



# SPP1413

## P-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SPP1413 is the P-Channel logic 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.

These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management and other battery powered circuits where high-side switching , and low in-line power loss are needed in a very small outline surface mount package.

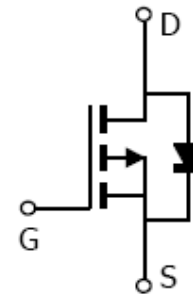
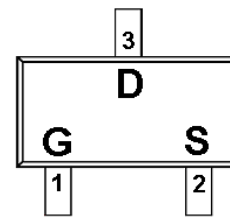
### FEATURES

- ◆ -20V/-2.4A, $R_{DS(ON)}=130m\Omega@V_{GS}=-10V$
- ◆ -20V/-2.9A, $R_{DS(ON)}=150m\Omega@V_{GS}=-4.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ SOT-323 ( SC-70 ) package design

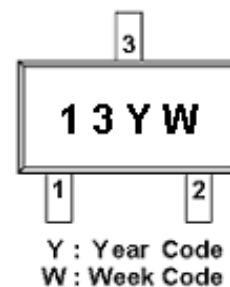
### APPLICATIONS

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

### PIN CONFIGURATION ( SOT-323 ; SC-70 )



### PART MARKING





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### PIN DESCRIPTION

| Pin | Symbol | Description |
|-----|--------|-------------|
| 1   | G      | Gate        |
| 2   | S      | Source      |
| 3   | D      | Drain       |

### ORDERING INFORMATION

| Part Number   | Package | Part Marking |
|---------------|---------|--------------|
| SPP1413S32RGB | SOT-323 | 13           |

※ Week Code : A ~ Z( 1 ~ 26 ) ; a ~ z( 27 ~ 52 )

※ SPP1413S32RGB : Tape Reel ; Pb – Free; Halogen - Free

### ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

| Parameter                                       | Symbol           | Typical | Unit |   |
|---|------------------|---------|------|---|
| Drain-Source Voltage                            | V <sub>DSS</sub> | -20     | V    |   |
| Gate –Source Voltage                            | V <sub>GSS</sub> | ±12     | V    |   |
| Continuous Drain Current(T <sub>J</sub> =150°C) | I <sub>D</sub>   | TA=25°C | -2.9 | A |
|   |                  | TA=70°C | -2.0 |   |
| Pulsed Drain Current                            | I <sub>DM</sub>  | -8      | A    |   |
| Continuous Source Current(Diode Conduction)     | I <sub>S</sub>   | -1.4    | A    |   |
| Power Dissipation                               | P <sub>D</sub>   | TA=25°C | 0.33 | W |
|   |                  | TA=70°C | 0.21 |   |
| 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> | 105     | °C/W |   |



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### ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

