    |      | -0.55 | -1.0      | V        |
| <b>Dynamic</b>                  |               |                                                                           |      |       |           |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=-15V, V_{GS}=-10V$<br>$I_D=-3.5A$                                 |      | 10    | 18        | nC       |
| Gate-Source Charge              | $Q_{gs}$      |                                                                           |      | 1.6   |           |          |
| Gate-Drain Charge               | $Q_{gd}$      |                                                                           |      | 3.0   |           |          |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=-15V, V_{GS}=0V$<br>$f=1MHz$                                      |      | 450   |           | pF       |
| Output Capacitance              | $C_{oss}$     |                                                                           |      | 95    |           |          |
| Reverse Transfer Capacitance    | $C_{rss}$     |                                                                           |      | 55    |           |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=-15V, R_L=15\Omega$<br>$I_D=-1.0A, V_{GEN}=-10V$<br>$R_G=6\Omega$ |      | 8     | 18        | nS       |
|                                 | $t_r$         |                                                                           |      | 8     | 18        |          |
| Turn-Off Time                   | $t_{d(off)}$  |                                                                           |      | 25    | 50        |          |
|                                 | $t_f$         |                                                                           |      | 25    | 35        |          |



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### TYPICAL CHARACTERISTICS ( NMOS )

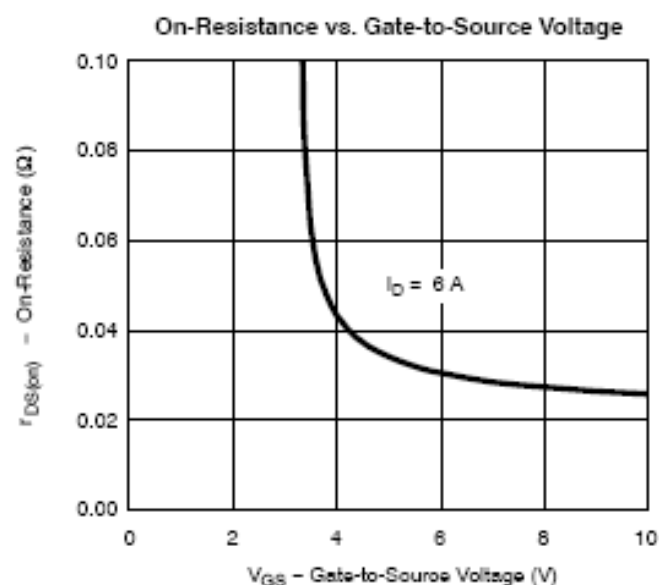
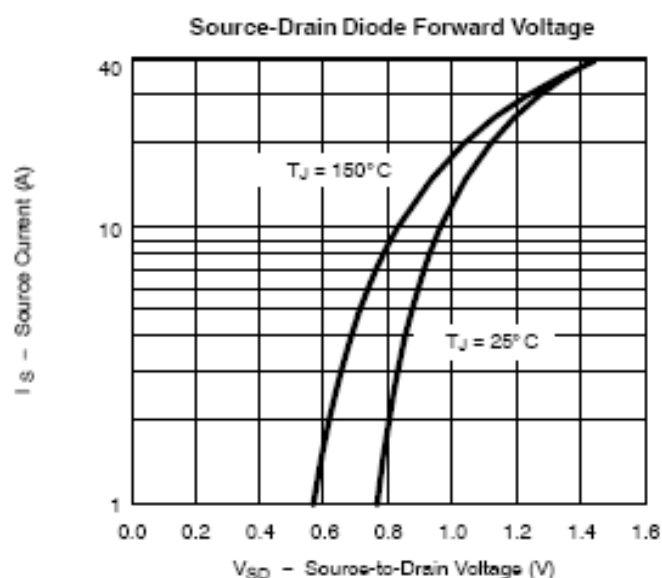
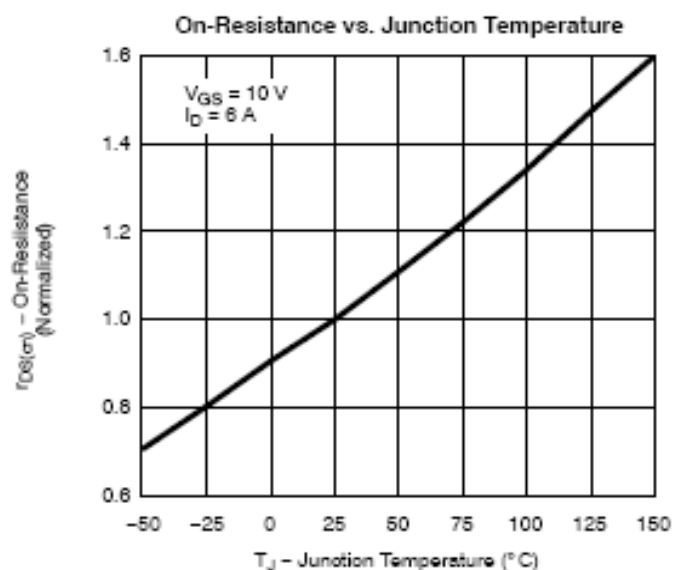
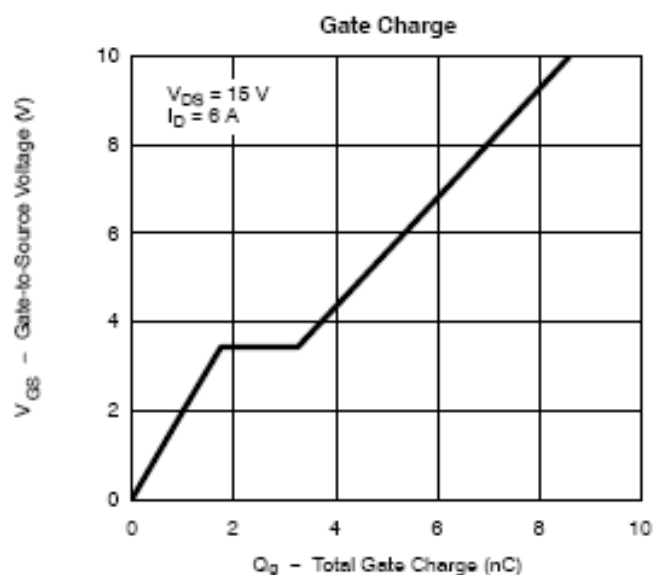




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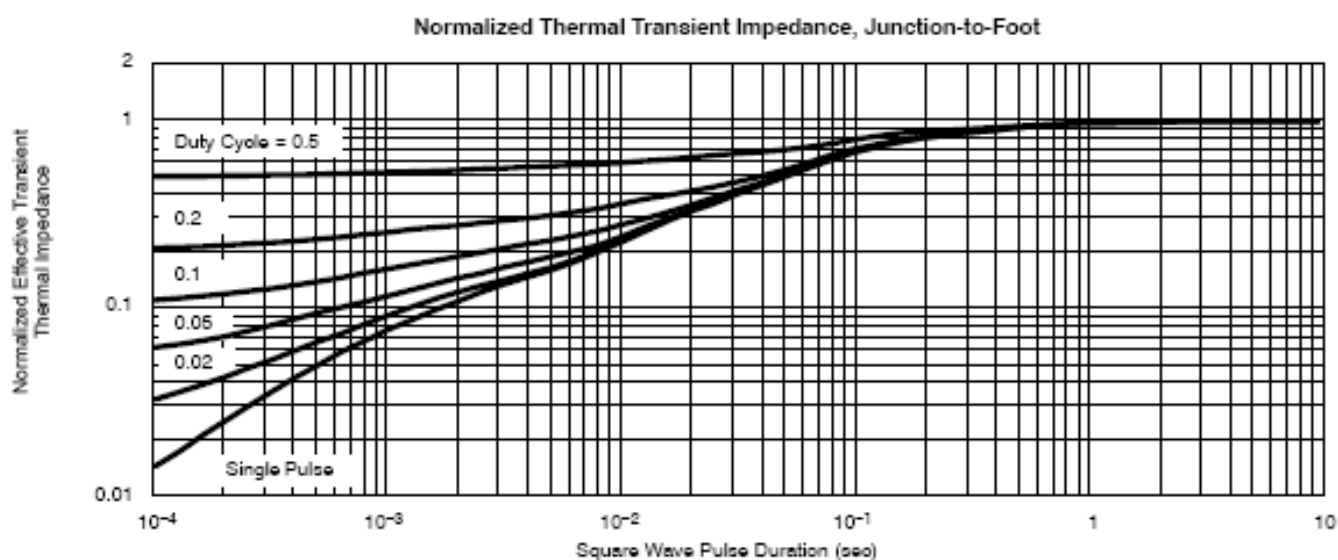
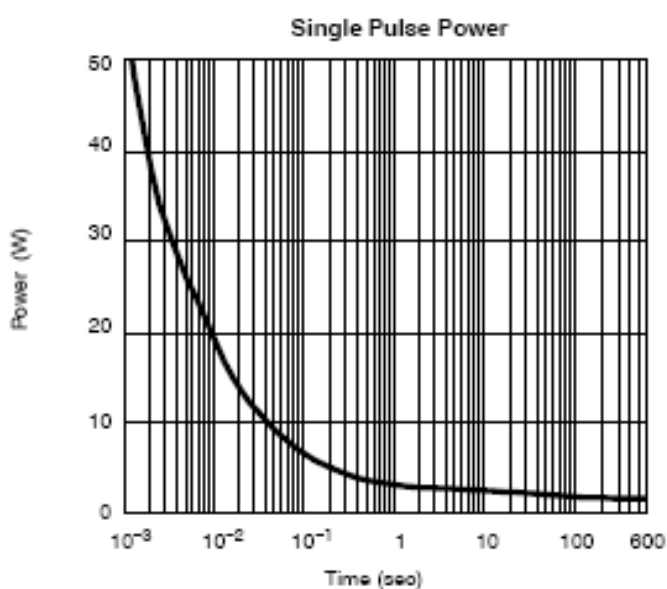
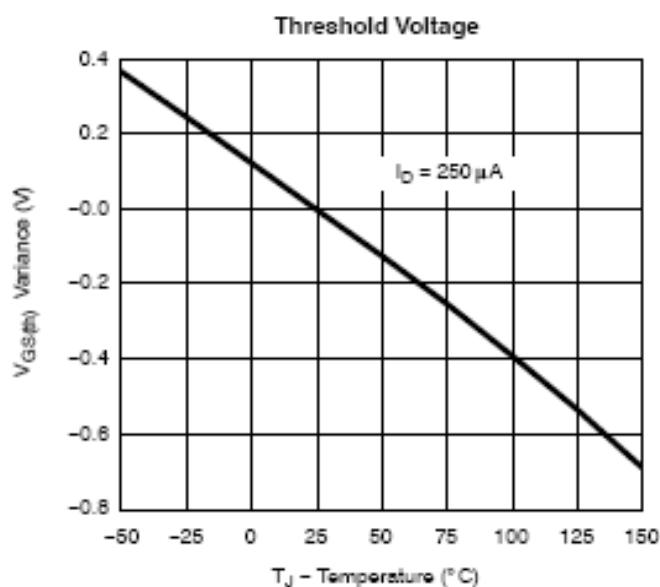




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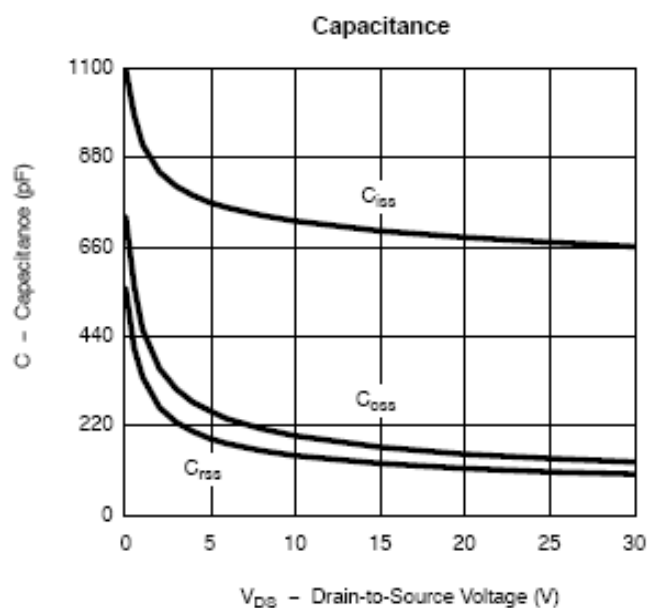
