

N-Channel Enhancement Mode Power MOSFET

Description

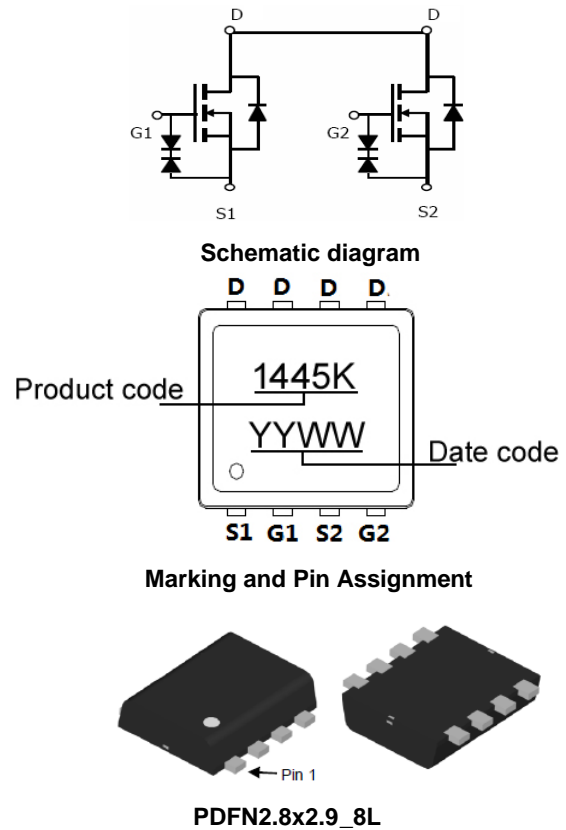
The PED1445 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

General Features

- $V_{DS} = 20V, I_D = 7A$
- $R_{DS(ON)} < 18m\Omega @ V_{GS}=4.5V$
- $R_{DS(ON)} < 20m\Omega @ V_{GS}=3.8V$
- $R_{DS(ON)} < 24m\Omega @ V_{GS}=2.5V$
- ESD Rating: 2000V HBM
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- PWM application
- Load switch
- Battery protection



Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Drain Current-Continuous | I_D | 7 | A |
| Drain Current-Pulsed (Note 1) | I_{DM} | 30 | A |
| Maximum Power Dissipation | P_D | 1.4 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | °C |

Thermal Characteristic

| | | | |
|--|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 89 | °C/W |
|--|-----------------|----|------|

Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 20 | | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=20V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 12V, V_{DS}=0V$ | - | - | ± 10 | μA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.5 | 0.75 | 1.1 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=6.0A$ | - | 14.5 | 18 | m Ω |
| | | $V_{GS}=3.8V, I_D=5.5A$ | - | 16.5 | 20 | m Ω |
| | | $V_{GS}=2.5V, I_D=5.5A$ | - | 20 | 24 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=10A$ | - | 20 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$ | - | 650 | - | PF |
| Output Capacitance | C_{oss} | | - | 85 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 67 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}=16V, I_{DS}=4A$ $V_{GS}=4.5V$ | - | 4.5 | | nS |
| Turn-on Rise Time | t_r | | - | 14 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 23 | | nS |
| Turn-Off Fall Time | t_f | | - | 3 | | nS |
| Total Gate Charge | Q_g | $V_{DS}=16V, I_{DS}=4A$ $V_{GS}=4.5V$ | - | 7.9 | | nC |
| Gate-Source Charge | Q_{gs} | | - | 1.3 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 1.5 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=1A$ | - | - | 1.1 | V |
| Diode Forward Current (Note 2) | I_S | | - | - | 10 | A |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