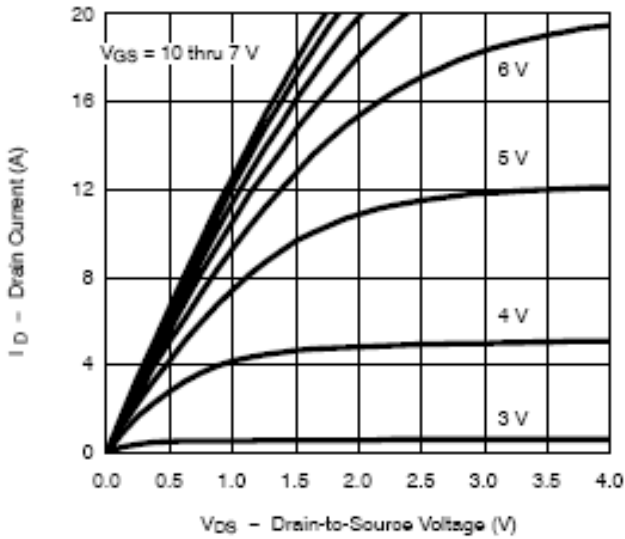
| Parameter                       | Symbol        | Conditions  | Min. | Typ   | Max.      | Unit     |
|---------------------------------|---------------|---|------|-------|-----------|----------|
| <b>Static</b>                   |               |   |      |       |           |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$  | -20  |       |           | V        |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$  | -0.5 |       | -1.8      | V        |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 12V$   |      |       | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=-20V, V_{GS}=0V$  |      |       | -1        | uA       |
|                                 |               | $V_{DS}=-20V, V_{GS}=0V$<br>$T_J=85^\circ C$                              |      |       | -5        |          |
| On-State Drain Current          | $I_{D(on)}$   | $V_{DS}=-5V, V_{GS}=-4.5V$  | -4   |       |           | A        |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=-10V, I_D=-2.4A$  |      | 0.090 | 0.130     | $\Omega$ |
|                                 |               | $V_{GS}=-4.5V, I_D=-2.9A$   |      | 0.125 | 0.150     |          |
| Forward Transconductance        | $g_{fs}$      | $V_{DS}=-10V, I_D=-2.9A$  |      | 6     |           | S        |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=-1.4A, V_{GS}=0V$  |      | -0.8  | -1.2      | V        |
| <b>Dynamic</b>                  |               |   |      |       |           |          |
| Total Gate Charge               | $Q_g$         | $V_{DS}=-10V, V_{GS}=-10V$<br>$I_D=-2.4A$                                 |      | 5.8   | 10        | nC       |
| Gate-Source Charge              | $Q_{gs}$      |   |      | 0.8   |           |          |
| Gate-Drain Charge               | $Q_{gd}$      |   |      | 1.5   |           |          |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=-10V, V_{GS}=0V$<br>$f=1MHz$                                      |      | 226   |           | pF       |
| Output Capacitance              | $C_{oss}$     |   |      | 87    |           |          |
| Reverse Transfer Capacitance    | $C_{rss}$     |   |      | 19    |           |          |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=-10V, R_L=15\Omega$<br>$I_D=-1.0A, V_{GEN}=-10V$<br>$R_G=6\Omega$ |      | 9     | 20        | nS       |
|                                 | $t_r$         |   |      | 9     | 20        |          |
| Turn-Off Time                   | $t_{d(off)}$  |   |      | 18    | 35        |          |
|                                 | $t_f$         |   |      | 6     | 20        |          |



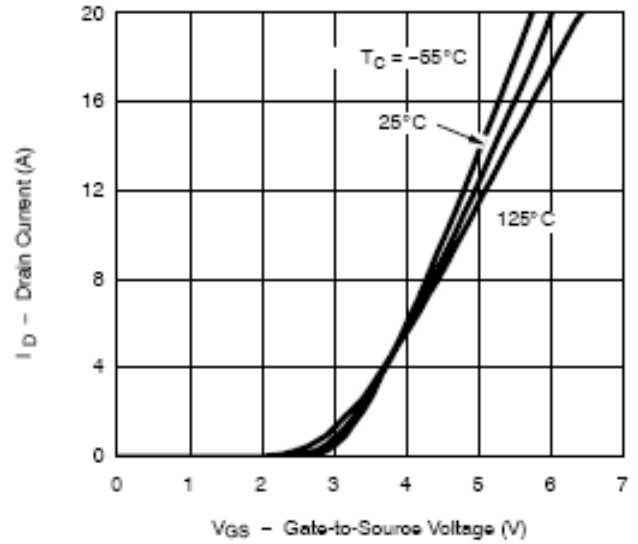
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## TYPICAL CHARACTERISTICS

