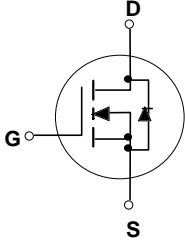
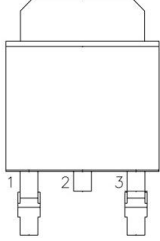
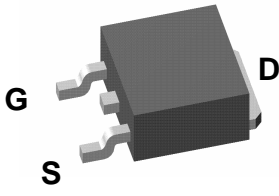


FH1806D

N-Channel Trench Power MOSFET

| | |
|--|--|
| <p>Description</p> <p>These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.</p> | <p>General Features</p> <ul style="list-style-type: none"> ◆ $V_{DSS}=60V$, $I_D=80A$ $R_{DS(ON)}=7.9m\Omega$ (MAX) @$V_{GS}=10V$ ◆ Improved dv/dt capability ◆ Fast switching ◆ 100% EAS Guaranteed ◆ Green device available <p>Applications</p> <ul style="list-style-type: none"> ◆ Motor Drives ◆ UPS ◆ DC DC Converter |
| <p>TO-252</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Schematic diagram</p> </div> <div style="text-align: center;">  <p>Marking and pin assignment</p> </div> <div style="text-align: center;">  <p>TO-252 top view</p> </div> </div> | |

Absolute Maximum Ratings Tc = 25°C unless otherwise noted

| Parameter | Symbol | Value | Unit |
|--|-----------|-------------|------|
| Drain Source Voltage | V_{DSS} | 60 | V |
| Continuous drain current ($T_c = 25^\circ C$) | I_D | 80 | A |
| Continuous drain current ($T_c = 100^\circ C$) | | 52 | A |
| Pulsed drain current ¹⁾ | I_{DM} | 320 | A |
| Gate-Source voltage | V_{GSS} | ± 20 | V |
| Avalanche energy ²⁾ | E_{AS} | 144 | mJ |
| Power Dissipation ($T_c = 25^\circ C$) | P_D | 110 | W |
| Storage Temperature Range | T_{STG} | -55 to +150 | °C |
| Operating Junction Temperature Range | T_J | 55 to +150 | °C |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--------------------------------------|-----------------|-------|------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.14 | °C/W |

Electrical Characteristics

T_J = 25°C unless otherwise noted

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---------------------|---|------|------|------|------|
| Static characteristics | | | | | | |
| Drain-source breakdown voltage | BV _{DSS} | V _{GS} =0 V, I _D =250μA | 60 | --- | --- | V |
| Gate threshold voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 0.8 | 1.3 | 1.8 | V |
| Drain source leakage current | I _{DSS} | V _{DS} =60V, V _{GS} =0V, T _J = 25°C | --- | --- | 1 | μA |
| | | V _{DS} =48V, V _{GS} =0V, T _J = 125°C | | | 30 | μA |
| Gate leakage current, Forward | I _{GSSF} | V _{GS} =20V, V _{DS} =0 V | | | 100 | nA |
| Gate leakage current, Reverse | I _{GSSR} | V _{GS} =-20V, V _{DS} =0 V | --- | --- | -100 | nA |
| Drain-source on-state resistance | R _{DS(on)} | V _{GS} =10V, I _D =30A | --- | 6.5 | 7.9 | mΩ |
| | | V _{GS} =4.5V, I _D =20A | | 7.6 | 9.5 | mΩ |
| Forward transconductance | g _{fs} | V _{DS} =5V, I _D =30A | --- | 92 | --- | S |
| Dynamic characteristics | | | | | | |
| Input capacitance | C _{iss} | V _{DS} = 25V, V _{GS} = 0V, F = 1MHz | --- | 3752 | --- | pF |
| Output capacitance | C _{oss} | | --- | 269 | --- | |
| Reverse transfer capacitance | C _{rss} | | --- | 206 | --- | |
| Turn on delay time | t _{d(on)} | V _{DD} = 30V, V _{GS} =10V, I _D =25A | | 16.5 | | ns |
| Rise time | t _r | | | 170 | | |
| Turn-off delay time | t _{d(off)} | | --- | 464 | --- | |
| Fall time | t _f | | | 140 | | |
| Gate resistance | R _g | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 2.95 | --- | Ω |
| Gate charge characteristics | | | | | | |
| Gate to source charge | Q _{gs} | V _{DS} =48V, I _D =25A, V _{GS} = 10V | | 11.7 | | nC |
| Gate to drain charge | Q _{gd} | | --- | 13.1 | --- | |
| Gate charge total | Q _g | | --- | 69 | --- | |
| Drain-Source diode characteristics and Maximum Ratings | | | | | | |
| Continuous Source Current | I _S | | --- | --- | 80 | A |
| Pulsed Source Current ³⁾ | I _{SM} | | --- | --- | 320 | A |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =20A, T _J =25°C | --- | --- | 1.2 | V |
| Reverse Recovery Time | t _{rr} | I _S =25A, di/dt=100A/μs, T _J =25°C | --- | 26.8 | --- | ns |
| Reverse Recovery Charge | Q _{rr} | | | | 29 | |

