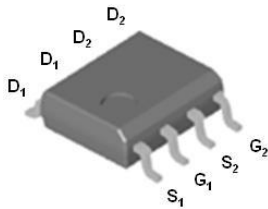


# P2804NVG

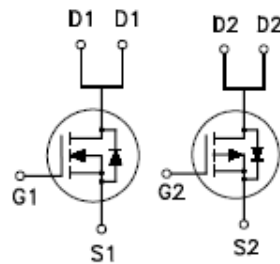
## N&P-Channel Enhancement Mode MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$                   | $I_D$ | Channel |
|---------------|--------------------------------|-------|---------|
| 40V           | 28m $\Omega$ @ $V_{GS} = 10V$  | 7A    | N       |
| -40V          | 65m $\Omega$ @ $V_{GS} = -10V$ | -6A   | P       |



SOP-8



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25\text{ }^\circ\text{C}$ Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS   |                                  | SYMBOL         | CH. | LIMITS     | UNITS            |
|--|----------------------------------|----------------|-----|------------|------------------|
| Drain-Source Voltage   |                                  | $V_{DS}$       | N   | 40         | V                |
|  |                                  |                | P   | -40        |                  |
| Gate-Source Voltage  |                                  | $V_{GS}$       | N   | $\pm 20$   | V                |
|  |                                  |                | P   | $\pm 20$   |                  |
| Continuous Drain Current   | $T_A = 25\text{ }^\circ\text{C}$ | $I_D$          | N   | 7          | A                |
|  |                                  |                | P   | -6         |                  |
|  | $T_A = 70\text{ }^\circ\text{C}$ |                | N   | 6          |                  |
|  |                                  |                | P   | -5         |                  |
| Pulsed Drain Current <sup>1</sup>  |                                  | $I_{DM}$       | N   | 20         | A                |
|  |                                  |                | P   | -20        |                  |
| Power Dissipation  | $T_A = 25\text{ }^\circ\text{C}$ | $P_D$          | N   | 2          | W                |
|  |                                  |                | P   |            |                  |
|  | $T_A = 70\text{ }^\circ\text{C}$ |                | N   | 1.3        |                  |
|  |                                  |                | P   |            |                  |
| Junction & Storage Temperature Range                                     |                                  | $T_J, T_{stg}$ |     | -55 to 150 | $^\circ\text{C}$ |
| Lead Temperature ( <sup>1</sup> / <sub>16</sub> " from case for 10 sec.) |                                  | $T_L$          |     | 275        |                  |

# P2804NVG

## N&P-Channel Enhancement Mode MOSFET

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | SYMBOL          | TYPICAL | MAXIMUM | UNITS                         |
|---------------------|-----------------|---------|---------|-------------------------------|
| Junction-to-Ambient | $R_{\theta JA}$ | 48      | 62.5    | $^{\circ}\text{C} / \text{W}$ |

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Duty cycle  $\leq 1\%$ .

