## Features

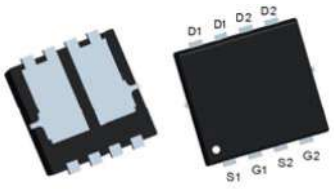
- Fast Switching
- Low Input Capacitance
- Low Input/Output Leakage
- Low On- Resistance
- Low gate Charge

## Product Summary

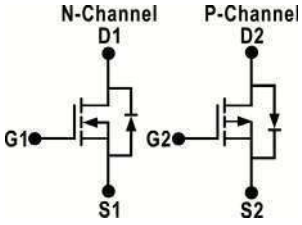
| | | | |
|---|---|---|---|
| $V_{DS}$ | 100 | -100 | V |
| $R_{DS(on),TYP}$@ $V_{GS}$=10 V | 88 | 97 | mΩ |
| $I_D$ | 12 | -10 | A |

## Application

- Motor / Body Load Control
- Automotive Systems
- Load Switch




PDFN5*6-8




## Absolute Maximum Ratings ($T_C$=25℃ unless otherwise specified)

| Symbol | Parameter | | Rating | | Unit |
|---|---|---|---|---|---|
| | | | NMOS | PMOS | |
| $BV_{DSS}$ | Drain-Source breakdown voltage | | 100 | -100 | V |
| VGS | Gate-Source voltage | | ±20 | ±20 | V |
| $I_S$ | Diode continuous forward current | $T_C$=25°C | 12 | -10 | A |
| $I_D$ | Continuous drain current @VGS=±10V | $T_C$=25°C | 12 | -10 | A |
| | | $T_C$=100°C | 8 | -7 | A |
| $I_{DM}$ | Pulse drain current tested ① | $T_C$=25°C | 48 | -40 | A |
| $I_{DSM}$ | Continuous drain current @VGS=±10V | $T_A$=25°C | 4.5 | -3.2 | A |
| | | $T_A$=70°C | 3.5 | -2.5 | A |
| EAS | Avalanche energy, single pulsed ② | | 10 | 21 | mJ |
| $P_D$ | Maximum power dissipation | $T_C$=25°C | 25 | 34 | W |
| $P_{DSM}$ | Maximum power dissipation ③ | $T_A$=25°C | 3.3 | 3.3 | W |
| $T_{STG}$, $T_J$ | Storage and junction temperature range | | -55 to 150 | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typical | | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 5.6 | 4.9 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 41 | | °C/W |

## N-Channel Electrical Characteristics

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 100 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current($T_j$=25℃) | $V_{DS}$=80V,$V_{GS}$=0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current($T_j$=125℃) | $V_{DS}$=80V,$V_{GS}$=0V | -- | -- | 100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ④ | $V_{GS}$=10V, $I_D$=5A | -- | 88 | 106 | mΩ |
| | | $T_j$=100℃ | -- | 100 | -- | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3A | -- | 92 | 110 | mΩ |
| **Dynamic Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=30V,$V_{GS}$=0V, f=1MHz | | 730 | | pF |
| $C_{oss}$ | Output Capacitance | | | 55 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 48 | | pF |
| $R_g$ | Gate Resistance f=1MHz | | -- | 1.9 | -- | Ω |
| $Q_g$ (10V) | Total Gate Charge | | -- | 16 | -- | nC |
| $Q_g$ (4.5V) | Total Gate Charge | $V_{DS}$=30V,$I_D$=8A, $V_{GS}$=10V | -- | 7.8 | -- | nC |
| $Q_{gs}$ | Gate Source Charge | | -- | 1.9 | -- | nC |
| $Q_{gd}$ | Gate Drain Charge | | -- | 4.3 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn on Delay Time | $V_{DD}$=30V, $I_D$=8A, $R_G$=3Ω, $V_{GS}$=10V | -- | 5.9 | -- | ns |
| $t_r$ | Turn on Rise Time | | -- | 7.8 | -- | ns |
| $t_{d(off)}$ | Turn Off Delay Time | | - | 17 | -- | ns |
| $t_f$ | Turn Off Fall Time | | -- | 4.6 | -- | ns |
| **Source Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=8A,$V_{GS}$=0V | -- | 1 | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_j$=25℃,$I_{sd}$=8A, $V_{GS}$=0V di/dt=100A/ s | -- | 19 | -- | ns |
| Q | Reverse Recovery Charge | | -- | 16 | -- | nC |

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by $T_{Jmax}$, starting $T_J$ = 25°C, L = 0.5mH, $R_G$ = 25Ω, $I_{AS}$ = 6A, $V_{GS}$ =10V. Part not recommended for use above this value

③ The power dissipation $P_{DSM}$ is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle≤ 2%.

## P-Channel Electrical Characteristics

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250μA | -100 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current($T_j$=25℃) | $V_{DS}$=-80V,$V_{GS}$=0V | -- | -- | -1 | μA |
| | Zero Gate Voltage Drain Current($T_j$=125℃) | $V_{DS}$=-80V,$V_{GS}$=0V | -- | -- | -100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -1.0 | -1.8 | -2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance ④ | $V_{GS}$=-10V, $I_D$=-6A | -- | 97 | 116 | mΩ |
| | | $T_j$=100℃ | -- | 190 | -- | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-5A | -- | 101 | 121 | mΩ |
| **Dynamic Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | VDS=-30V,VGS=0V, f=1MHz | | 1623 | | pF |
| $C_{oss}$ | Output Capacitance | | | 59 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 57 | | pF |
| $R_g$ | Gate Resistance f=1MHz | | -- | 45 | -- | Ω |
| $Q_g$ (-10V) | Total Gate Charge | VDS=-30V,ID=-8A, VGS=-10V | -- | 38 | -- | nC |
| $Q_g$ (-4.5V) | Total Gate Charge | | -- | 19 | -- | nC |
| $Q_{gs}$ | Gate Source Charge | | -- | 5.6 | -- | nC |
| $Q_{gd}$ | Gate Drain Charge | | -- | 7.5 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn on Delay Time | VDD=-30V, ID=-8.3A, RG=2.7Ω, VGS=-10V | -- | 6.8 | -- | ns |
| $t_r$ | Turn on Rise Time | | -- | 16 | -- | ns |
| $t_{d(off)}$ | Turn Off Delay Time | | - | 116 | -- | ns |
| $t_f$ | Turn Off Fall Time | | -- | 36 | -- | ns |
| **Source Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=-8A,$V_{GS}$=0V | -- | -0.9 | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_j$=25℃,Isd=-8A, VGS=0V di/dt=-100A/μs | -- | 28 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 46 | -- | nC |