Notes:

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature
- 2: V_{DD}=25V, V_{GS}=10V, L=0.5mH, I_{AS}=24A, R_G=25Ω, Starting T_J=25°C.
- 3: Pulse Test: Pulse Width ≤300 μs, Duty Cycle≤2%.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

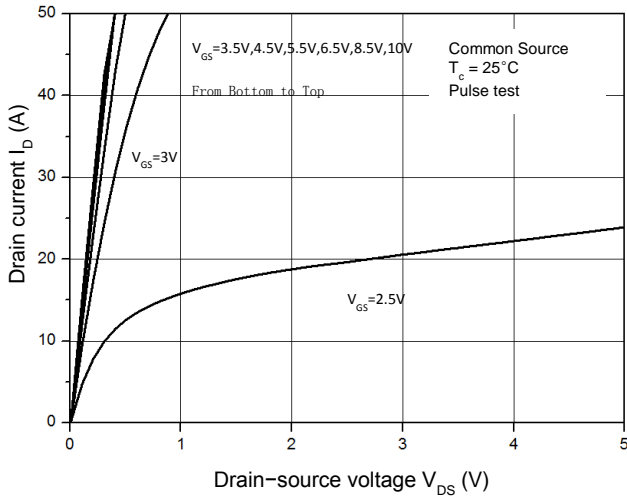


Figure 2. Transfer Characteristics

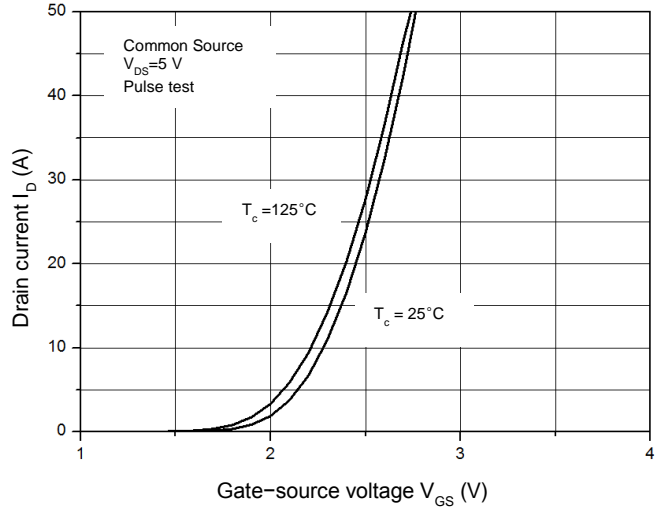


