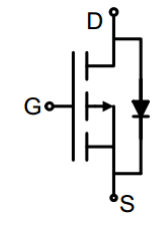
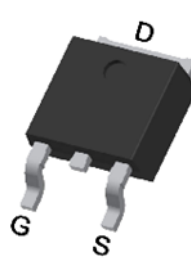


P-Channel Enhancement Mode Power MOSFET

| | | | |
|---|----------------|--|------------------|
| <p>Description</p> <p>The G12P04K uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.</p> <p>General Features</p> <ul style="list-style-type: none"> ● V_{DS} -40V ● I_D (at $V_{GS} = -10V$) -12A ● $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 35mΩ ● $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) < 45mΩ ● 100% Avalanche Tested ● RoHS Compliant <p>Application</p> <ul style="list-style-type: none"> ● Power switch ● DC/DC converters | |  <p>Schematic diagram</p>  <p>TO-252</p> | |
| Device | Package | Marking | Packaging |
| G12P04K | TO-252 | G12P04 | 2500pcs/Reel |

| Absolute Maximum Ratings $T_C = 25^{\circ}C$, unless otherwise noted | | | |
|---|----------------|------------|-------------|
| Parameter | Symbol | Value | Unit |
| Drain-Source Voltage | V_{DS} | -40 | V |
| Continuous Drain Current | I_D | -12 | A |
| Pulsed Drain Current (note1) | I_{DM} | -48 | A |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Power Dissipation | P_D | 50 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 To 150 | $^{\circ}C$ |

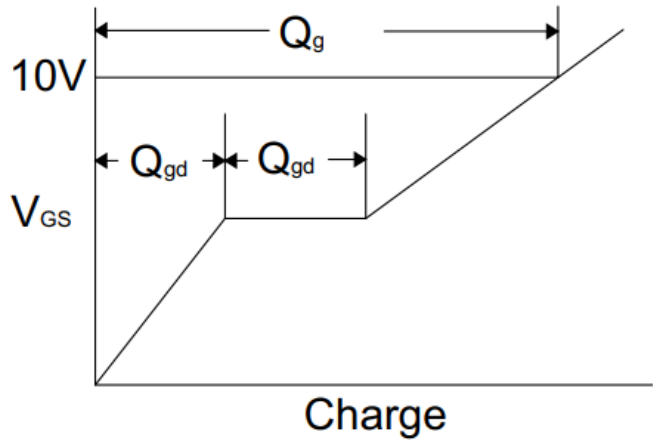
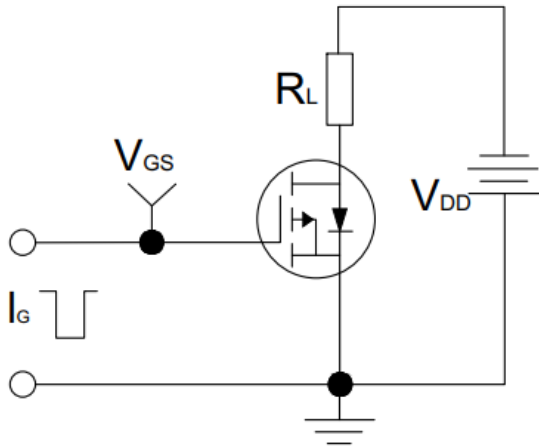
| Thermal Resistance | | | |
|--------------------------------------|------------|-------|---------------|
| Parameter | Symbol | Value | Unit |
| Thermal Resistance, Junction-to-Case | R_{thJC} | 2.5 | $^{\circ}C/W$ |

| Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|---------------|---|-------|------|-----------|------------|
| Parameter | Symbol | Test Conditions | Value | | | Unit |
| | | | Min. | Typ. | Max. | |
| Static Parameters | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$ | -40 | -- | -- | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -40V, V_{GS} = 0V$ | -- | -- | -1 | μA |
| Gate-Source Leakage | I_{GSS} | $V_{GS} = \pm 20V$ | -- | -- | ± 100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu A$ | -1.0 | -1.8 | -2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS} = -10V, I_D = -6A$ | -- | 27 | 35 | m Ω |
| | | $V_{GS} = -4.5V, I_D = -5A$ | -- | 39 | 45 | |
| Forward Transconductance | g_{FS} | $V_{DS}=10V, I_D=-6A$ | -- | 10 | -- | S |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0V,$ $V_{DS} = -20V,$ $f = 1.0\text{MHz}$ | -- | 930 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 85 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 35 | -- | |
| Total Gate Charge | Q_g | $V_{DD} = -20V,$ $I_D = -6A,$ $V_{GS} = -10V$ | -- | 25 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 3 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 7 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD} = -20V,$ $I_D = -6A,$ $R_G = 3\Omega$ | -- | 8 | -- | ns |
| Turn-on Rise Time | t_r | | -- | 4 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 32 | -- | |
| Turn-off Fall Time | t_f | | -- | 7 | -- | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Body Diode Current | I_S | $T_C = 25^\circ\text{C}$ | -- | -- | -12 | A |
| Body Diode Voltage | V_{SD} | $T_J = 25^\circ\text{C}, I_{SD} = -6A, V_{GS} = 0V$ | -- | -- | -1.2 | V |
| Reverse Recovery Time | T_{rr} | $I_S = -6A, V_{GS} = 0V$ $di/dt = -100A/\mu s$ | -- | 25 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | | -- | 31 | -- | ns |

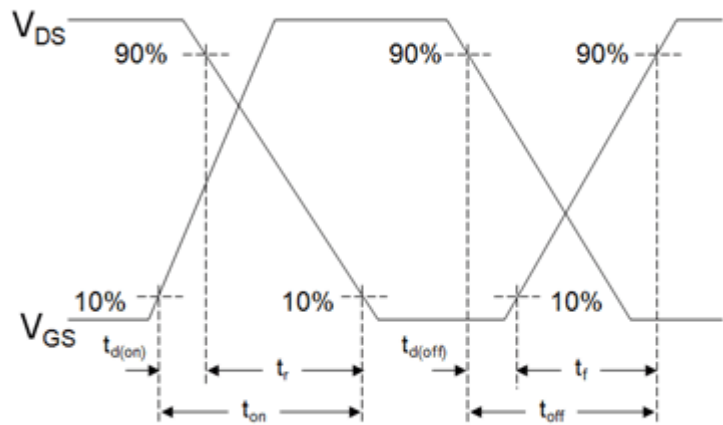
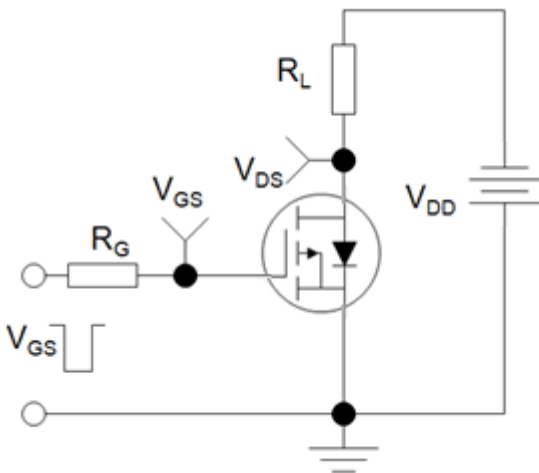
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical R_G