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by $T_{Jmax}$, starting $T_J$ = 25°C, L = 0.5mH, $R_G$ = 25Ω, $I_{AS}$ = -9A, $V_{GS}$ =-10V. Part not recommended for use above this value

③ The power dissipation $P_{DSM}$ is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle≤ 2%.

## N-Channel Typical Characteristics

**Figure1:** Output Characteristics

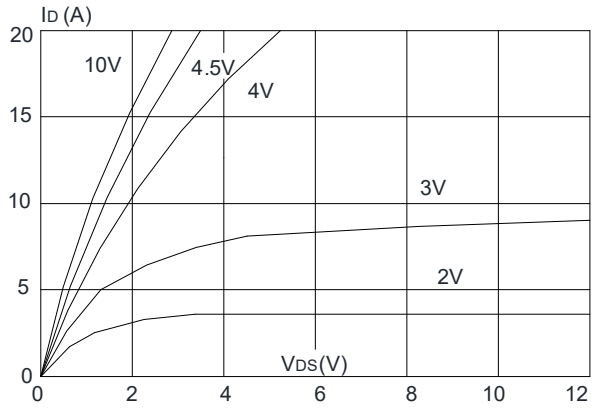



**Figure 2:** Typical Transfer Characteristics

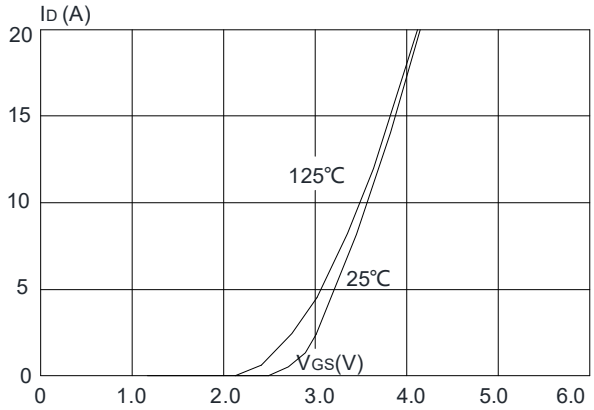



**Figure 3:**On-resistance vs. Drain Current

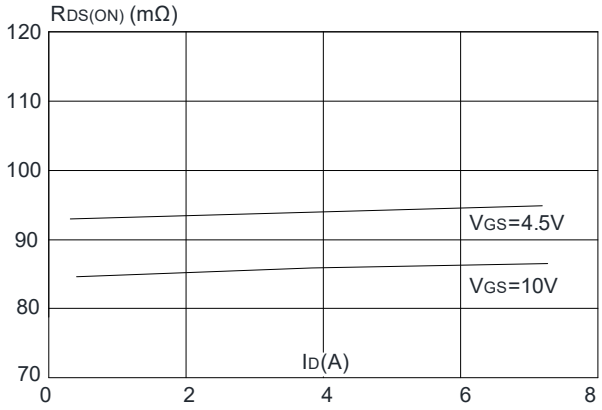



**Figure 4**: Body Diode Characteristics

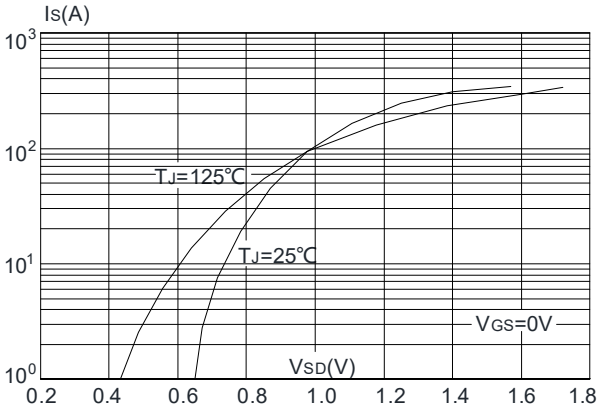