Figure 3. Capacitance Characteristics

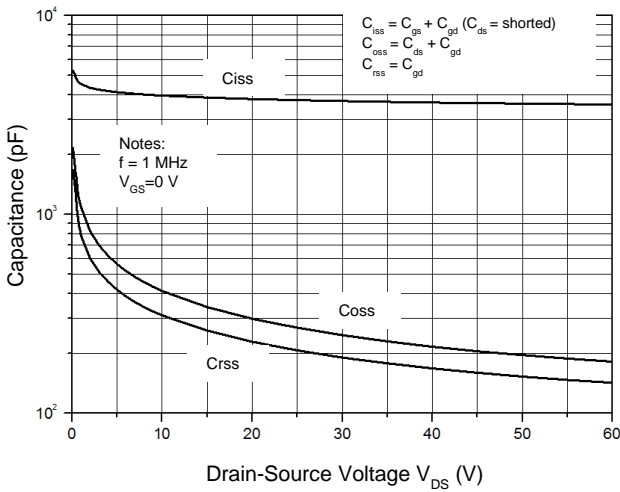


Figure 4. Gate Charge Waveform

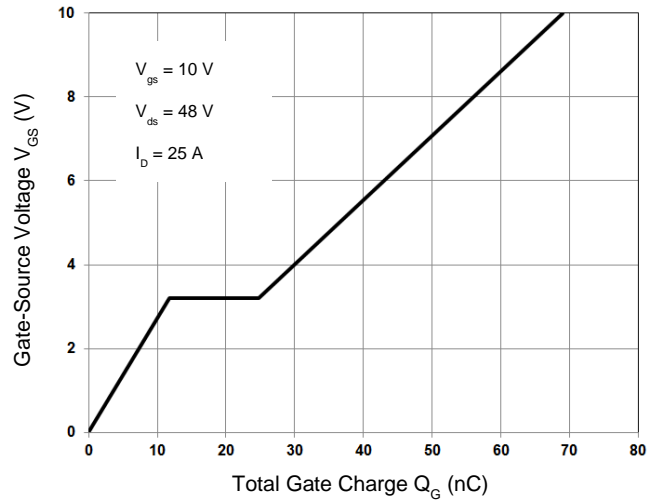


Figure 5. Body-Diode Characteristics

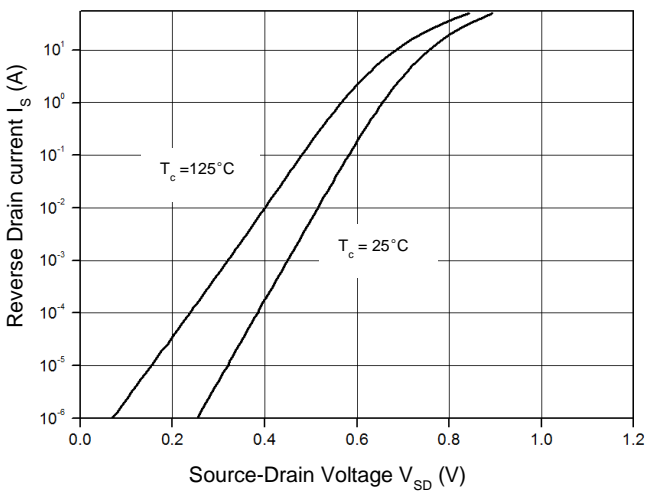


Figure 6. R_dson-Drain Current

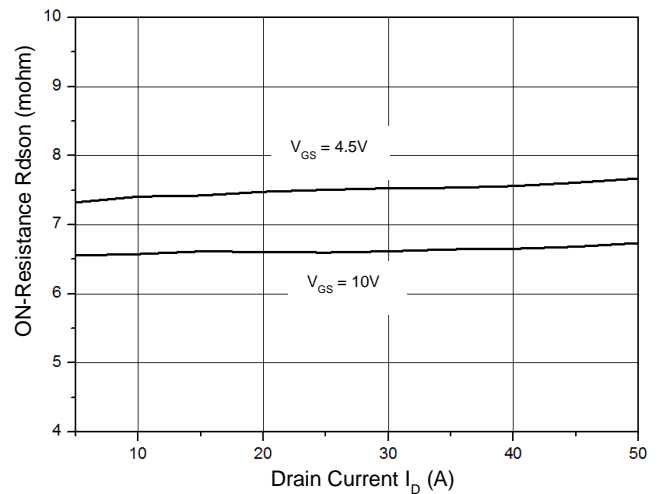


Figure 7. Rdson-Junction Temperature(°C)