### ELECTRICAL CHARACTERISTICS ( $T_J = 25^{\circ}\text{C}$ , Unless Otherwise Noted)

| PARAMETER                                     | SYMBOL        | TEST CONDITIONS  | CH. | LIMITS |     |           | UNITS         |
|---|---------------|--|-----|--------|-----|-----------|---------------|
|   |               |  |     | MIN    | TYP | MAX       |               |
| <b>STATIC</b>                                 |               |  |     |        |     |           |               |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$                           | N   | 40     |     |           | V             |
|   |               | $V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$                          | P   | -40    |     |           |               |
| Gate Threshold Voltage                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                              | N   | 1      | 2   | 3         | V             |
|   |               | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$                             | P   | -1     | -2  | -3        |               |
| Gate-Body Leakage                             | $I_{GSS}$     | $V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$                        | N   |        |     | $\pm 100$ | nA            |
|   |               | $V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$                        | P   |        |     | $\pm 100$ |               |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$                            | N   |        |     | 1         | $\mu\text{A}$ |
|   |               | $V_{DS} = -32\text{V}, V_{GS} = 0\text{V}$                           | P   |        |     | -1        |               |
|   |               | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, T_J = 55^{\circ}\text{C}$  | N   |        |     | 10        |               |
|   |               | $V_{DS} = -30\text{V}, V_{GS} = 0\text{V}, T_J = 55^{\circ}\text{C}$ | P   |        |     | -10       |               |
| On-State Drain Current <sup>1</sup>           | $I_{D(ON)}$   | $V_{DS} = 5\text{V}, V_{GS} = 10\text{V}$                            | N   | 20     |     |           | A             |
|   |               | $V_{DS} = -5\text{V}, V_{GS} = -10\text{V}$                          | P   | -20    |     |           |               |
| Drain-Source On-State Resistance <sup>1</sup> | $R_{DS(ON)}$  | $V_{GS} = 5\text{V}, I_D = 6\text{A}$                                | N   |        | 27  | 42        | m $\Omega$    |
|   |               | $V_{GS} = -5\text{V}, I_D = -4.5\text{A}$                            | P   |        | 80  | 94        |               |
|   |               | $V_{GS} = 10\text{V}, I_D = 7\text{A}$                               | N   |        | 21  | 28        |               |
|   |               | $V_{GS} = -10\text{V}, I_D = -5\text{A}$                             | P   |        | 50  | 65        |               |
| Forward Transconductance <sup>1</sup>         | $g_{fs}$      | $V_{DS} = 10\text{V}, I_D = 7\text{A}$                               | N   |        | 19  |           | S             |