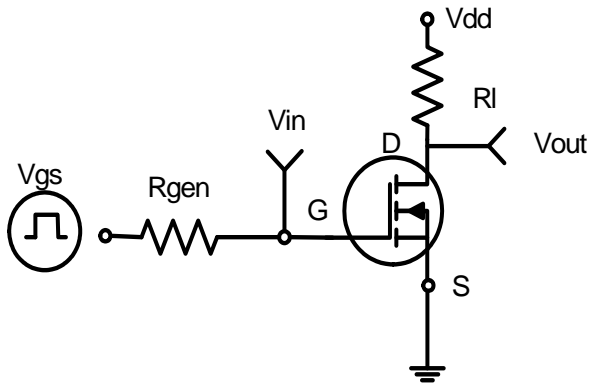


Figure 1: Switching Test Circuit

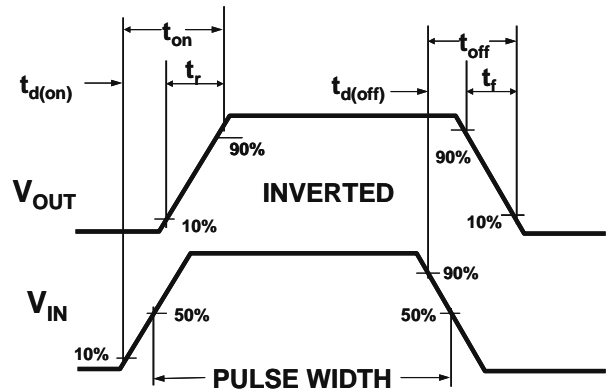


Figure 2: Switching Waveforms

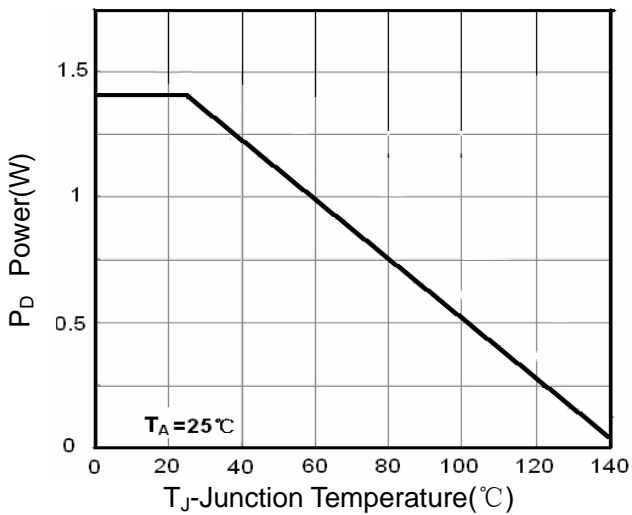


Figure 3 Power Dissipation

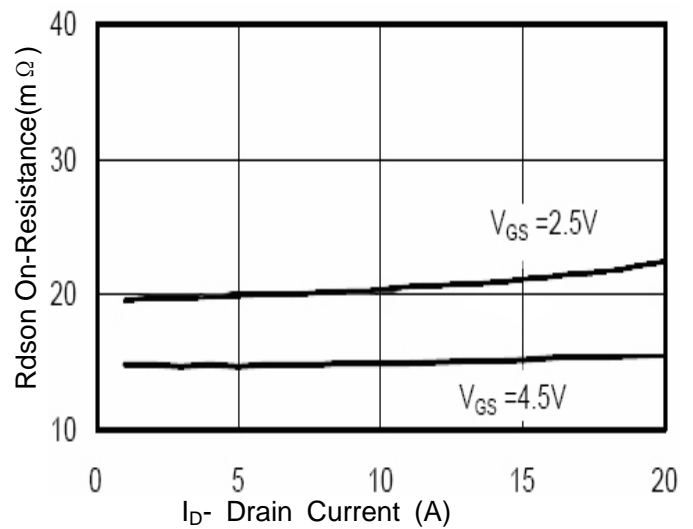


Figure 4 Drain-Source On-Resistance

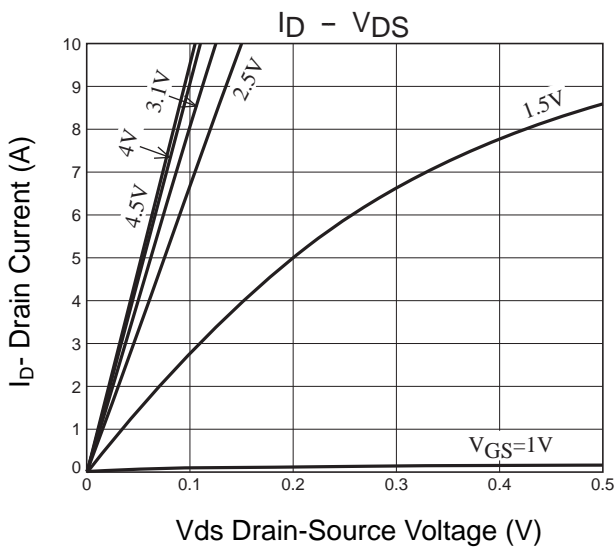