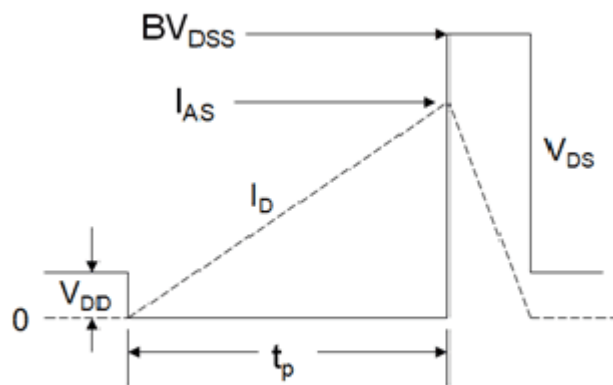
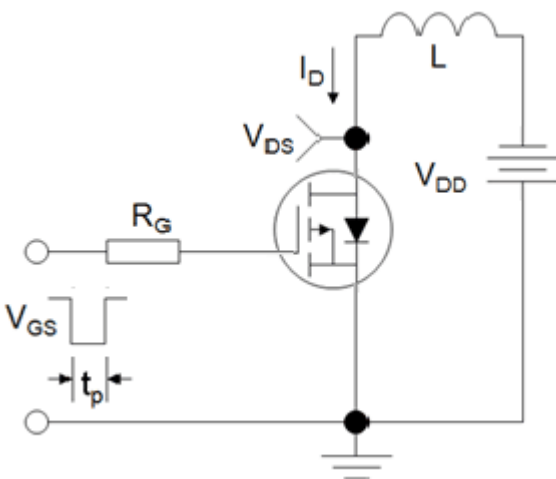
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