**Figure 5:** Gate Charge Characteristics

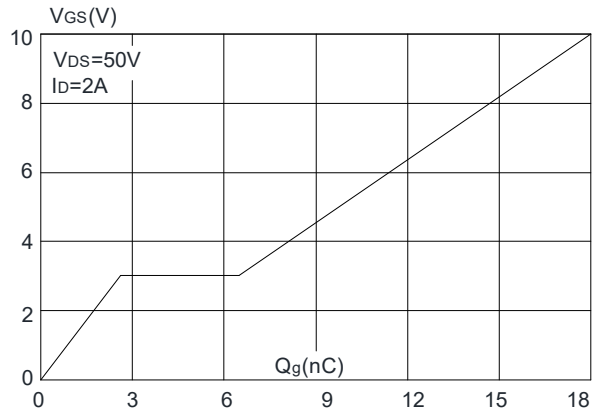



**Figure 6:** Capacitance Characteristics

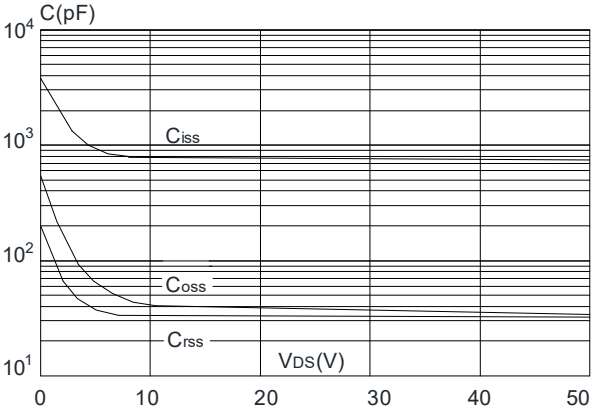


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

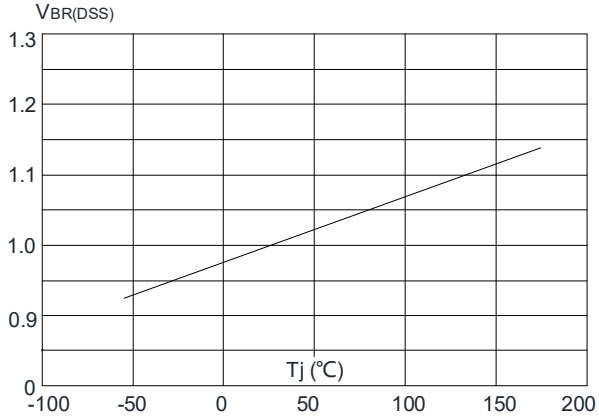



**Figure 8:** Normalized on Resistance vs. Junction Temperature

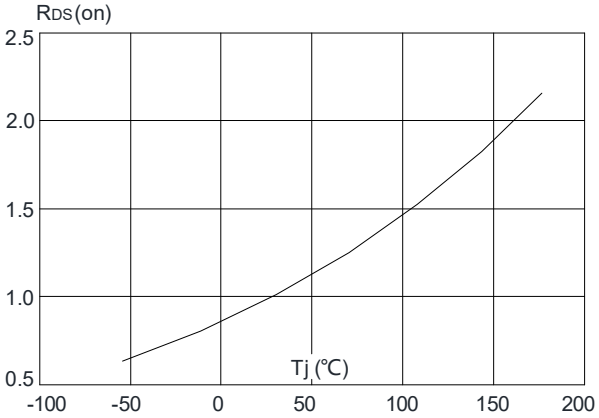



**Figure 9:** Maximum Safe Operating Area

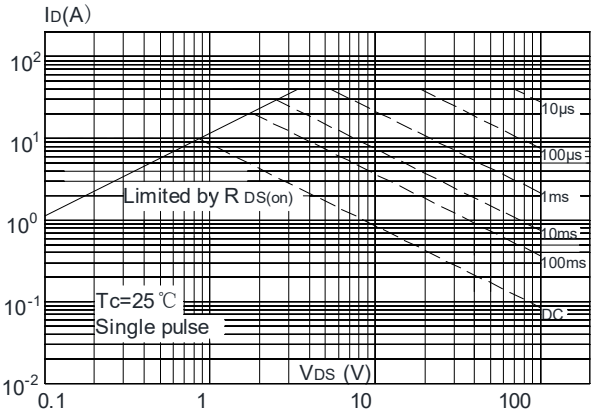



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

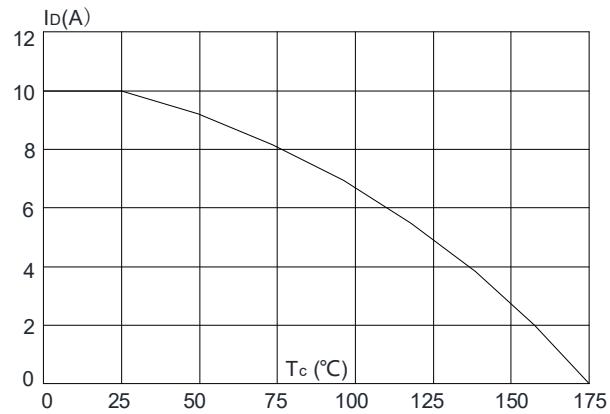
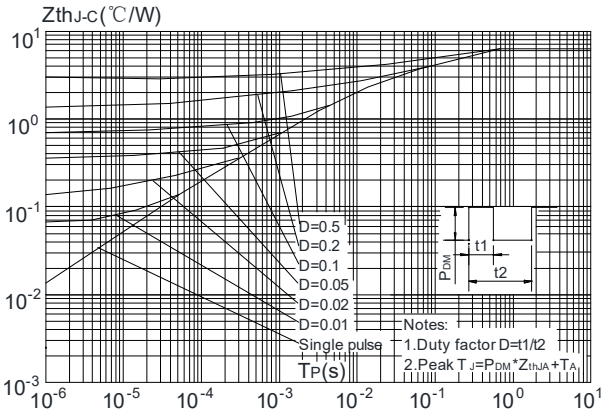



