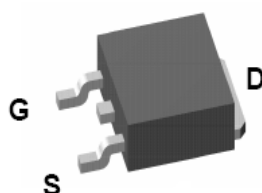


# P1603BD

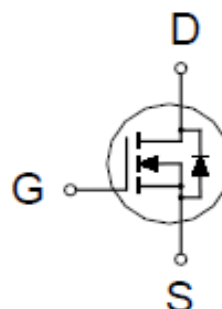
## N-Channel Enhancement Mode MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$          | $I_D$ |
|---------------|-----------------------|-------|
| 30V           | 14mΩ @ $V_{GS} = 10V$ | 40A   |



TO-252



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

| PARAMETERS/TEST CONDITIONS           |                       | SYMBOL         | LIMITS     | UNITS |
|--------------------------------------|-----------------------|----------------|------------|-------|
| Drain-Source Voltage                 |                       | $V_{DS}$       | 30         | V     |
| Gate-Source Voltage                  |                       | $V_{GS}$       | ±20        |       |
| Continuous Drain Current             | $T_C = 25\text{ °C}$  | $I_D$          | 40         | A     |
|                                      | $T_C = 100\text{ °C}$ |                | 32         |       |
| Pulsed Drain Current <sup>1</sup>    |                       | $I_{DM}$       | 150        |       |
| Avalanche Current                    |                       | $I_{AS}$       | 23         |       |
| Avalanche Energy                     | $L=0.1mH$             | $E_{AS}$       | 26         | mJ    |
| Power Dissipation                    | $T_C = 25\text{ °C}$  | $P_D$          | 42         | W     |
|                                      | $T_C = 100\text{ °C}$ |                | 27         |       |
| Junction & Storage Temperature Range |                       | $T_j, T_{stg}$ | -55 to 150 | °C    |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | SYMBOL          | TYPICAL | MAXIMUM | UNITS  |
|---------------------|-----------------|---------|---------|--------|
| Junction-to-Case    | $R_{\theta JC}$ |         | 3       | °C / W |
| Junction-to-Ambient | $R_{\theta JA}$ |         | 62.5    |        |