Figure 5 Output CHARACTERISTICS

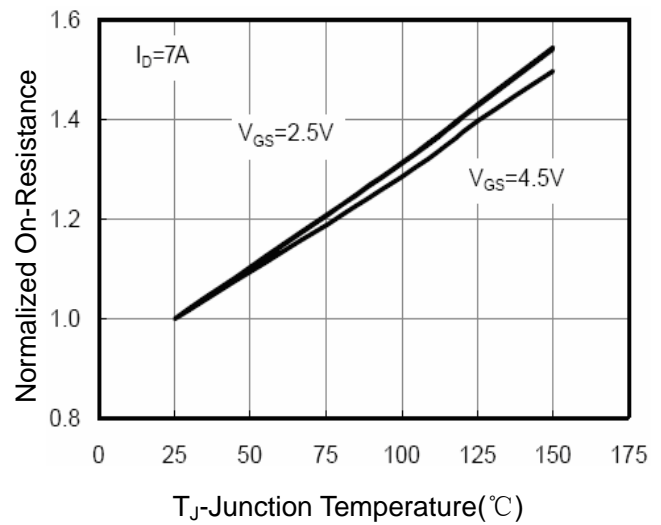
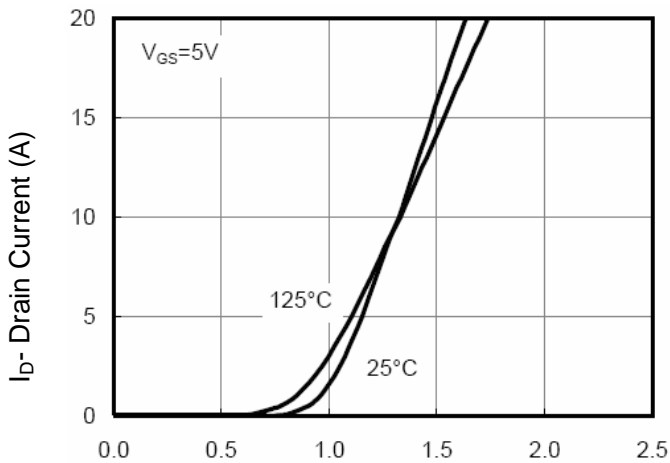
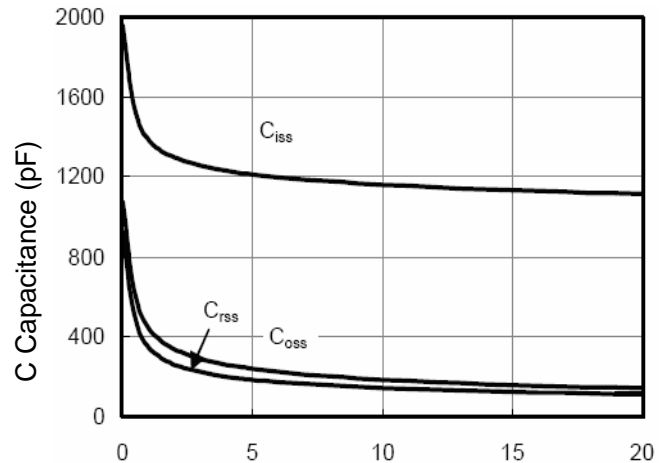


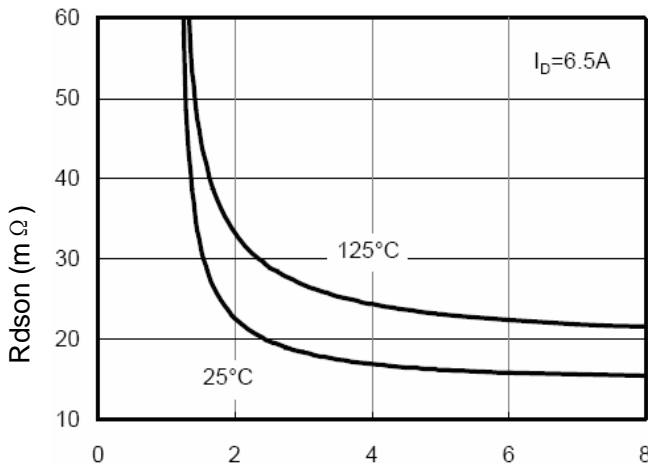
Figure 6 Drain-Source On-Resistance



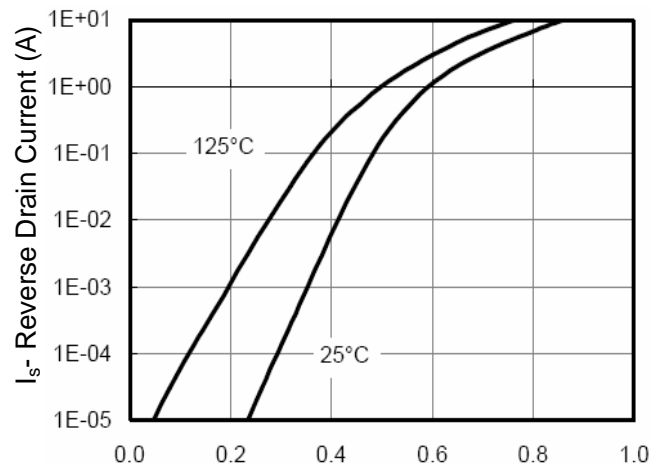
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