|   |               | $V_{DS} = -10\text{V}, I_D = -5\text{A}$                             | P   |        | 11  |           |               |

## P2804NVG

### N&P-Channel Enhancement Mode MOSFET

| DYNAMIC   |              |  |   |  |      |      |    |
|---|--------------|--|---|--|------|------|----|
| Input Capacitance   | $C_{iss}$    | N-Channel<br>$V_{GS} = 0V, V_{DS} = 10V, f = 1MHz$   | N |  | 790  | 988  | pF |
|   |              |  | P |  | 690  | 863  |    |
| Output Capacitance  | $C_{oss}$    | P-Channel<br>$V_{GS} = 0V, V_{DS} = -10V, f = 1MHz$  | N |  | 175  | 245  |    |
|   |              |  | P |  | 310  | 430  |    |
| Reverse Transfer Capacitance  | $C_{rss}$    | N-Channel<br>$V_{DS} = 0.5V_{(BR)DSS}, V_{GS} = 10V, I_D = 7A$                               | N |  | 65   | 98   | nC |
|   |              |  | P |  | 75   | 113  |    |
| Total Gate Charge <sup>2</sup>  | $Q_g$        | P-Channel<br>$V_{DS} = 0.5V_{(BR)DSS}, V_{GS} = -10V, I_D = -5A$                             | N |  | 16   |      |    |
| Gate-Source Charge <sup>2</sup>                                       | $Q_{gs}$     |  | P |  | 14   |      |    |
| Gate-Drain Charge <sup>2</sup>  | $Q_{gd}$     | N-Channel<br>$V_{DS} = 20V, I_D \cong 1A, V_{GS} = 10V, R_{GEN} = 6\Omega$                   | N |  | 2.5  |      |    |
|   |              |  | P |  | 2.2  |      |    |
| Turn-On Delay Time <sup>2</sup>                                       | $t_{d(on)}$  | P-Channel<br>$V_{DS} = -20V, R_L = 1\Omega, I_D \cong -1A, V_{GS} = -10V, R_{GEN} = 6\Omega$ | N |  | 2.1  |      | nS |
|   |              |  | P |  | 1.9  |      |    |
| Rise Time <sup>2</sup>  | $t_r$        | N-Channel<br>$V_{DS} = 20V, I_D \cong 1A, V_{GS} = 10V, R_{GEN} = 6\Omega$                   | N |  | 2.2  | 4.4  |    |
|   |              |  | P |  | 6.7  | 13.4 |    |
| Turn-Off Delay Time <sup>2</sup>                                      | $t_{d(off)}$ | P-Channel<br>$V_{DS} = -20V, R_L = 1\Omega, I_D \cong -1A, V_{GS} = -10V, R_{GEN} = 6\Omega$ | N |  | 7.5  | 15   |    |
|   |              |  | P |  | 9.7  | 19.4 |    |
| Fall Time <sup>2</sup>  | $t_f$        | N-Channel<br>$V_{DS} = 20V, I_D \cong 1A, V_{GS} = 10V, R_{GEN} = 6\Omega$                   | N |  | 11.8 | 21.3 |    |
|   |              |  | P |  | 19.8 | 35.6 |    |
|   |              | P-Channel<br>$V_{DS} = -20V, R_L = 1\Omega, I_D \cong -1A, V_{GS} = -10V, R_{GEN} = 6\Omega$ | N |  | 3.7  | 7.4  |    |
|   |              |  | P |  | 12.3 | 22.2 |    |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ( $T_J = 25^\circ C$ ) |              |  |   |  |      |      |    |
| Continuous Current  | $I_S$        |  | N |  |      | 1.3  | A  |
|   |              |  | P |  |      | -1.3 |    |
| Pulsed Current <sup>3</sup>   | $I_{SM}$     |  | N |  |      | 2.6  |    |
|   |              |  | P |  |      | -2.6 |    |
| Forward Voltage <sup>1</sup>  | $V_{SD}$     | $I_F = I_S, V_{GS} = 0V$   | N |  |      | 1    | V  |
|   |              | $I_F = I_S, V_{GS} = 0V$   | P |  |      | -1   |    |