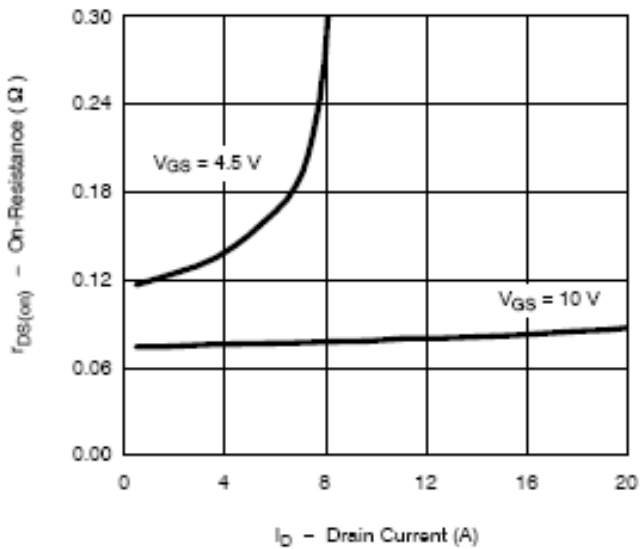
Output Characteristics



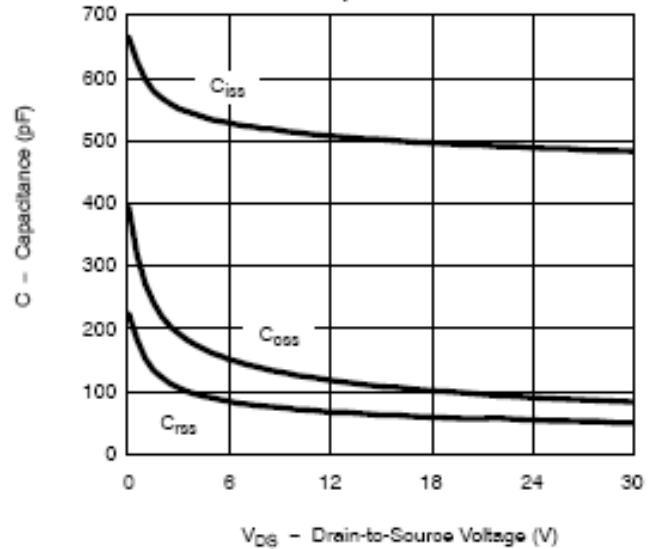
Transfer Characteristics



On-Resistance vs. Drain Current