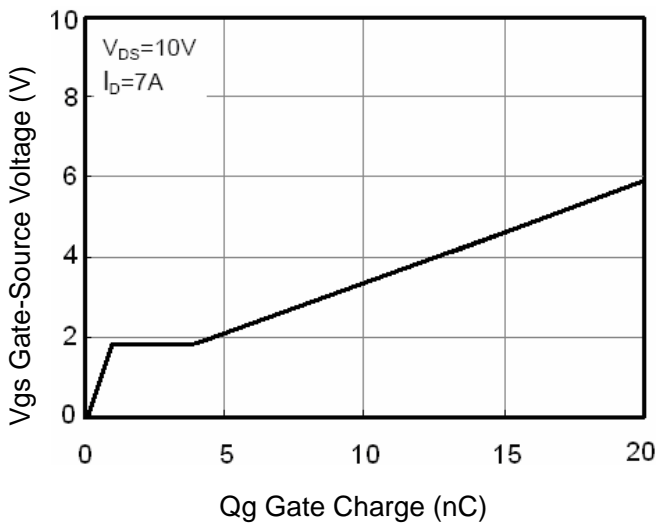
Vds Drain-Source Voltage (V)
Figure 8 Capacitance vs Vds



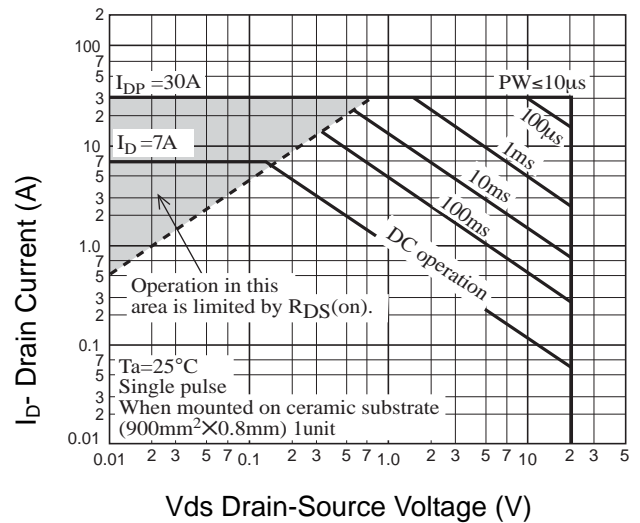
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vds Drain-Source Voltage (V)
Figure 12 Safe Operation Area