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## Test Circuit

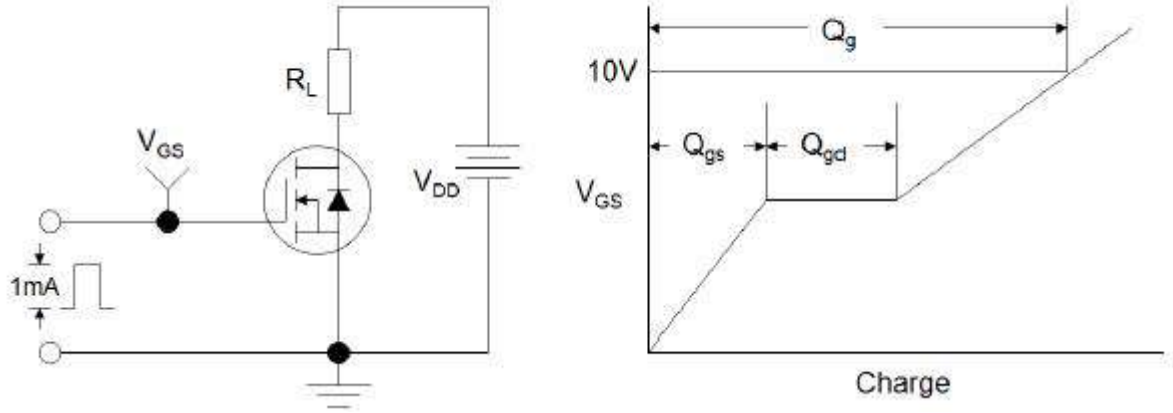



**Figure1:Gate Charge Test Circuit & Waveform**

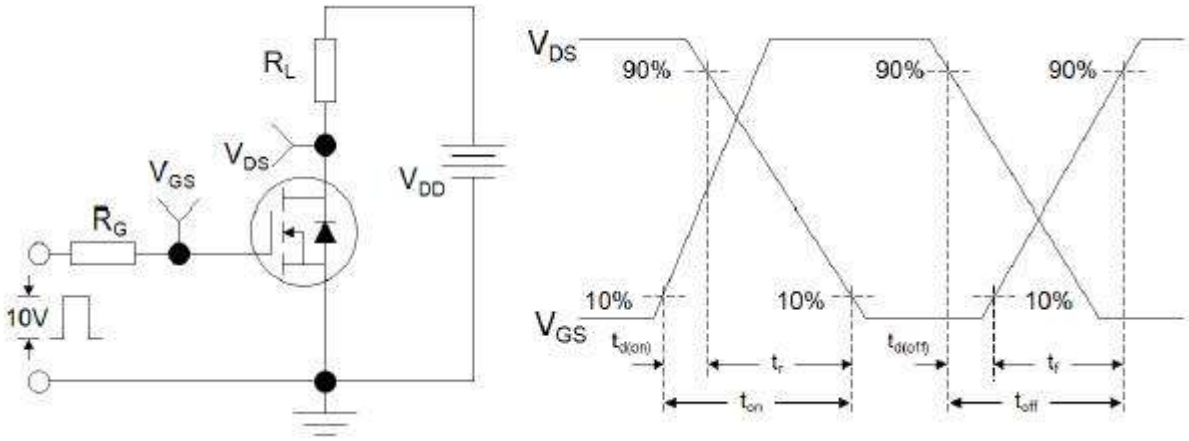



**Figure 2: Resistive Switching Test Circuit & Waveforms**

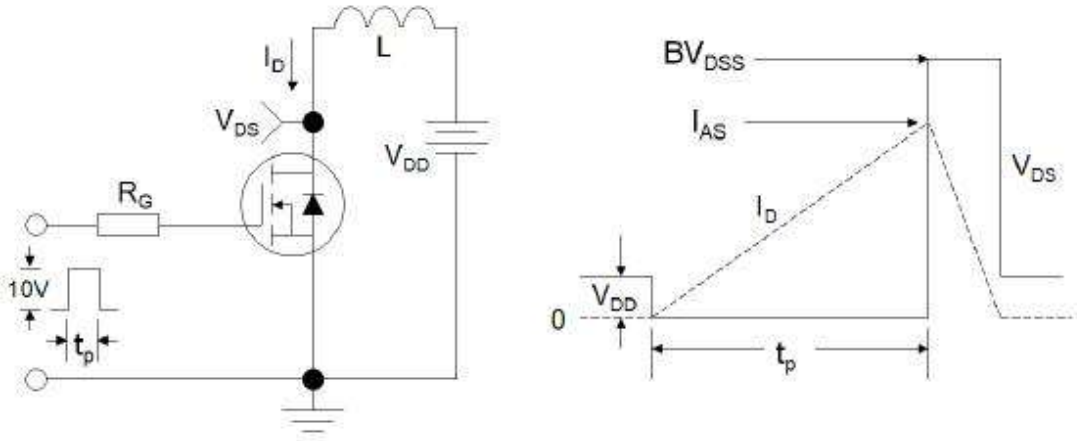



**Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms**

## P-Channel Typical Characteristics

Fig. 1 Typical Output Characteristics

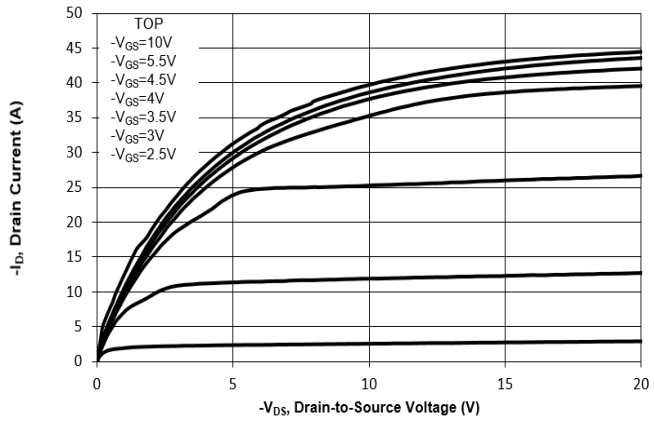