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

# P1603BD

## N-Channel Enhancement Mode MOSFET

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

| PARAMETER                                                               | SYMBOL        | TEST CONDITIONS                                 | LIMITS |      |           | UNITS      |
|-------------------------------------------------------------------------|---------------|-------------------------------------------------|--------|------|-----------|------------|
|                                                                         |               |                                                 | MIN    | TYP  | MAX       |            |
| STATIC                                                                  |               |                                                 |        |      |           |            |
| Drain-Source Breakdown                                                  | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                   | 30     |      |           | V          |
| Gate Threshold Voltage                                                  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$               | 1      | 1.7  | 2.5       |            |
| Gate-Body Leakage                                                       | $I_{GSS}$     | $V_{DS} = 0V, V_{GS} = \pm 20V$                 |        |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                                         | $I_{DSS}$     | $V_{DS} = 24V, V_{GS} = 0V$                     |        |      | 1         | $\mu A$    |
|                                                                         |               | $V_{DS} = 20V, V_{GS} = 0V, T_J = 125^{\circ}C$ |        |      | 10        |            |
| Drain-Source On-State Resistance <sup>1</sup>                           | $R_{DS(ON)}$  | $V_{GS} = 10V, I_D = 8A$                        |        | 13   | 14        | m $\Omega$ |
|                                                                         |               | $V_{GS} = 4.5V, I_D = 6A$                       |        | 20   | 23        |            |
| Forward Transconductance <sup>1</sup>                                   | $g_{fs}$      | $V_{DS} = 15V, I_D = 8A$                        |        | 21   |           | S          |
| On-State Drain Current <sup>1</sup>                                     | $I_{D(ON)}$   | $V_{DS} = 10V, V_{GS} = 10V,$                   | 150    |      |           | A          |
| DYNAMIC                                                                 |               |                                                 |        |      |           |            |
| Input Capacitance                                                       | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = 15V, f = 1MHz$           |        | 562  |           | pF         |
| Output Capacitance                                                      | $C_{oss}$     |                                                 |        | 159  |           |            |
| Reverse Transfer Capacitance                                            | $C_{rss}$     |                                                 |        | 95   |           |            |
| Gate Resistance                                                         | $R_g$         | $V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$            |        | 1.9  |           | $\Omega$   |
| Total Gate Charge <sup>2</sup>                                          | $Q_g$         | $V_{GS} = 10V$                                  |        | 12.3 |           | nC         |
|                                                                         |               | $V_{GS} = 4.5V$                                 |        | 5.2  |           |            |
| Gate-Source Charge <sup>2</sup>                                         | $Q_{gs}$      | $V_{DS} = 15V, V_{GS} = 10V,$<br>$I_D = 8A$     |        | 1.8  |           |            |
| Gate-Drain Charge <sup>2</sup>                                          | $Q_{gd}$      |                                                 |        | 3.6  |           |            |
| Turn-On Delay Time <sup>2</sup>                                         | $t_{d(on)}$   | $V_{DS} = 15V,$<br>$I_D \leq 8A, V_{GS} = 10V$  |        | 21   |           | nS         |
| Rise Time <sup>2</sup>                                                  | $t_r$         |                                                 |        | 9    |           |            |
| Turn-Off Delay Time <sup>2</sup>                                        | $t_{d(off)}$  |                                                 |        | 3    |           |            |
| Fall Time <sup>2</sup>                                                  | $t_f$         |                                                 |        | 5    |           |            |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>J</sub> = 25 °C) |               |                                                 |        |      |           |            |
| Continuous Current                                                      | $I_S$         |                                                 |        |      | 40        | A          |
| Forward Voltage <sup>1</sup>                                            | $V_{SD}$      | $I_F = 8A, V_{GS} = 0V$                         |        |      | 1         | V          |
| Reverse Recovery Time                                                   | $t_{rr}$      | $I_F = 8A, dI_F/dt = 100A/\mu s$                |        | 24   |           | nS         |
| Reverse Recovery Charge                                                 | $Q_{rr}$      |                                                 |        | 14   |           | nC         |

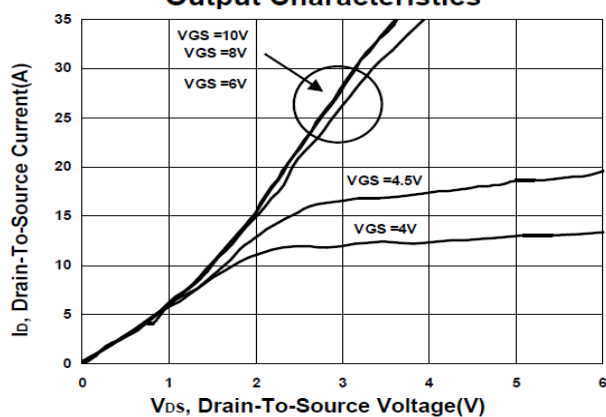
<sup>1</sup>Pulse test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