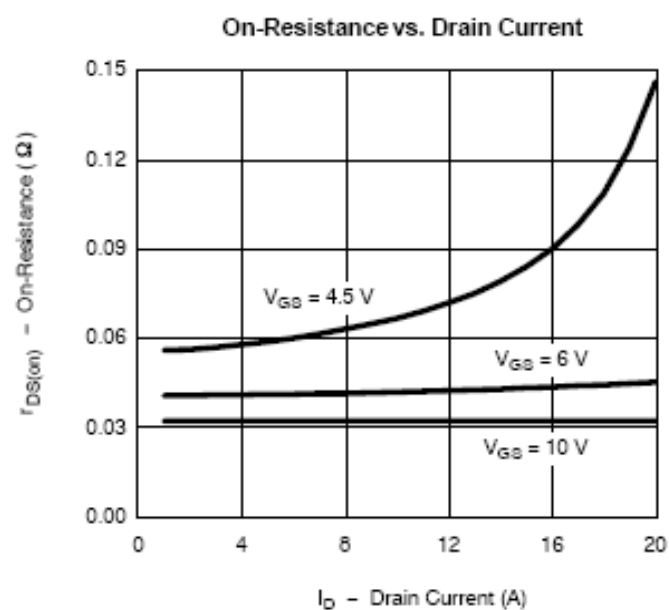
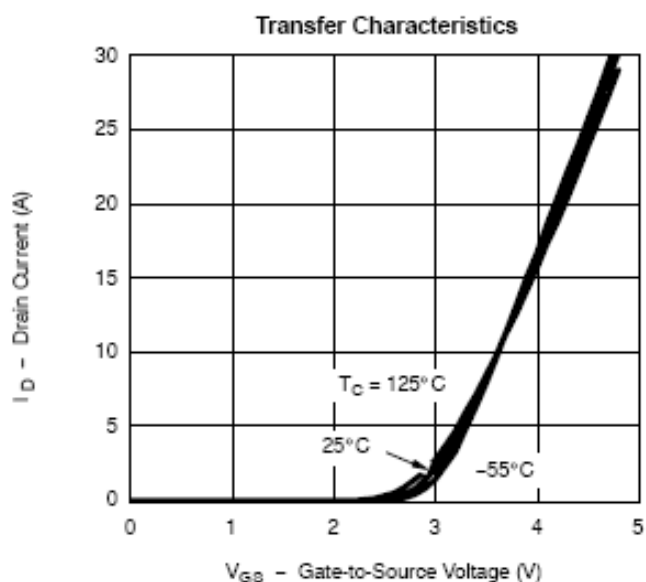
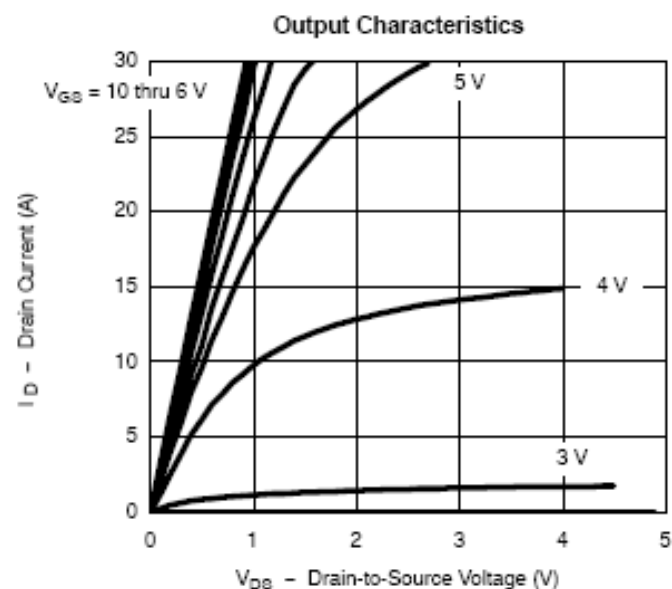




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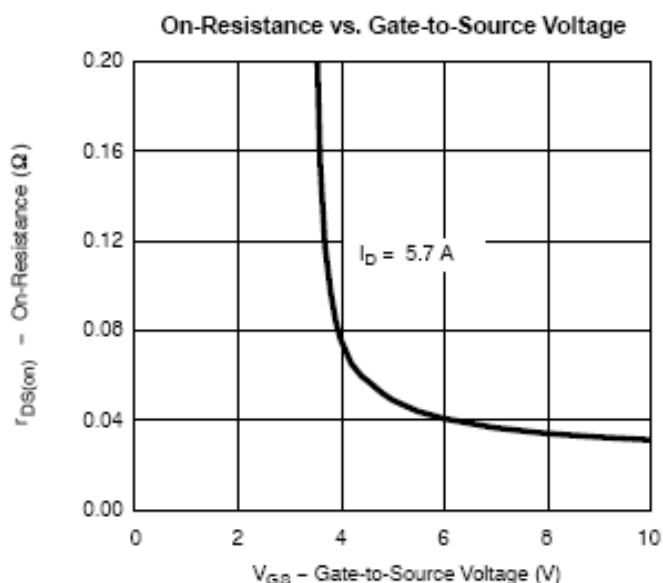
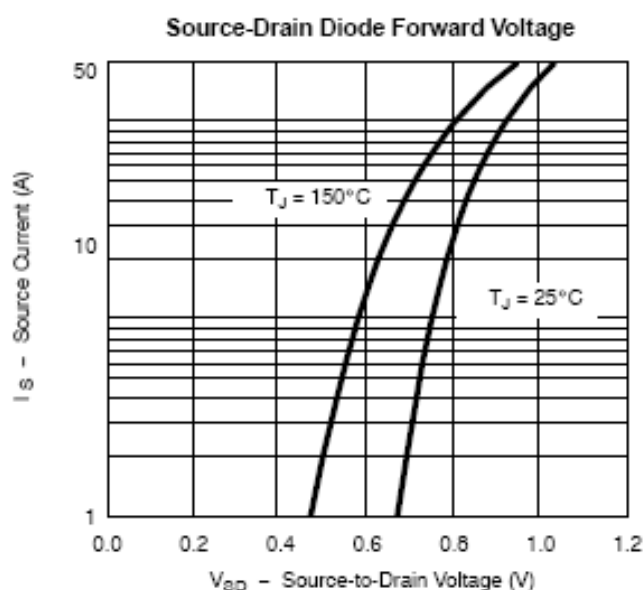
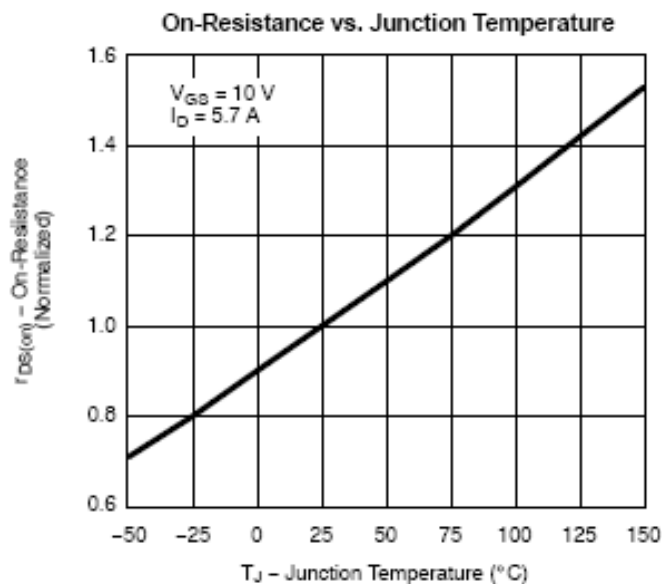
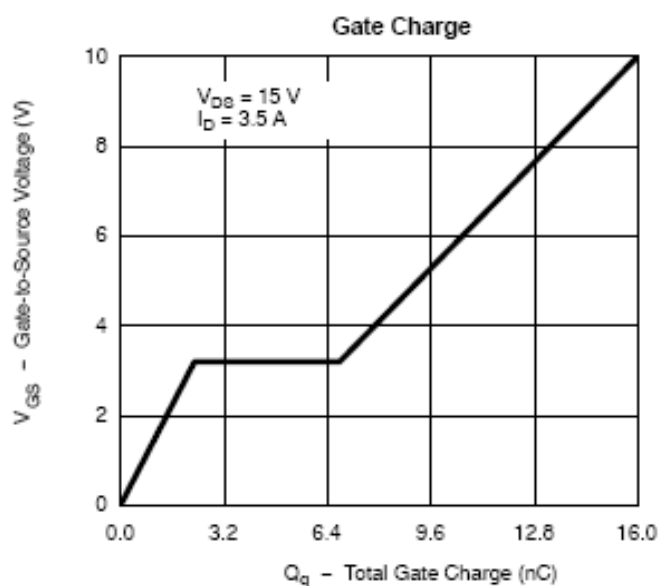




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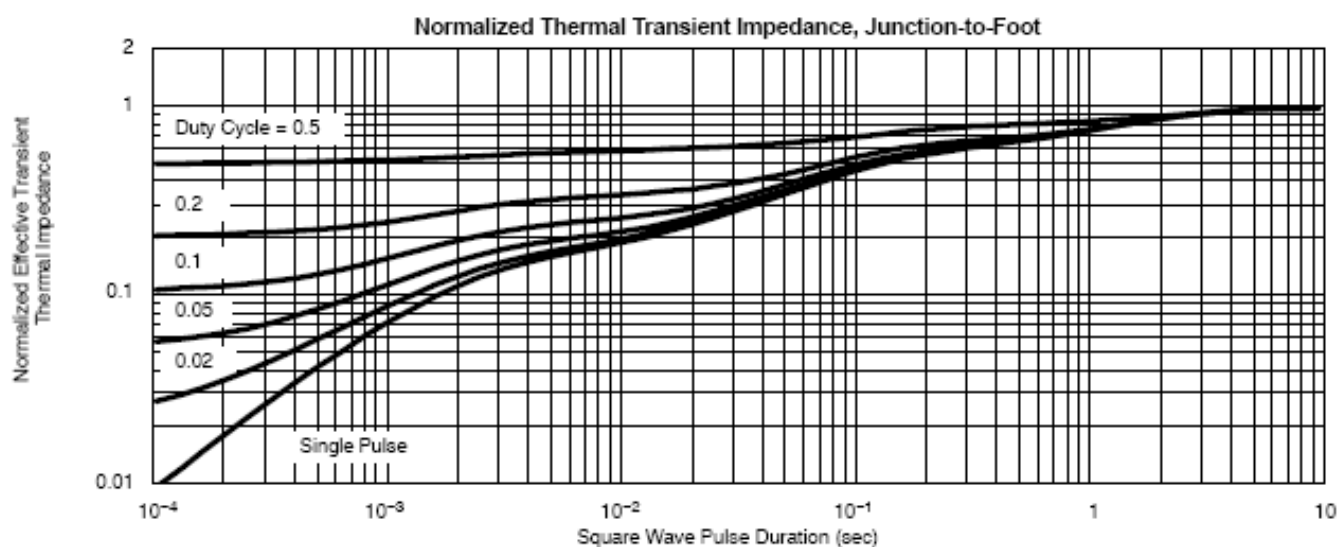
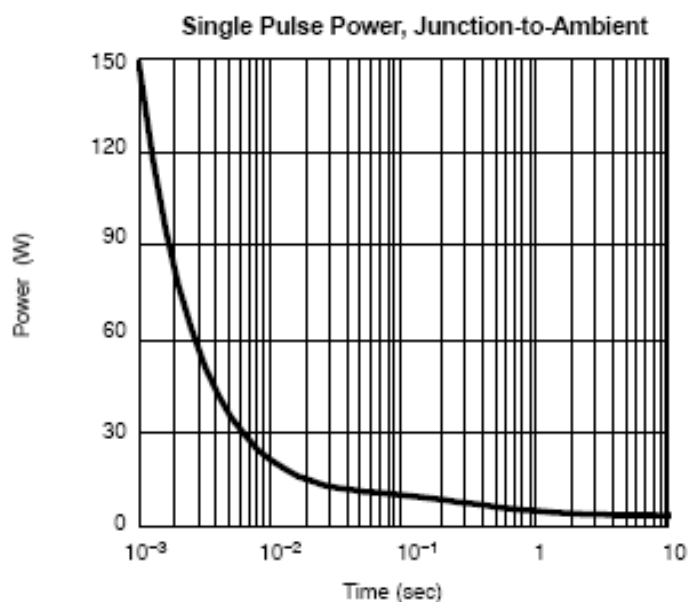