Fig. 2 Typical Transfer Characteristics

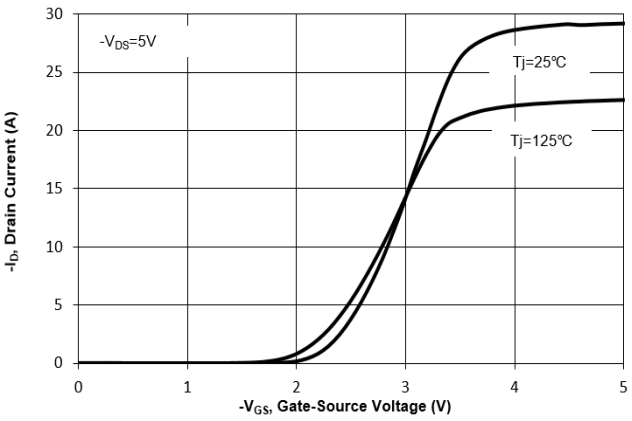



Fig. 3 on-Resistance vs. Drain Current

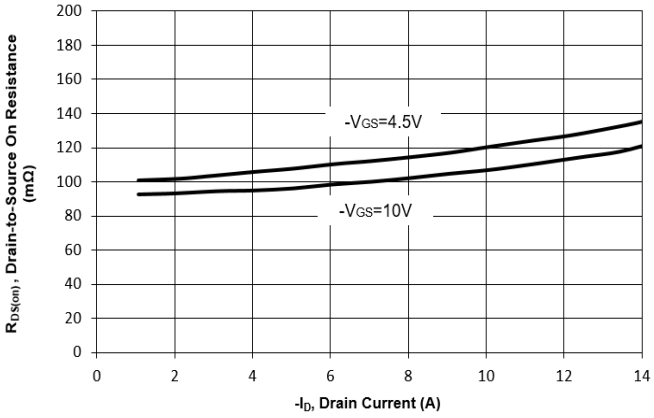



Fig. 4 on-Resistance vs. Gate Voltage

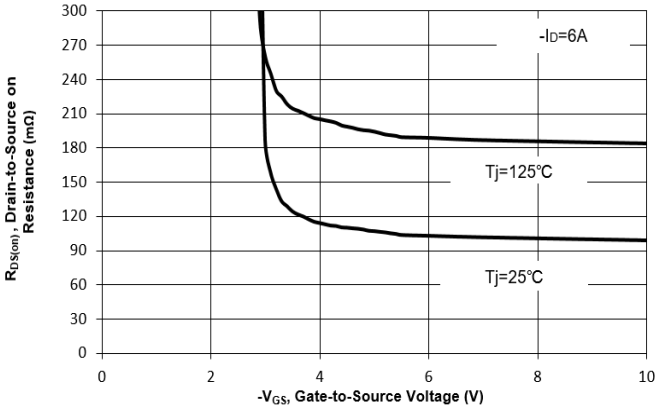



Fig. 5 on-Resistance vs.$T_j$

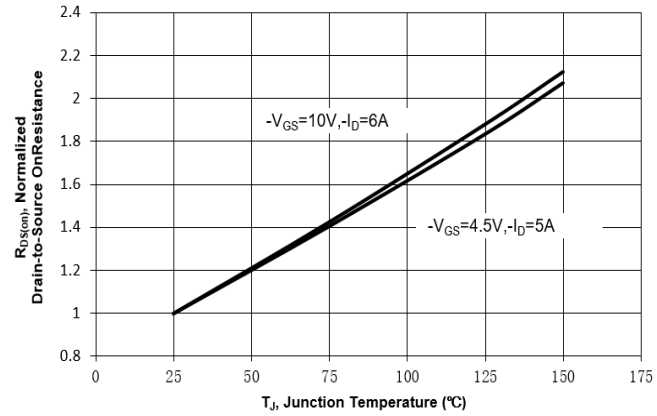



Fig. 6 Typical Body-Diode Forward Characteristics

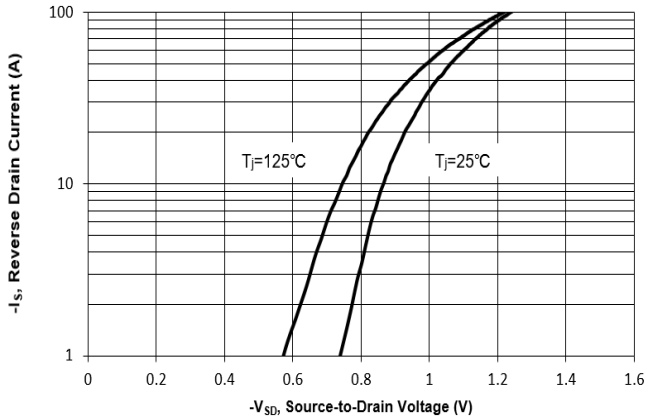


Fig. 7 Typical Junction Capacitance

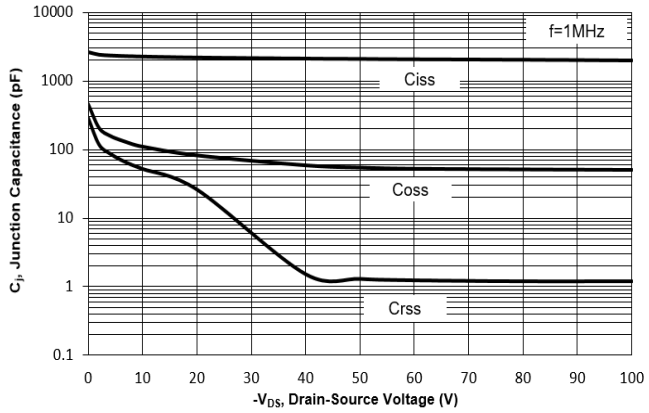