<sup>1</sup>Pulse test : Pulse Width  $\leq 300 \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

<sup>2</sup>Independent of operating temperature.

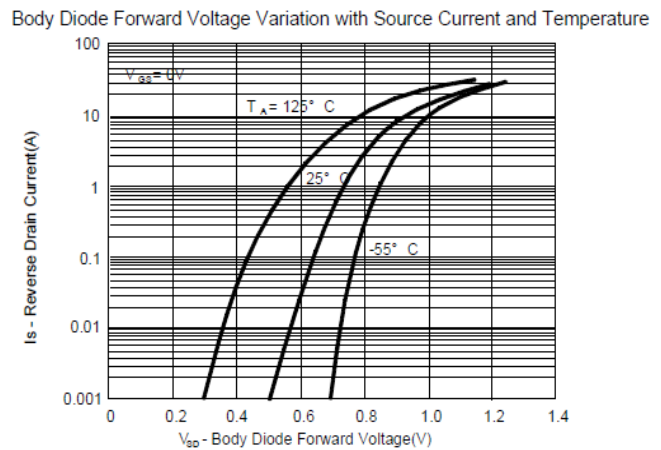
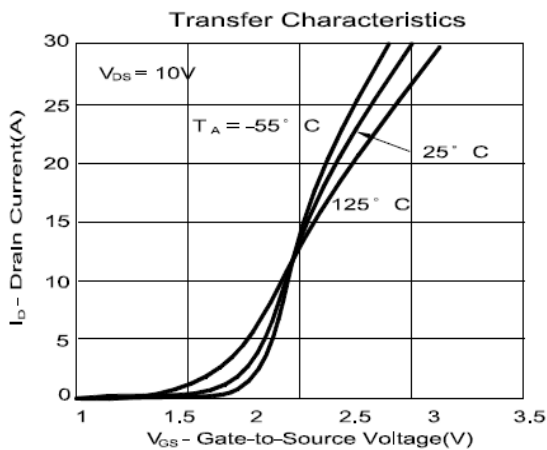
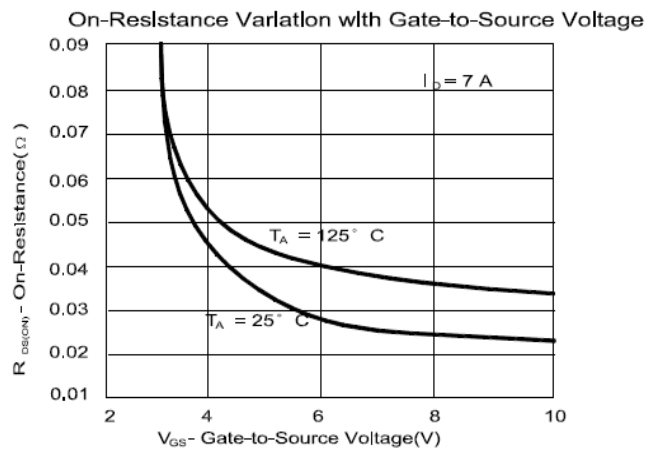
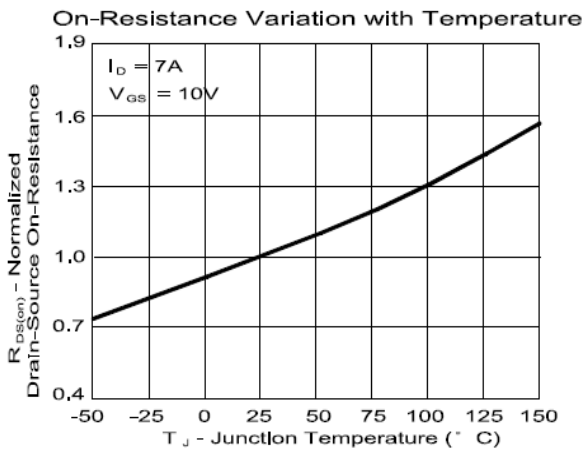
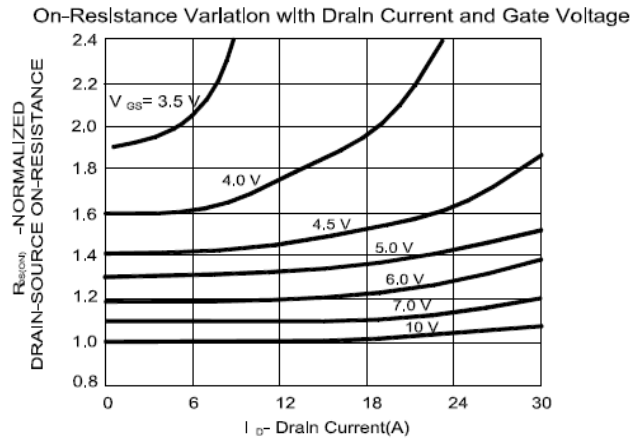
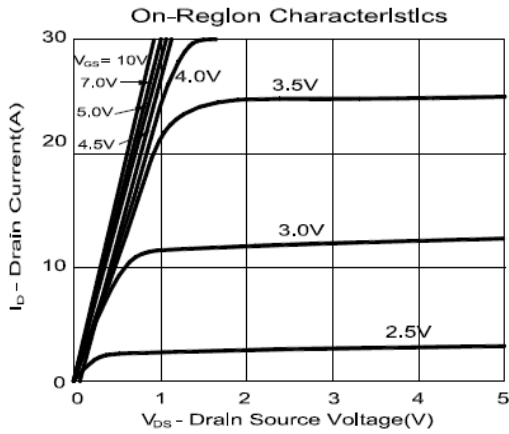
<sup>3</sup>Pulse width limited by maximum junction temperature.