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

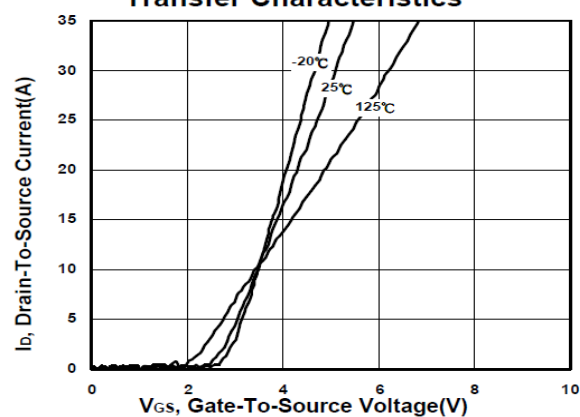
## P1603BD

### N-Channel Enhancement Mode MOSFET

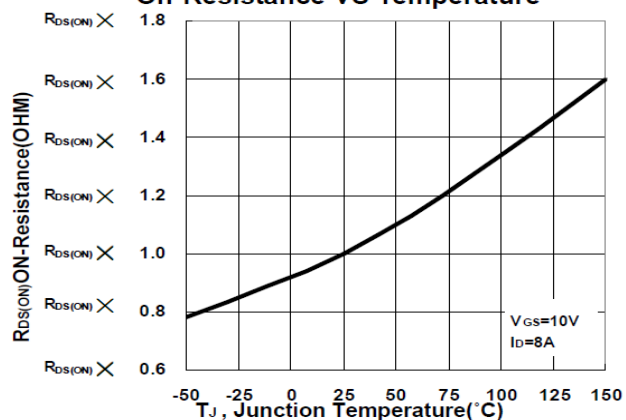
**Output Characteristics**



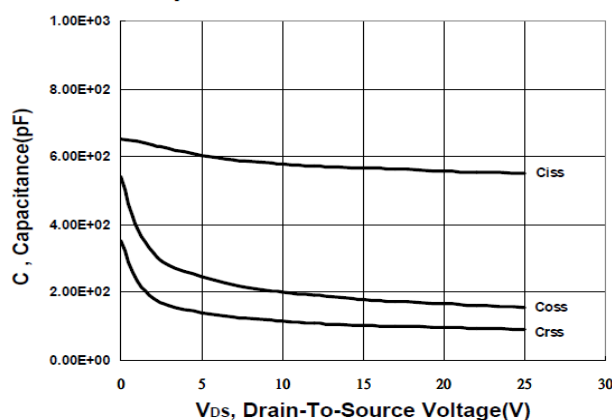
**Transfer Characteristics**



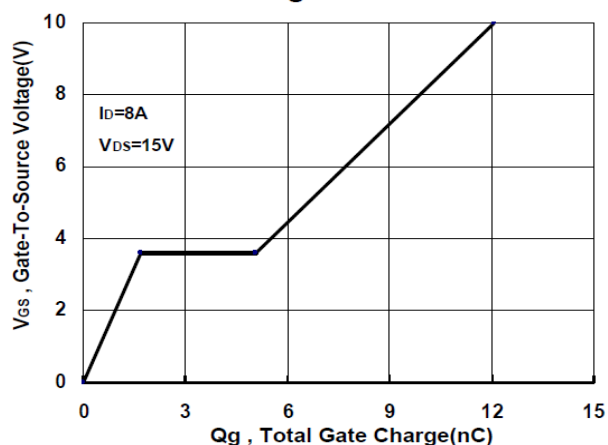
**On-Resistance VS Temperature**



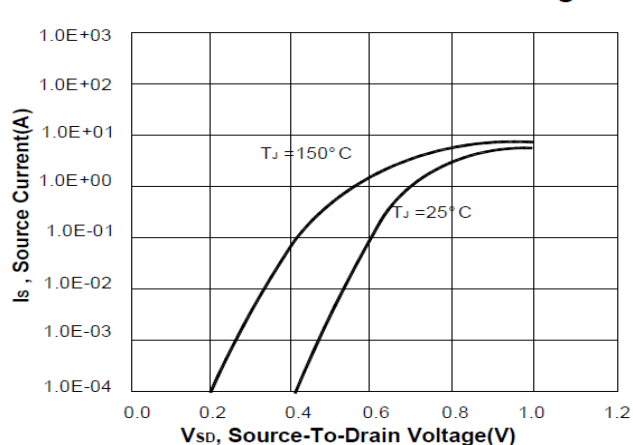
**Capacitance Characteristic**



**Gate charge Characteristics**



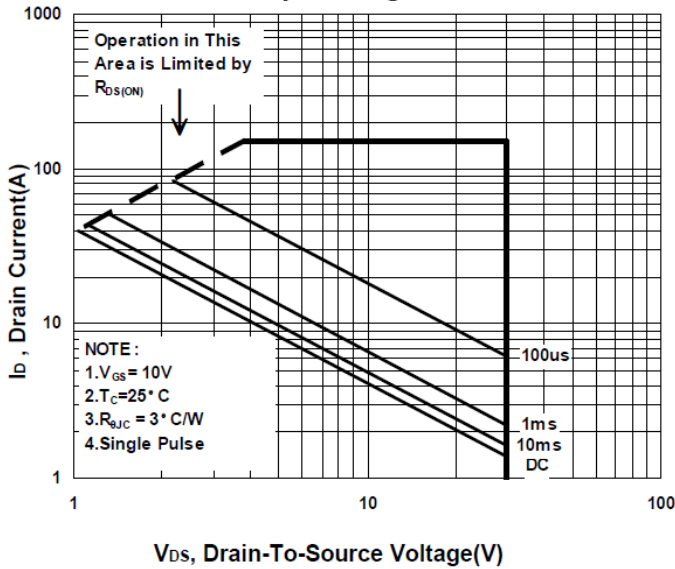
**Source-Drain Diode Forward Voltage**



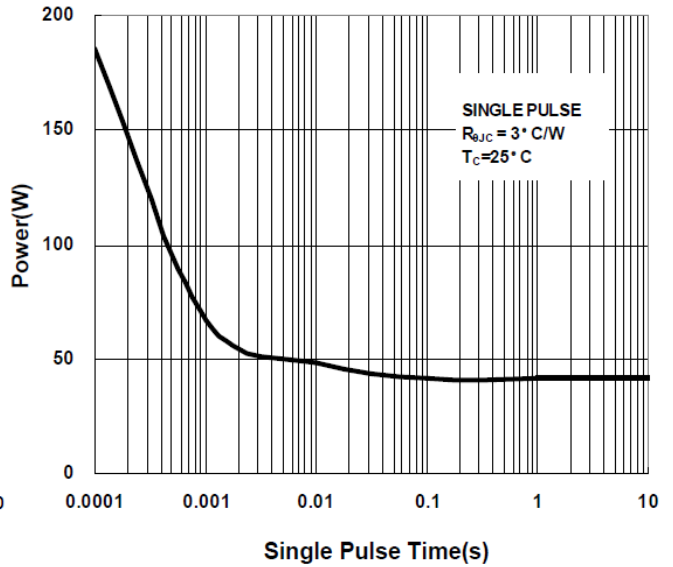