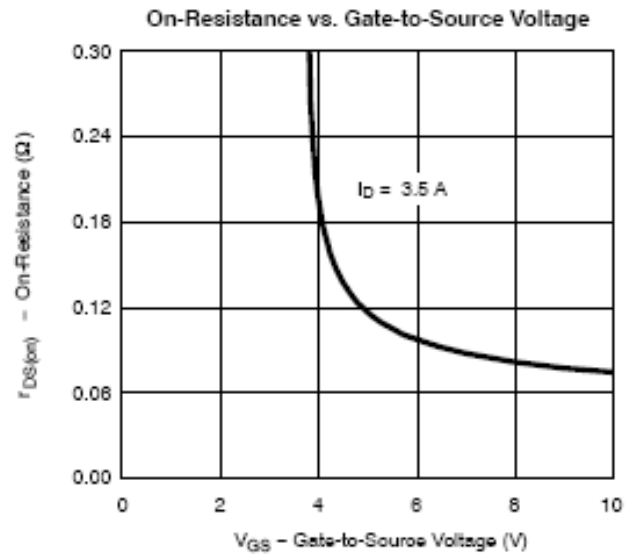
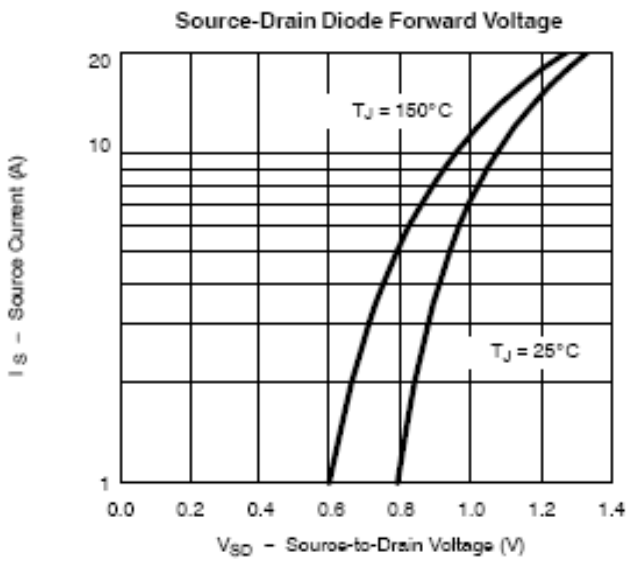
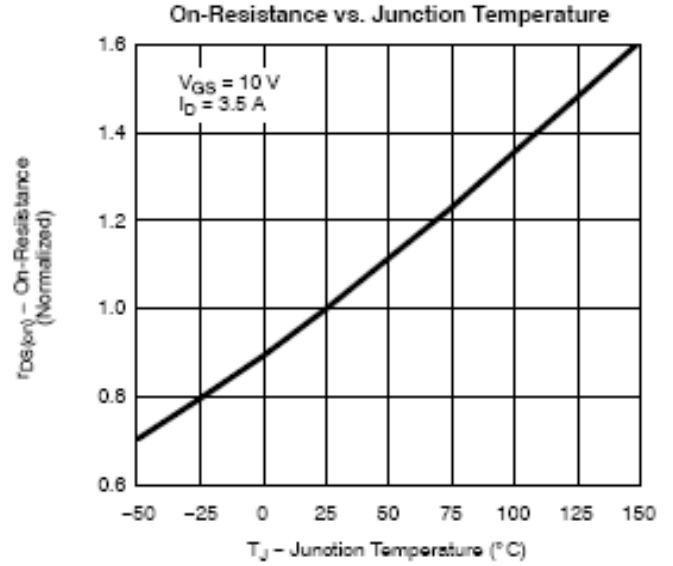
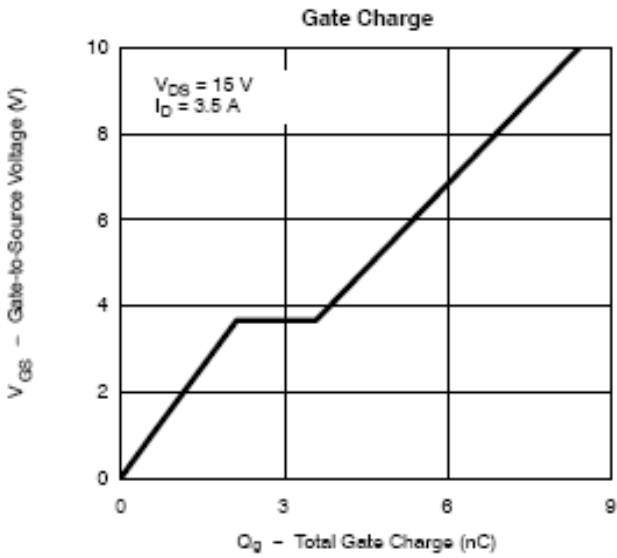
Capacitance