Fig. 8 Drain-Source Leakage Current vs. $T_j$

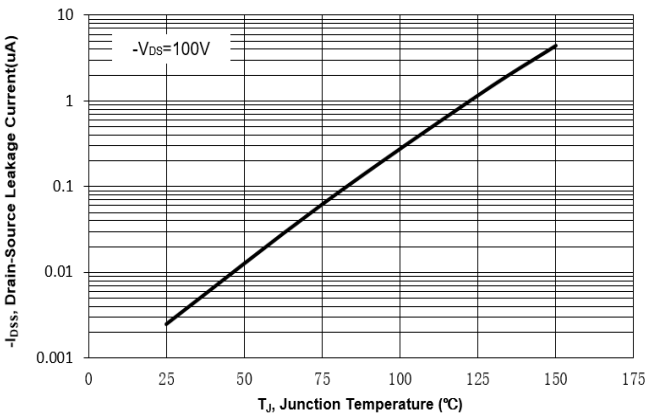



Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

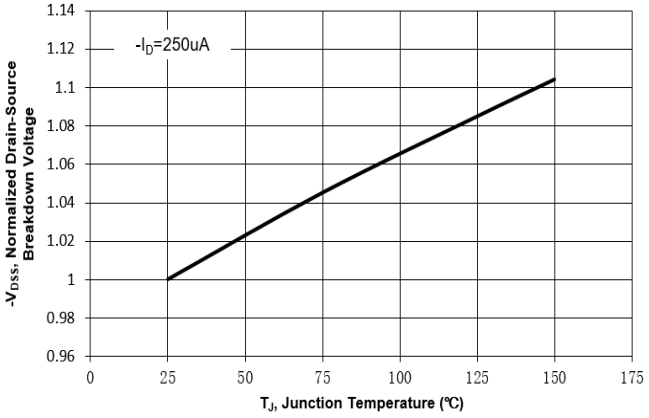



Fig. 10 Gate Threshold Variation vs. $T_j$

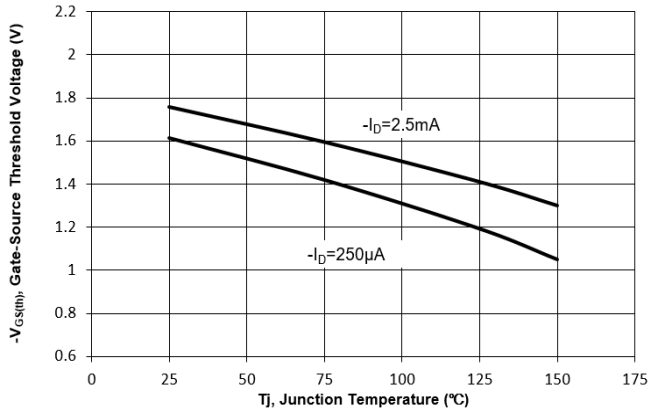



Fig. 11 Gate Charge

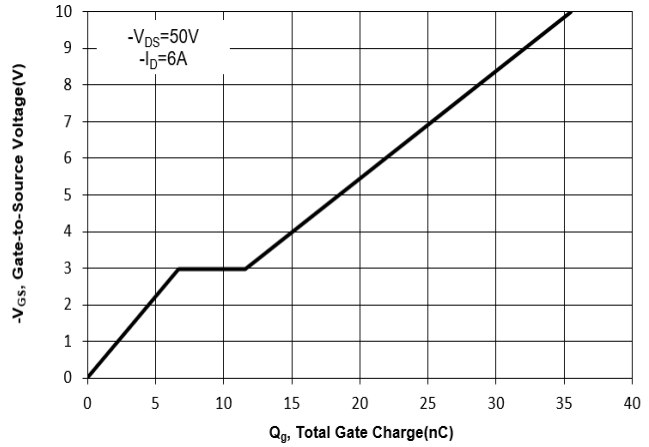
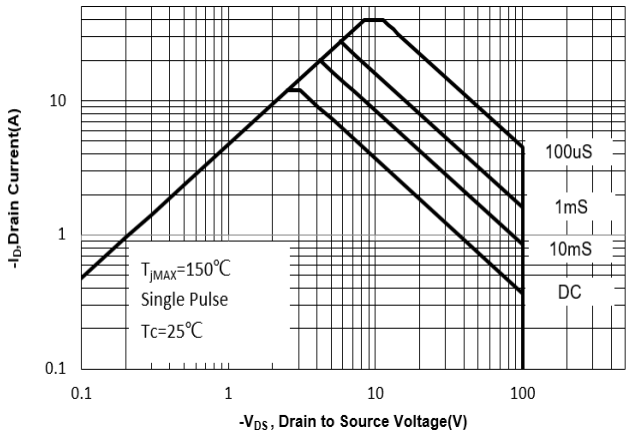



Fig. 12 Safe Operation Area



## Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($Z_{\Theta JC}$)