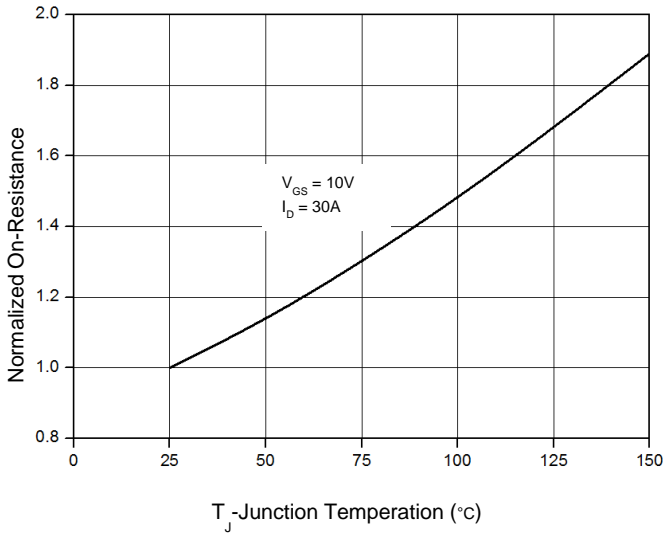


Figure 8. Maximum Safe Operating Area

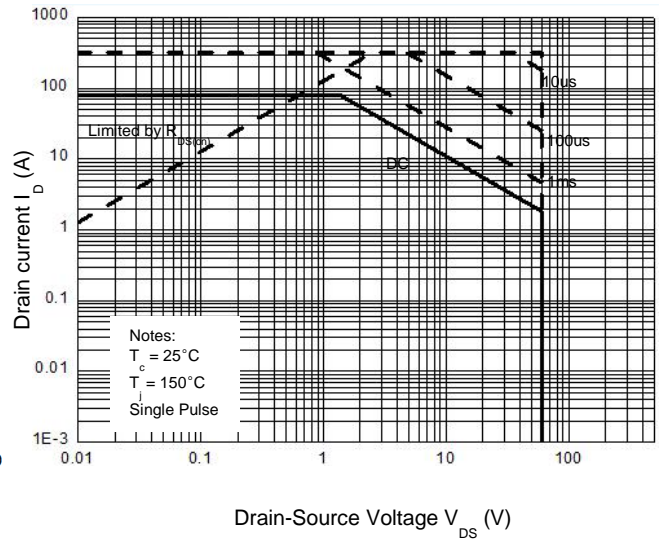
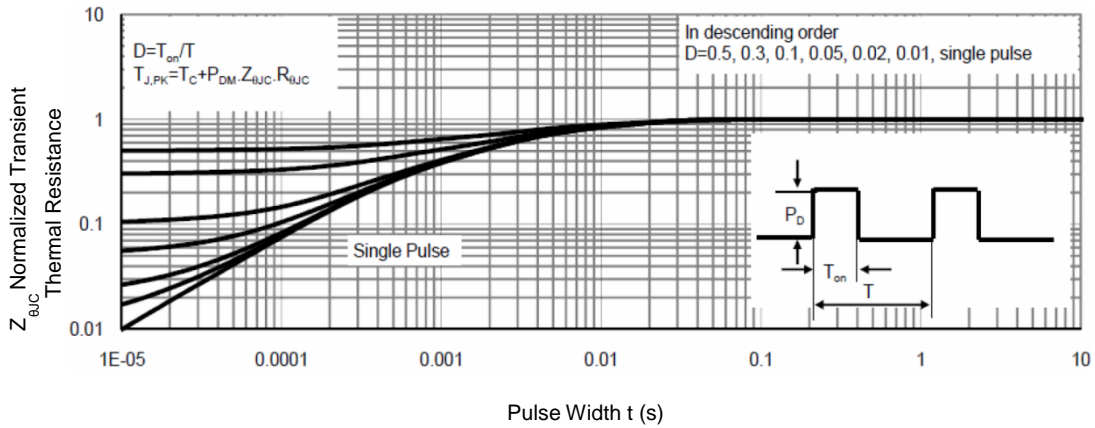


Figure 6. Normalized Maximum Transient Thermal Impedance (RthJC)