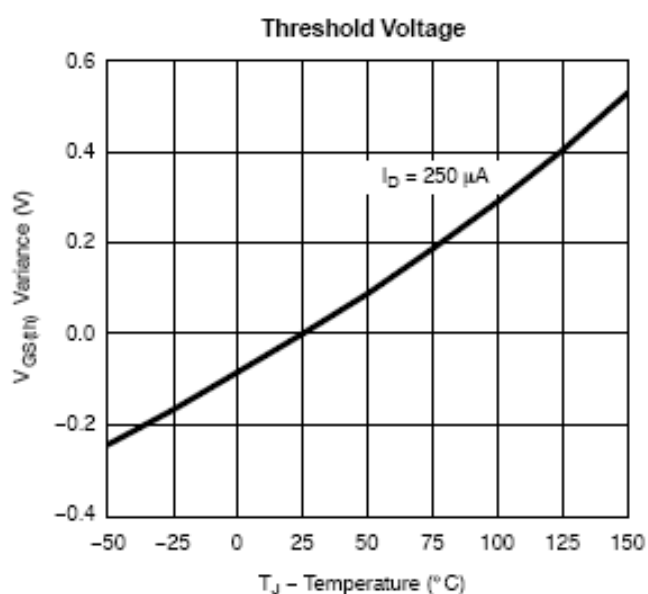




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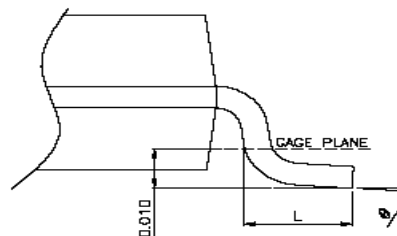
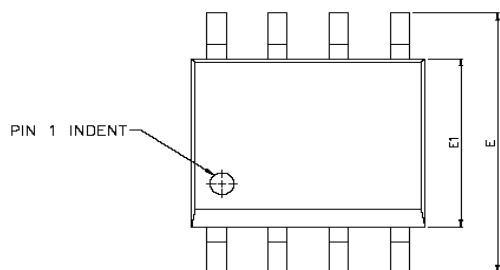




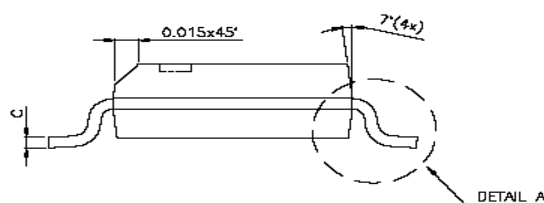
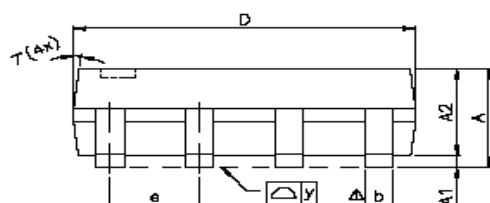
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### SOP- 8 PACKAGE OUTLINE



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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