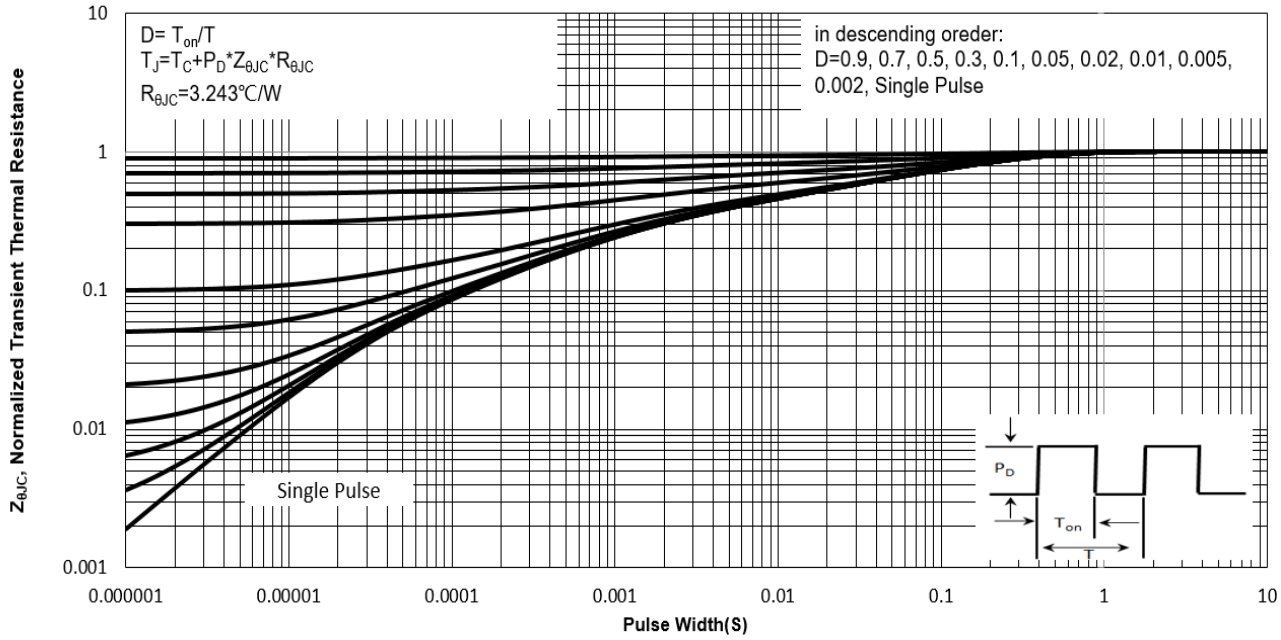
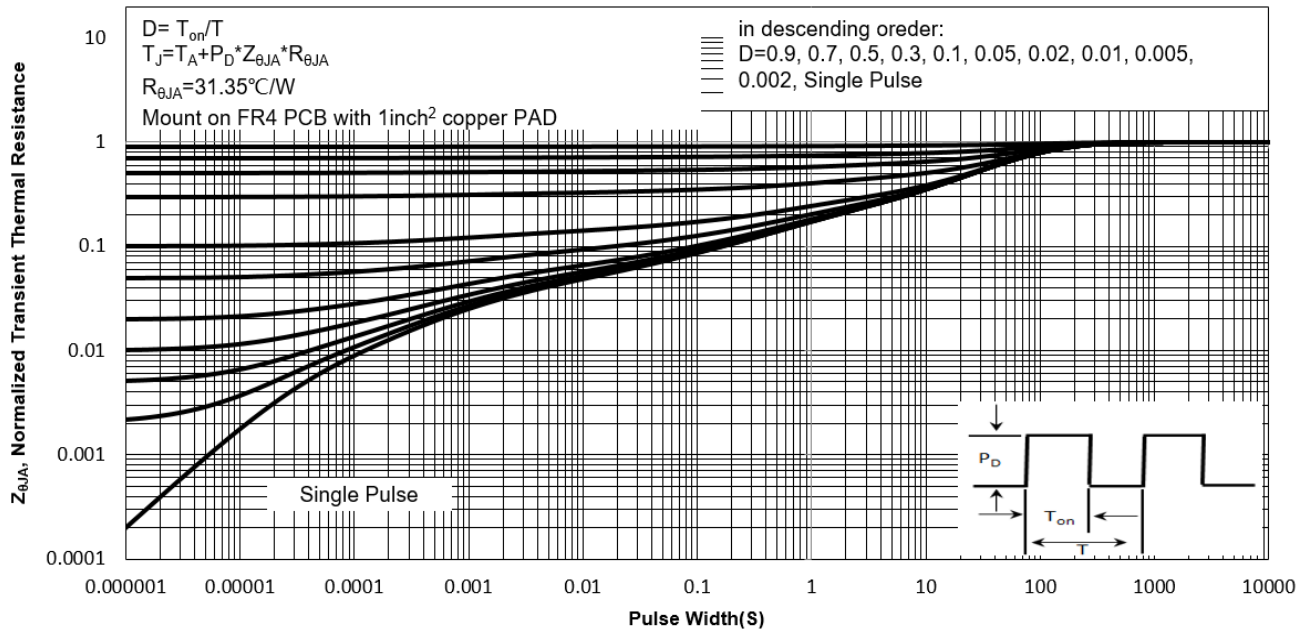



Fig. 14 Normalized Maximum Transient Thermal Impedance($Z_{\Theta JA}$)