# P2804NVG

## N&P-Channel Enhancement Mode MOSFET

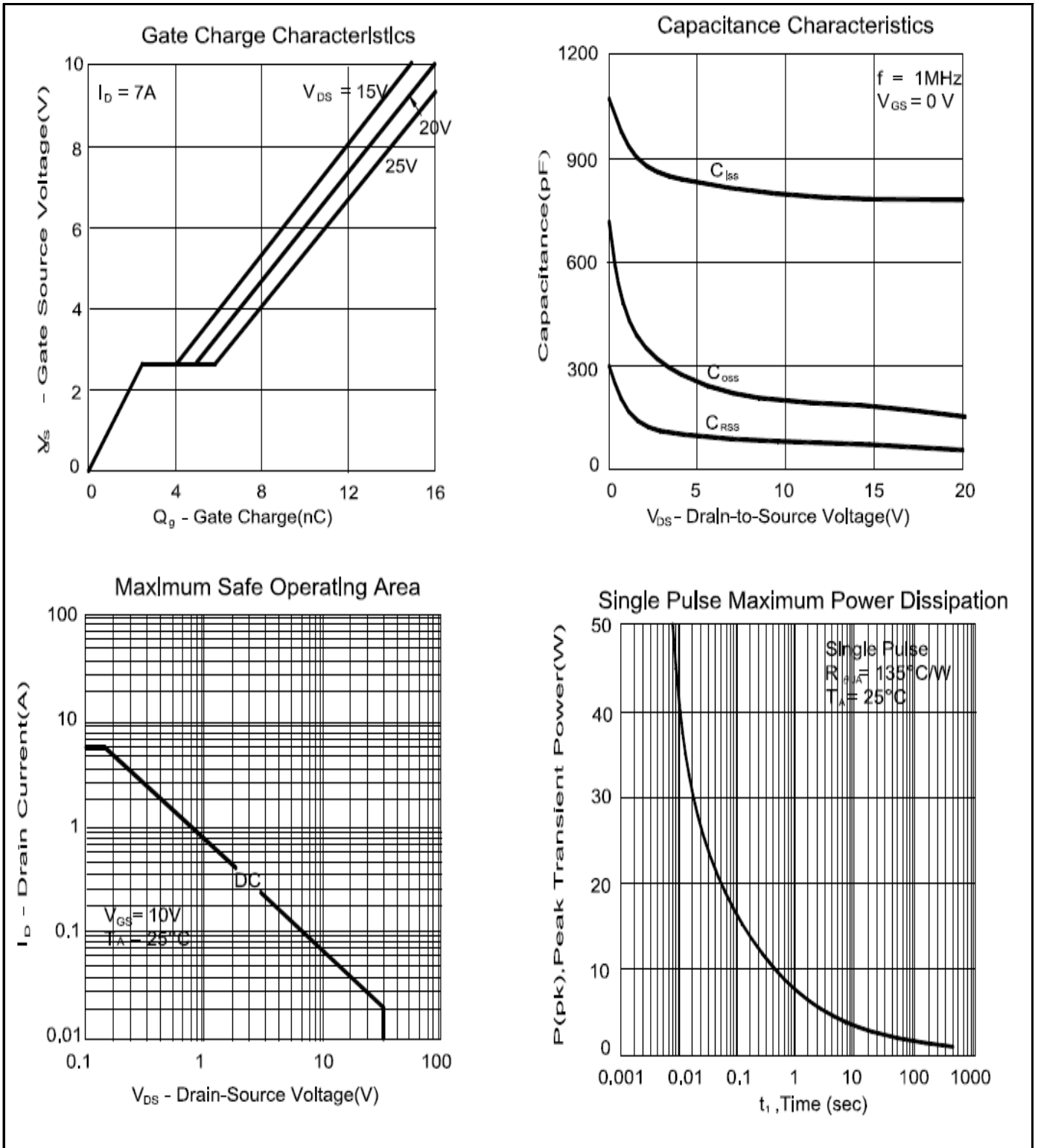
### TYPICAL PERFORMANCE CHARACTERISTICS

#### N-CHANNEL



# P2804NVG

## N&P-Channel Enhancement Mode MOSFET

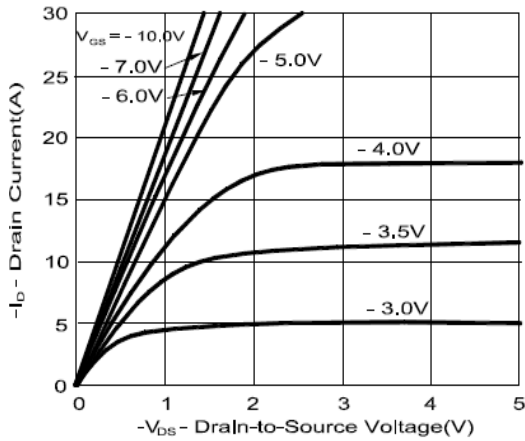


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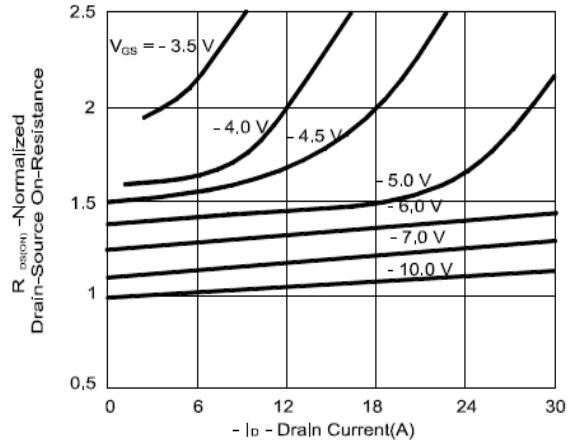
## N&P-Channel Enhancement Mode MOSFET