Test Circuit & Waveform

Figure 8. Gate Charge Test Circuit & Waveform

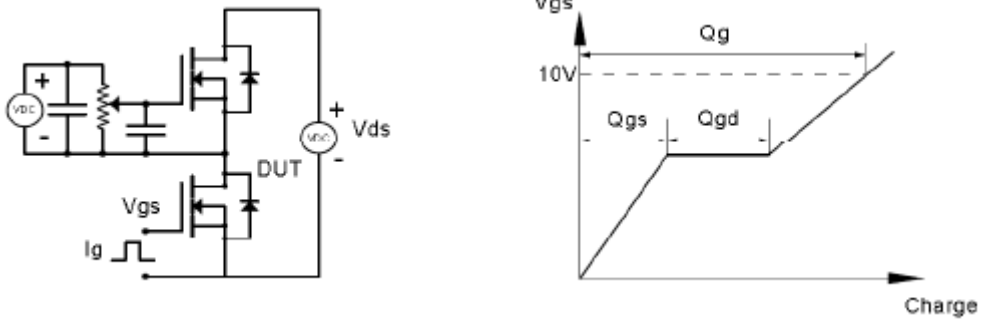


Figure 9. Resistive Switching Test Circuit & Waveforms

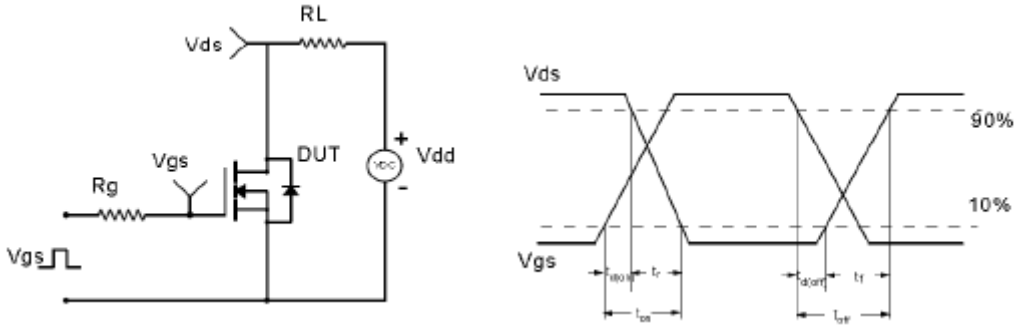


Figure 10. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

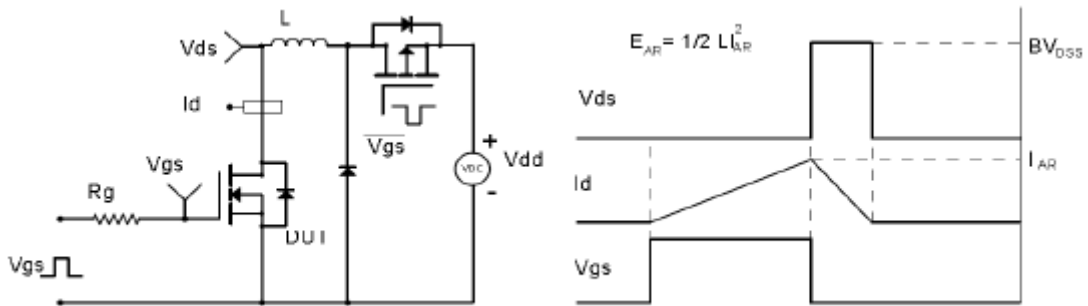
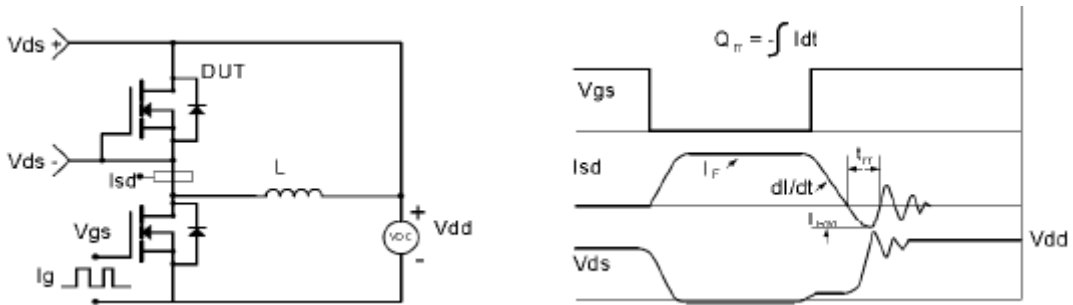
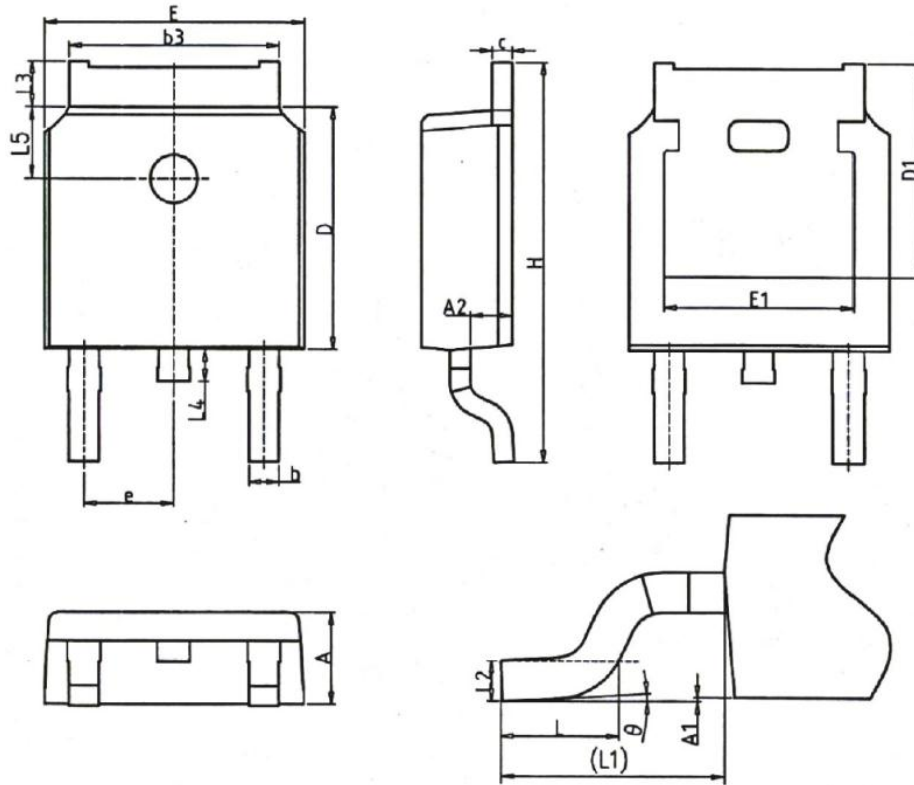


Figure 11. Diode Recovery Circuit & Waveform



Package Information : TO-252



| COMMON DIMENSIONS | | | | | | |
|-------------------|----------|-------|-------|----------|-------|-------|
| SYMBOL | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 | 0.087 | 0.091 | 0.094 |
| A1 | 0.00 | | 0.20 | 0.000 | | 0.008 |