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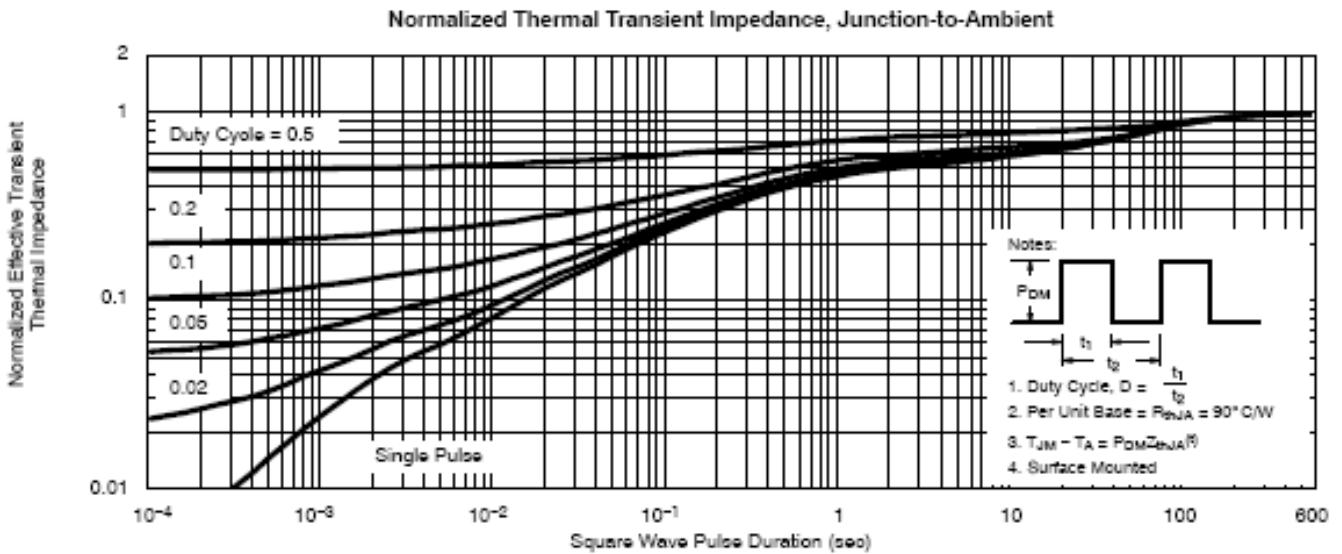
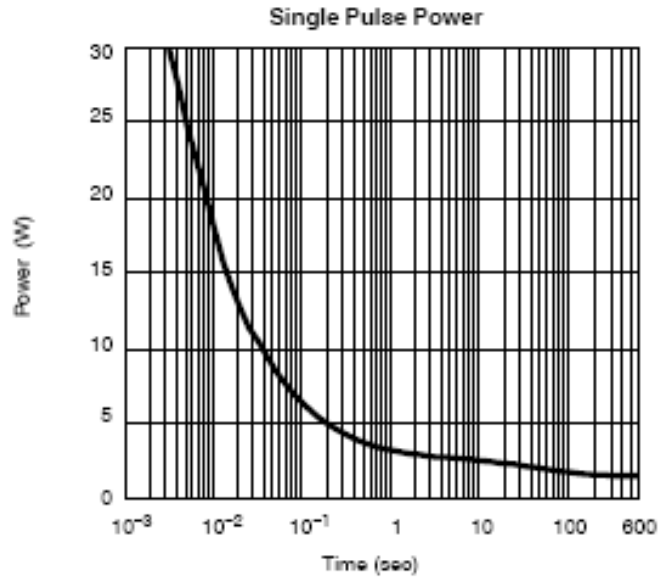
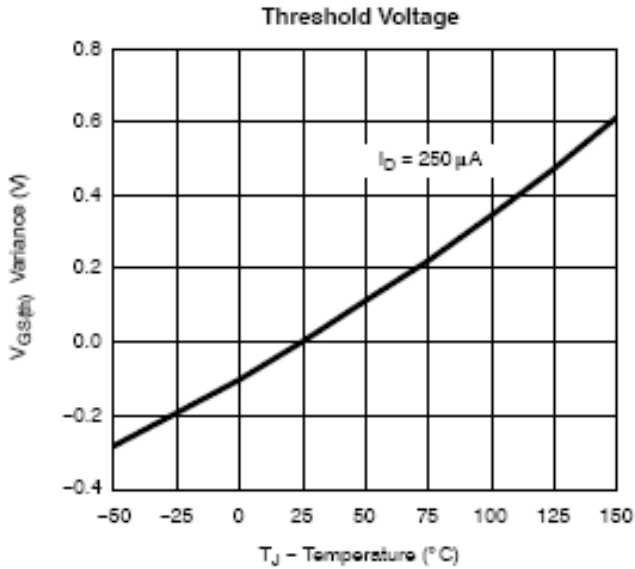
## TYPICAL CHARACTERISTICS





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## TYPICAL CHARACTERISTICS





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