### P-CHANNEL

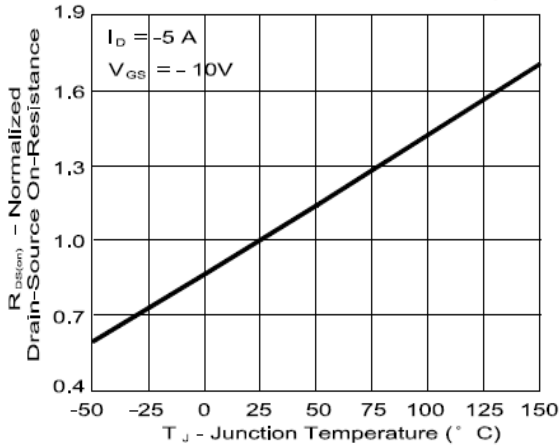
On-Region Characteristics



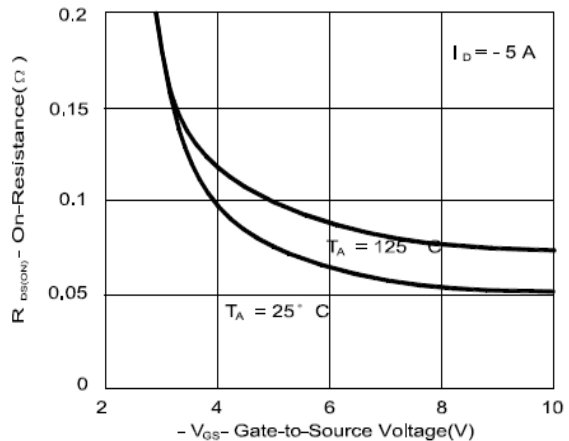
On-Resistance Variation with Drain Current and Gate Voltage



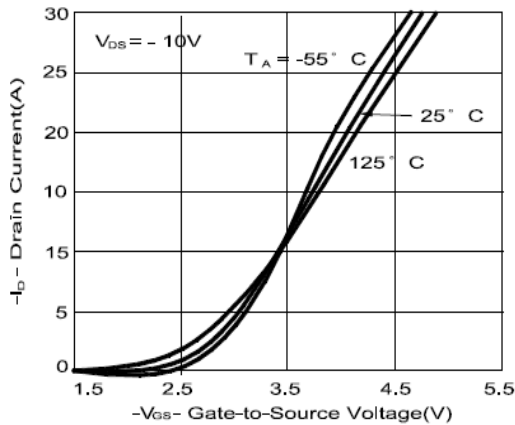
On-Resistance Variation with Temperature



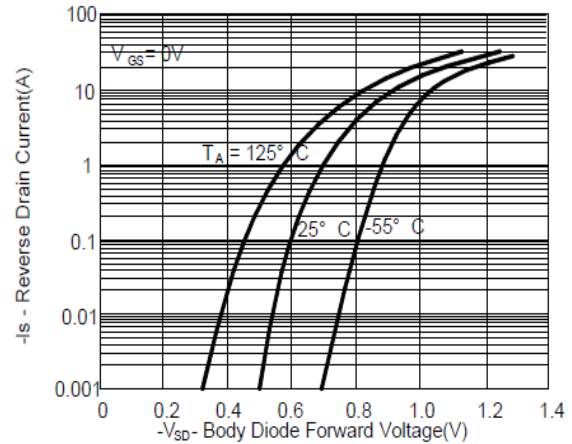
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics

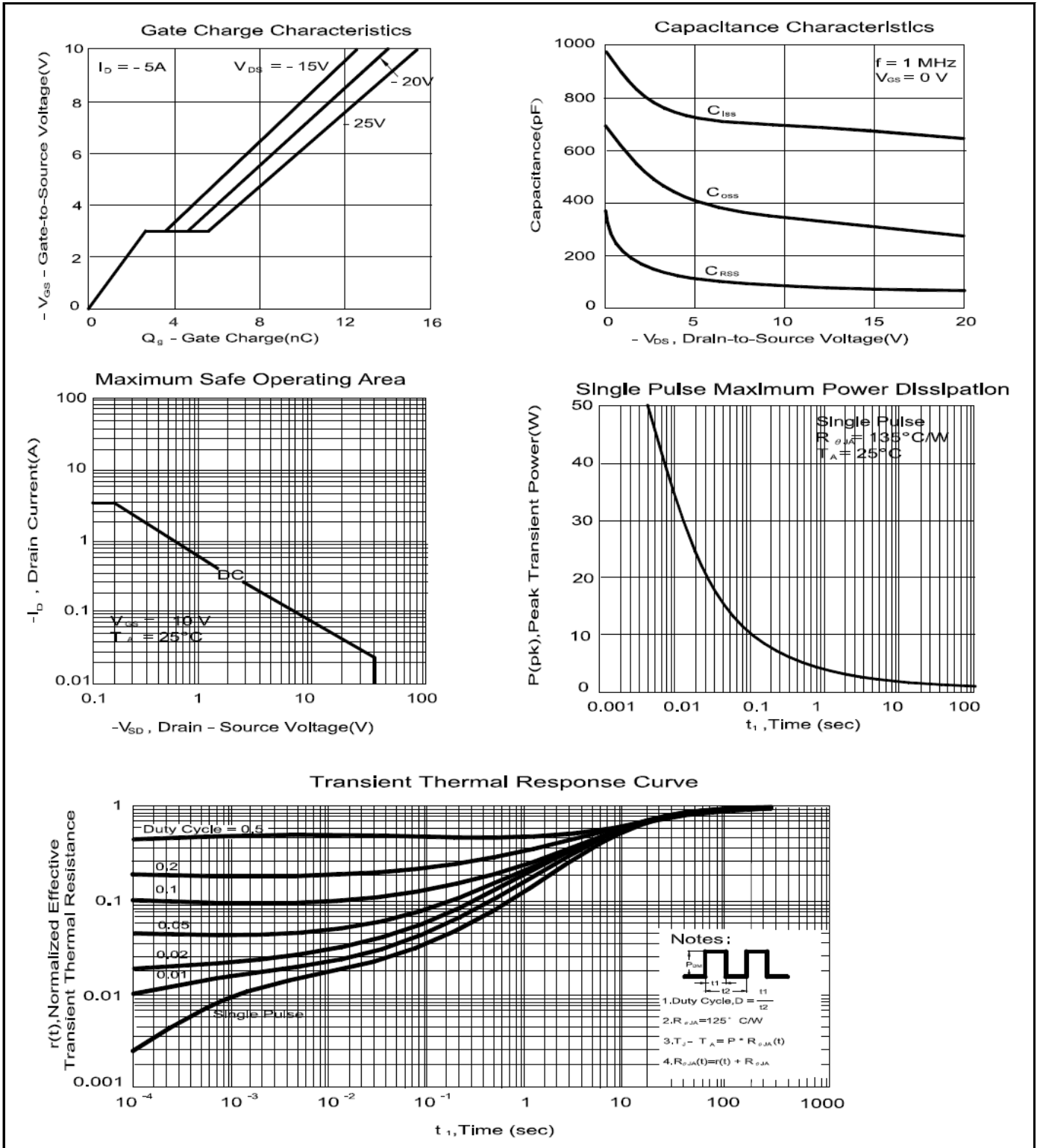


Body Diode Forward Voltage Variation with Source Current and Temperature



# P2804NVG

## N&P-Channel Enhancement Mode MOSFET



# P2804NVG

## N&P-Channel Enhancement Mode MOSFET

### Package Dimension

### SOP-8 MECHANICAL DATA

| Dimension | mm   |      |      | Dimension | mm   |       |      |
|-----------|------|------|------|-----------|------|-------|------|
|           | Min. | Typ. | Max. |           | Min. | Typ.  | Max. |
| A         | 4.8  | 4.9  | 5.0  | H         | 0.4  | 0.6   | 0.93 |
| B         | 3.8  | 3.9  | 4.0  | I         | 0.19 | 0.21  | 0.25 |
| C         | 5.79 | 6.0  | 6.2  | J         | 0.25 | 0.375 | 0.5  |
| D         | 0.33 | 0.4  | 0.51 | K         | 0°   | 3°    | 18°  |
| E         | 1.25 | 1.27 | 1.29 |           |      |       |      |
| F         | 1.1  | 1.3  | 1.65 |           |      |       |      |
| G         | 0.05 | 0.15 | 0.25 |           |      |       |      |