| A2 | 0.97 | 1.07 | 1.17 | 0.038 | 0.042 | 0.046 |
| b | 0.68 | 0.78 | 0.90 | 0.027 | 0.031 | 0.035 |
| b3 | 5.20 | 5.33 | 5.46 | 0.205 | 0.210 | 0.215 |
| c | 0.43 | 0.53 | 0.61 | 0.017 | 0.021 | 0.024 |
| D | 5.98 | 6.10 | 6.22 | 0.235 | 0.240 | 0.245 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | 6.60 | 6.73 | 0.252 | 0.260 | 0.265 |
| E1 | 4.63 | - | - | 0.182 | - | - |
| e | 2.286BSC | | | 0.090BSC | | |
| H | 9.40 | 10.10 | 10.50 | 0.370 | 0.398 | 0.413 |
| L | 1.38 | 1.50 | 1.75 | 0.054 | 0.059 | 0.069 |
| L1 | 2.90REF | | | 0.114REF | | |
| L2 | 0.51BSC | | | 0.020BSC | | |
| L3 | 0.88 | | 1.28 | 0.035 | | 0.050 |
| L4 | 0.50 | | 1.00 | 0.020 | | 0.039 |
| L5 | 1.65 | 1.80 | 1.95 | 0.065 | 0.071 | 0.077 |
| θ | 0° | | 8° | 0° | | 8° |