## P1603BD

### N-Channel Enhancement Mode MOSFET

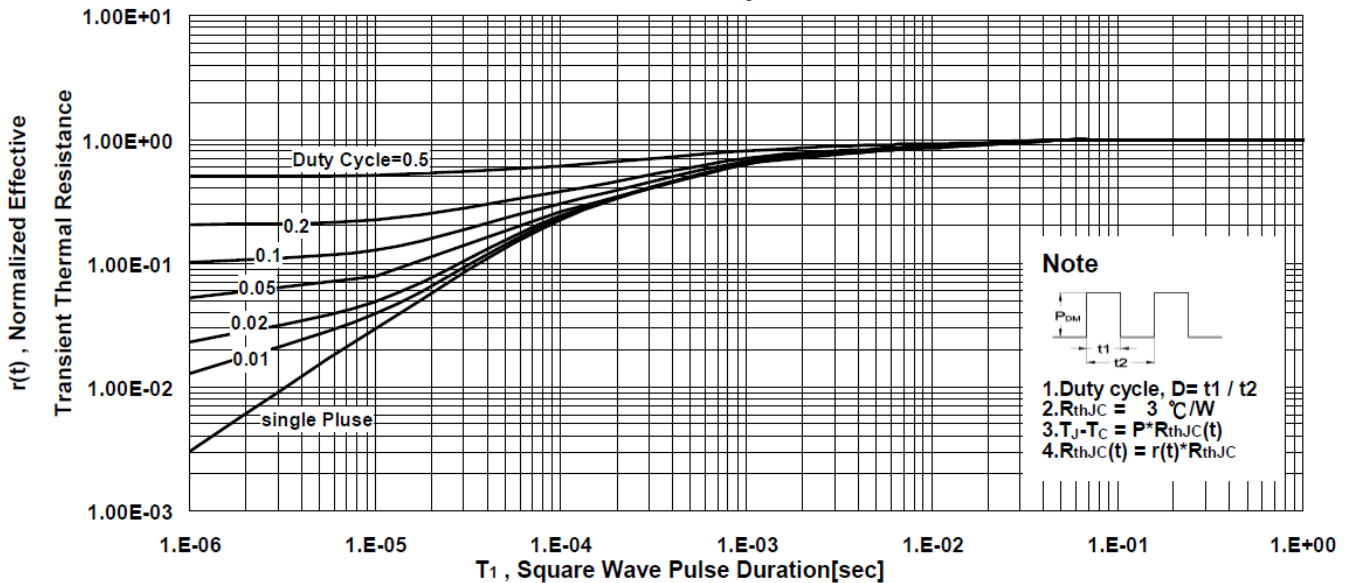
**Safe Operating Area**



**Single Pulse Maximum Power Dissipation**



**Transient Thermal Response Curve**



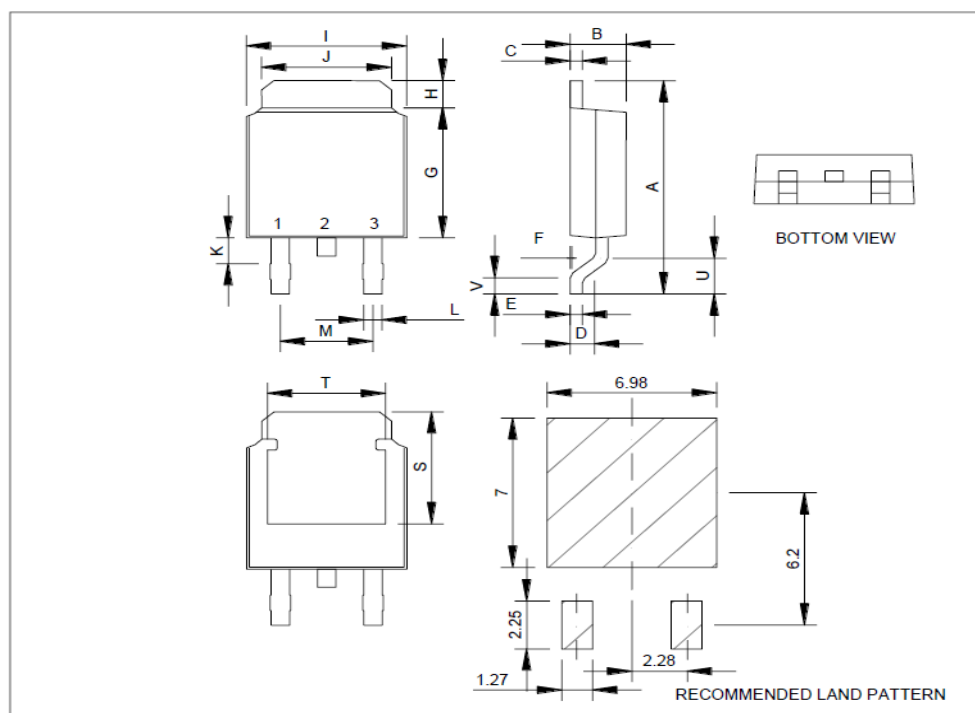
## P1603BD

### N-Channel Enhancement Mode MOSFET

#### Package Dimension

#### TO-252 (DPAK) MECHANICAL DATA

| Dimension | mm   |      |       | Dimension | mm   |      |      |
|-----------|------|------|-------|-----------|------|------|------|
|           | Min. | Typ. | Max.  |           | Min. | Typ. | Max. |
| A         | 8.9  | 10   | 10.41 | J         | 4.8  |      | 5.64 |
| B         | 2.1  | 2.2  | 2.4   | K         | 0.15 |      | 1.1  |
| C         | 0.4  | 0.5  | 0.61  | L         | 0.4  | 0.76 | 0.89 |
| D         | 0.82 | 1.2  | 1.5   | M         | 4.2  | 4.58 | 5    |
| E         | 0.4  | 0.5  | 0.61  | S         | 4.9  | 5.1  | 5.3  |
| F         | 0    |      | 0.2   | T         | 4.6  | 4.75 | 5.44 |
| G         | 5.3  | 6.1  | 6.3   | U         | 1.4  |      | 1.78 |
| H         | 0.9  |      | 1.7   | V         | 0.55 | 1.25 | 1.7  |
| I         | 6.3  | 6.5  | 6.8   |           |      |      |      |



\*因为各家封装模具不同而外观略有所差异，不影响电性及Layout。