**Test Circuits**

Fig.1-1 Switching times test circuit

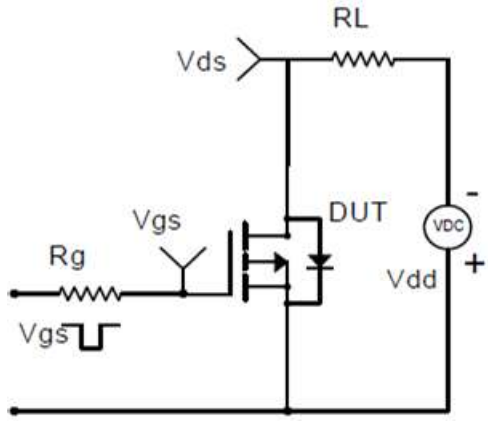



Fig.1-2 Switching Waveform

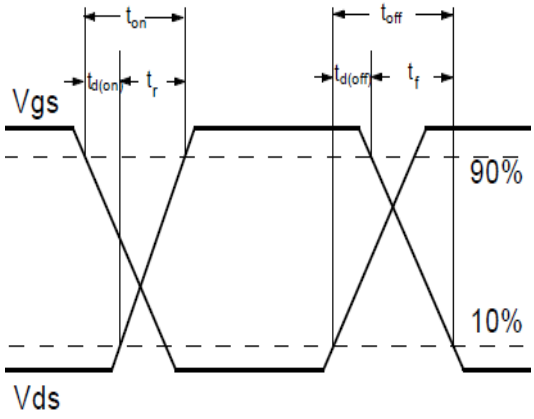



Fig.2-1 Gate charge test circuit

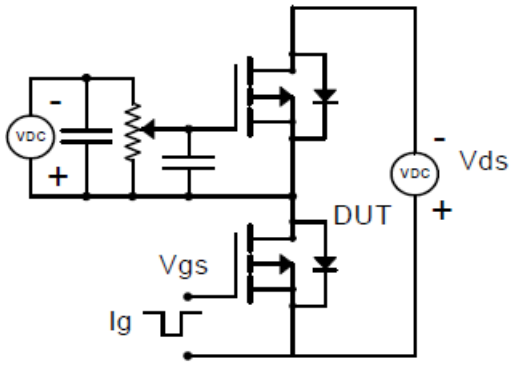



Fig.2-2 Gate charge waveform

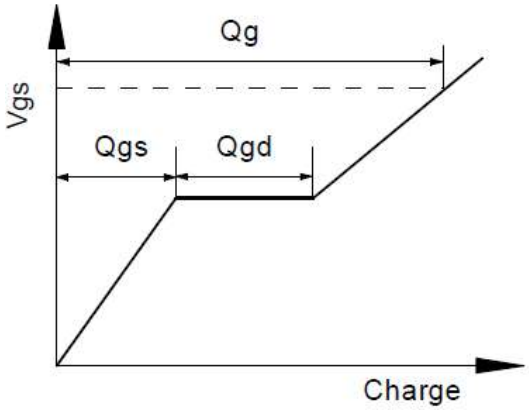



Fig.3-1 Avalanche test circuit

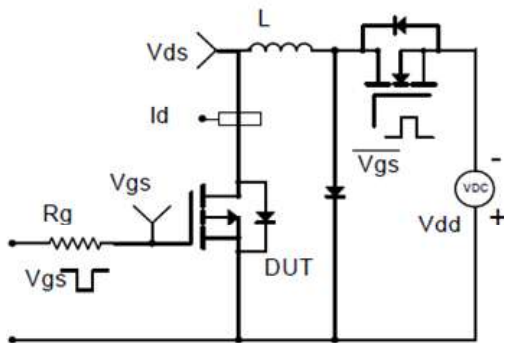
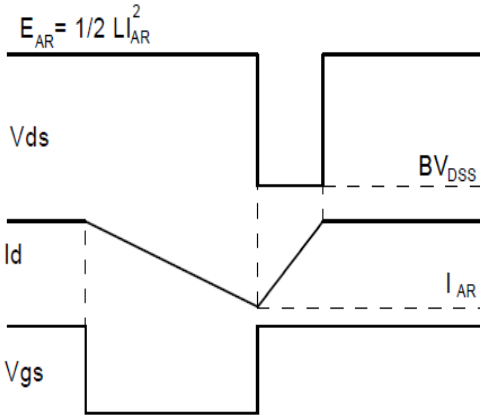
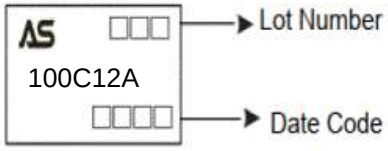



Fig.3-2 Avalanche waveform

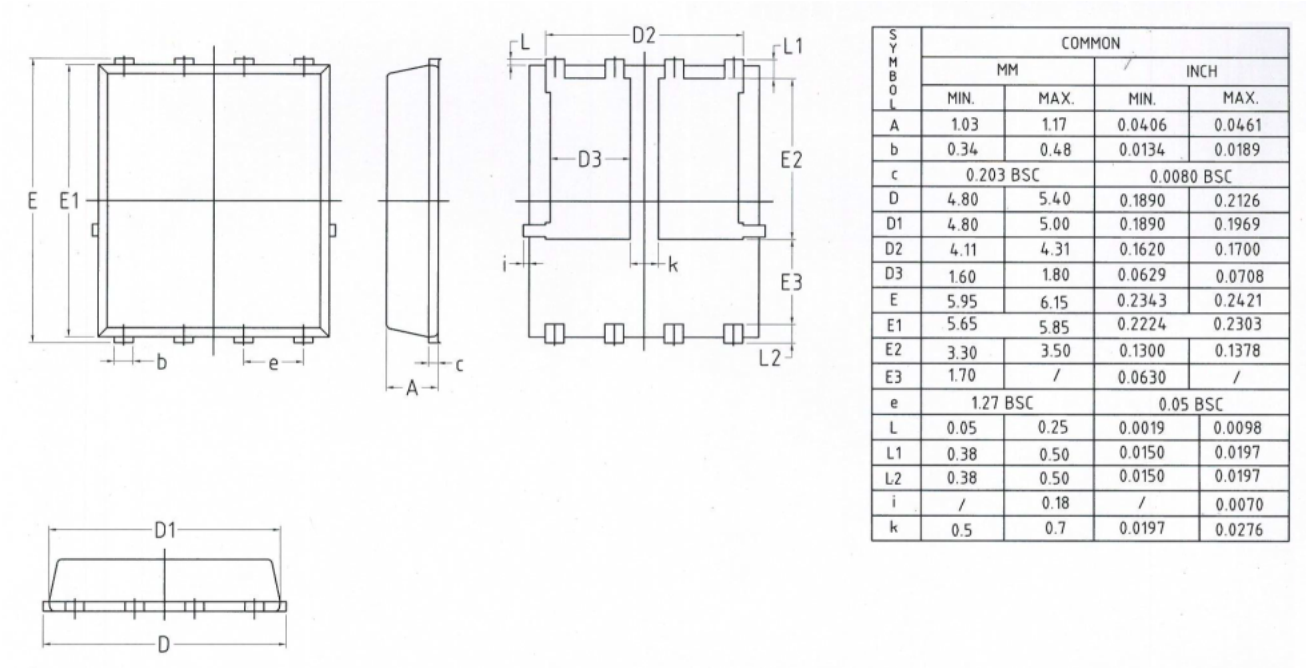


## Ordering and Marking Information

| Ordering Device No. | Marking | Package | Packing | Quantity |
|---|---|---|---|---|
| ASDM100C12AQ-R | 100C12A | PDFN5*6-8 | Tape&Reel | 4000/Reel |

| PACKAGE | MARKING |
|---|---|
| PDFN5*6-8 |  |

# PDFN5*6-8




| SYMBOL | COMMON | | | |
|---|---|---|---|---|
| | MM | | INCH | |
| | MIN. | MAX. | MIN. | MAX. |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.203 BSC | | 0.0080 BSC | |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| D2 | 4.11 | 4.31 | 0.1620 | 0.1700 |
| D3 | 1.60 | 1.80 | 0.0629 | 0.0708 |
| E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 3.30 | 3.50 | 0.1300 | 0.1378 |
| E3 | 1.70 | / | 0.0630 | / |
| e | 1.27 BSC | | 0.05 BSC | |
| L | 0.05 | 0.25 | 0.0019 | 0.0098 |
| L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| i | / | 0.18 | / | 0.0070 |
| k | 0.5 | 0.7 | 0.0197 | 0.0276 |

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