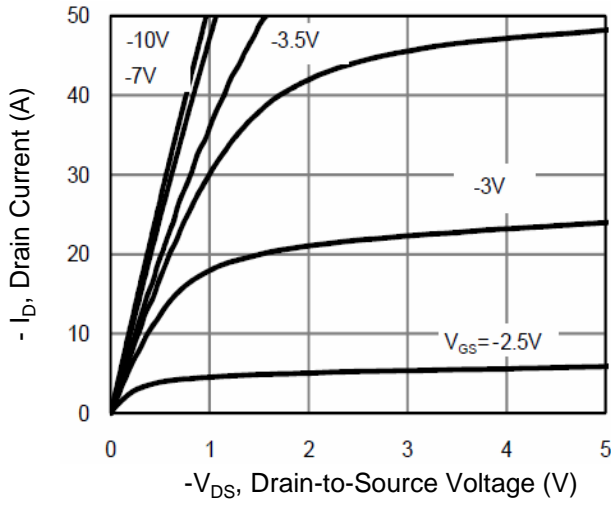


Figure 2. Transfer Characteristics

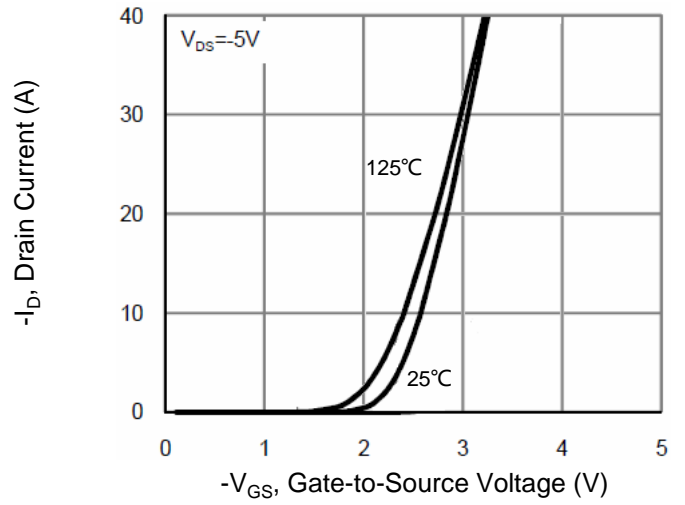


Figure 3. Gate Charge

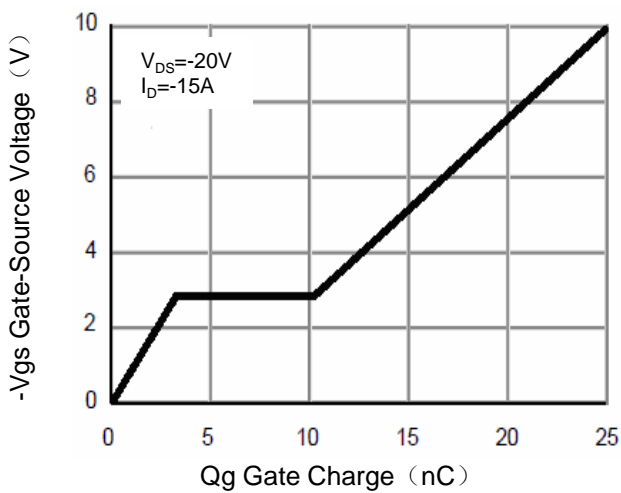


Figure 4. Drain Source On Resistance

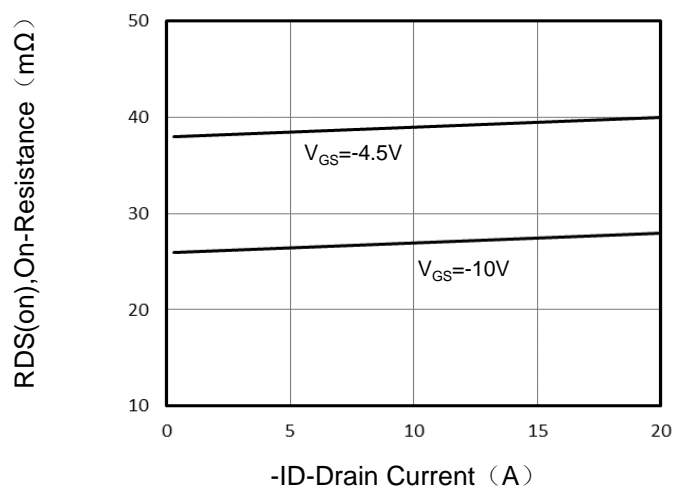


Figure 5. Capacitance

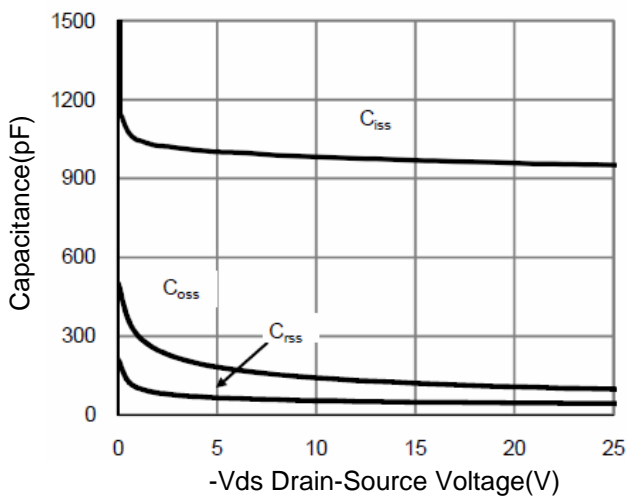
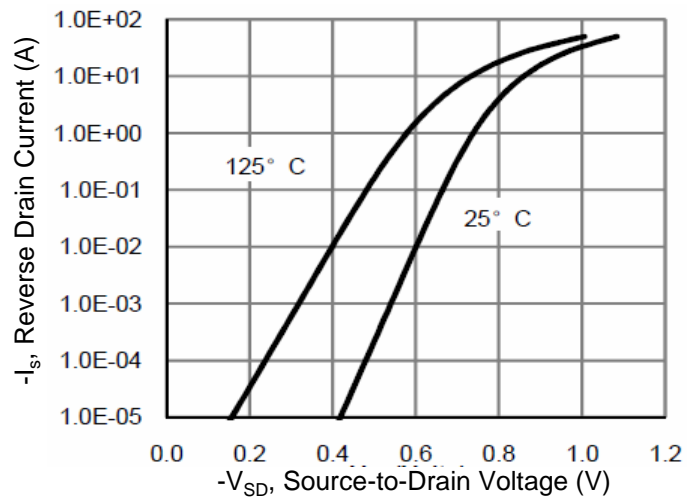