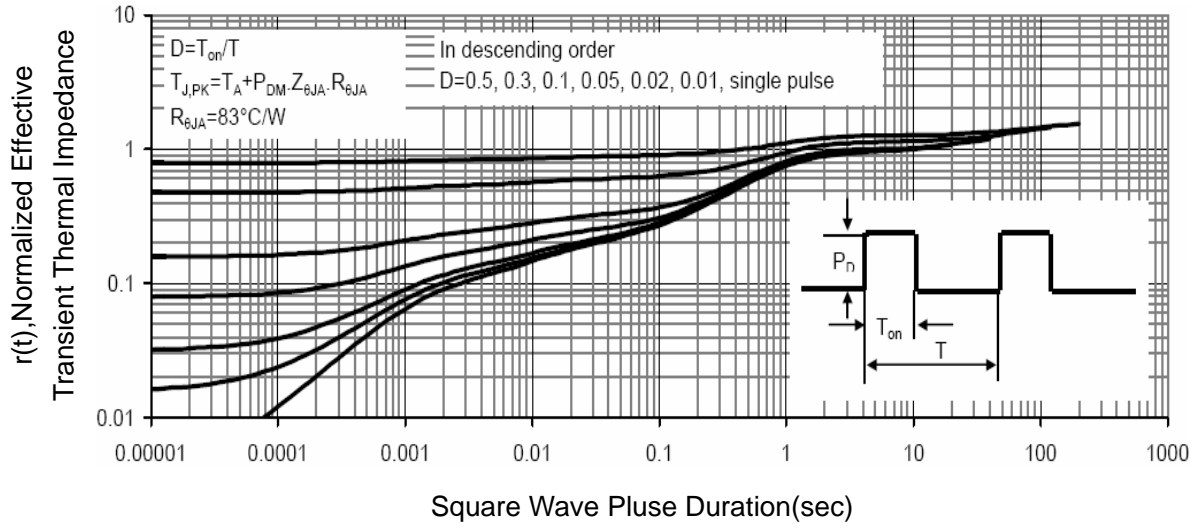
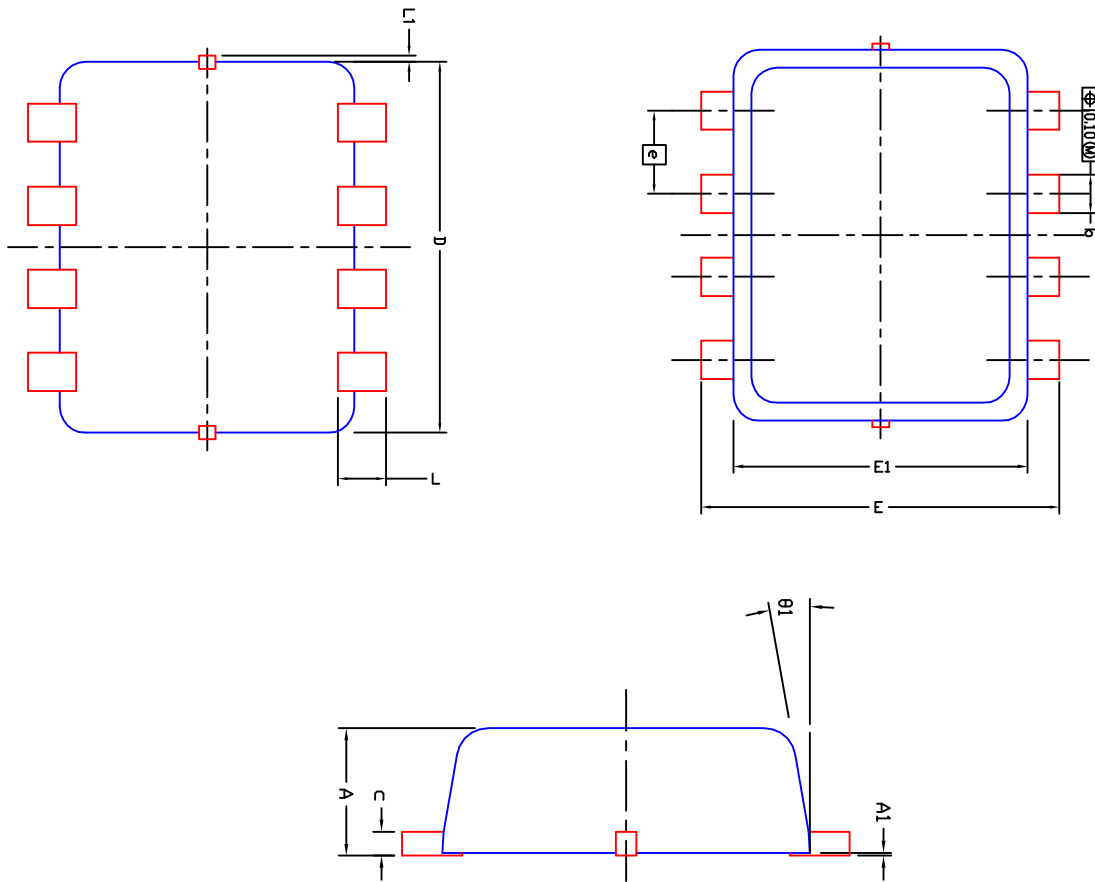


Figure 14 Normalized Maximum Transient Thermal Impedance

PDFN2.8x2.9_8L PACKAGE INFORMATION



| DIM. | MILLIMETERS | | | INCHES | | |
|----------|-------------|-------|-------|-----------|--------|--------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.80 | 0.900 | 0.0276 | 0.0315 | 0.0354 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.24 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| c | 0.08 | 0.152 | 0.25 | 0.003 | 0.006 | 0.010 |
| D | 2.90 BSC | | | 0.114 BSC | | |
| E | 2.80 BSC | | | 0.110 BSC | | |
| E1 | 2.30 BSC | | | 0.091 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.375 | 0.450 | 0.008 | 0.0148 | 0.0177 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ | 0° | 10° | 12° | 0° | 10° | 12° |