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

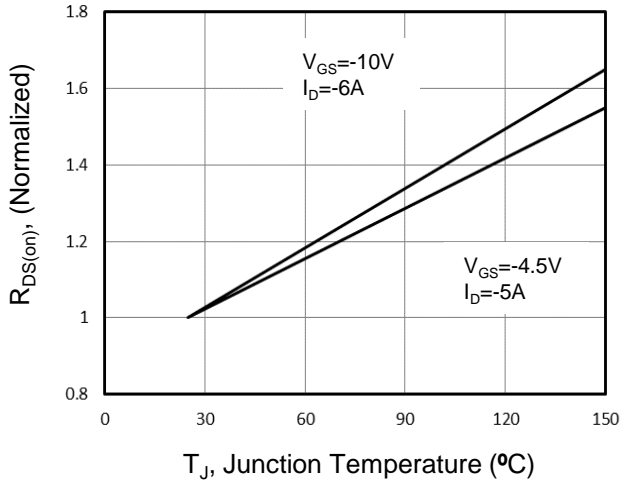


Figure 8. Safe Operation Area

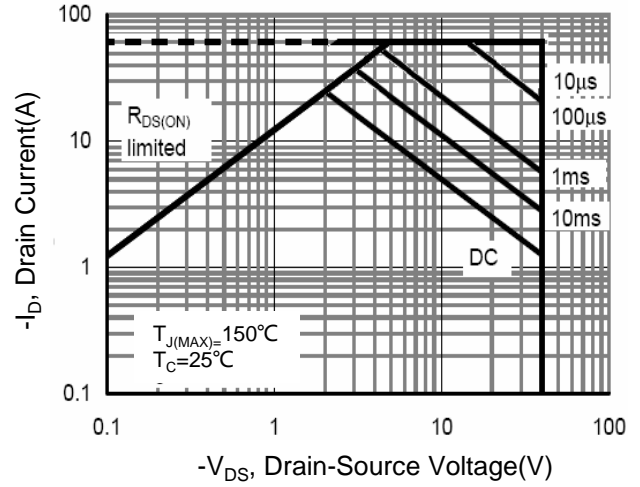
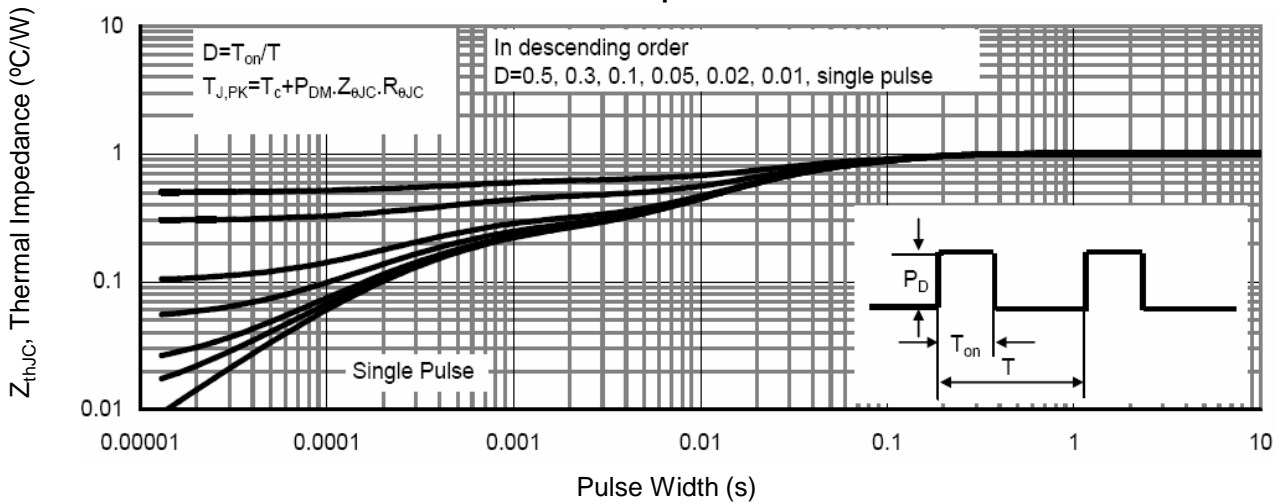
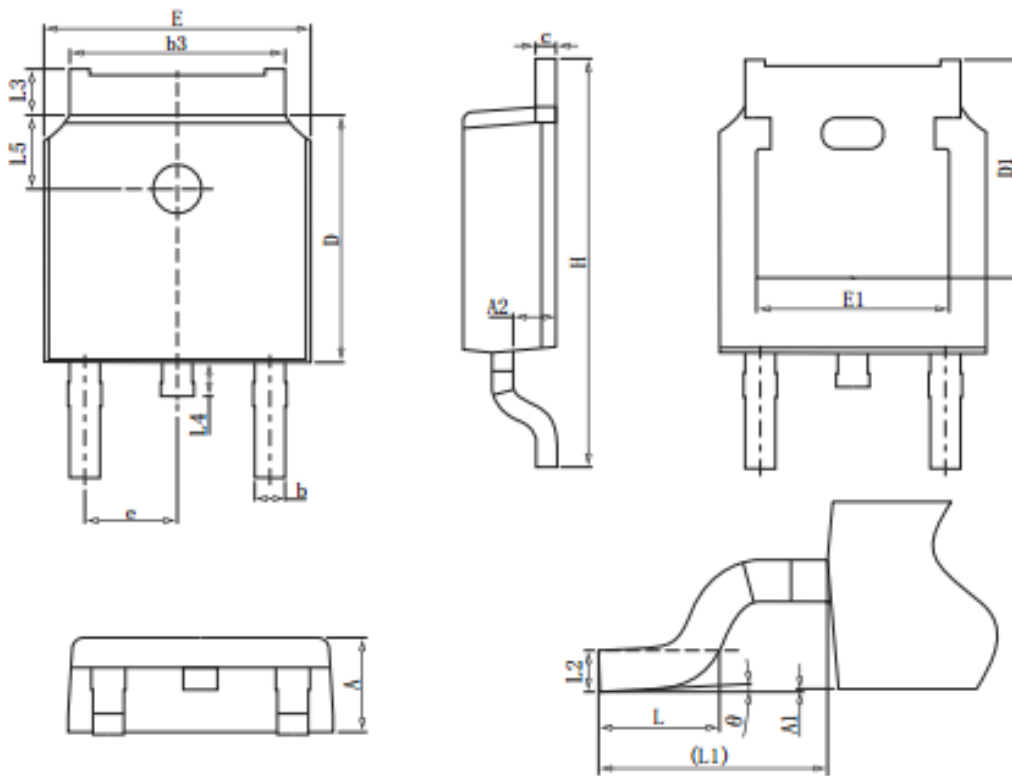


Figure 9. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



| Symbol | Dimensions in Millimeters | | |
|--------|---------------------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 2.2 | 2.3 | 2.4 |
| A1 | 0 | | 0.2 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.9 |
| b3 | 5.2 | 5.33 | 5.5 |
| c | 0.43 | 0.53 | 0.63 |
| D | 5.98 | 6.1 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.4 | 6.6 | 6.8 |
| E1 | 4.63 | | |
| e | 2.286BSC | | |
| H | 9.4 | 10.1 | 10.5 |
| L | 1.38 | 1.5 | 1.75 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.88 | | 1.28 |
| L4 | 0.5 | | 1 |
| L5 | 1.65 | 1.8 | 1.95 |
| θ | 0° | | 8° |