# NCE N-Channel Enhancement Mode Power MOSFET

## Description

The NCE30H11BK uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

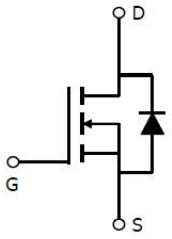
## General Features

- $V_{DS}$ =30V,$I_D$ =110A
  $R_{DS(ON)}$ =2.7mΩ (typical) @ $V_{GS}$=10V
  $R_{DS(ON)}$ =3.9mΩ (typical) @ $V_{GS}$=4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

## Application

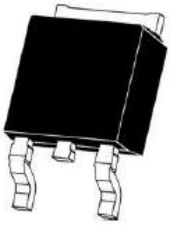
- DC/DC converters
- Synchronous Rectifier

***100% UIS TESTED!***




**Schematic diagram**


**Marking and pin assignment**



**TO-252-2L top view**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| NCE30H11BK | NCE30H11BK | TO-252-2L | Ø330mm | 12mm | 2500 units |

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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 110 | A |
| Drain Current-Continuous($T_C$=100℃) | $I_D$ (100℃) | 77.8 | A |
| Pulsed Drain Current | $I_{DM}$ | 440 | A |
| Maximum Power Dissipation | $P_D$ | 115 | W |
| Derating factor | | 0.77 | W/℃ |
| Single pulse avalanche energy (Note 5) | $E_{AS}$ | 300 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 175 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case (Note 2) | $R_{\theta JC}$ | 1.36 | ℃/W |

## Electrical Characteristics ($T_C$=25℃unless otherwise noted)

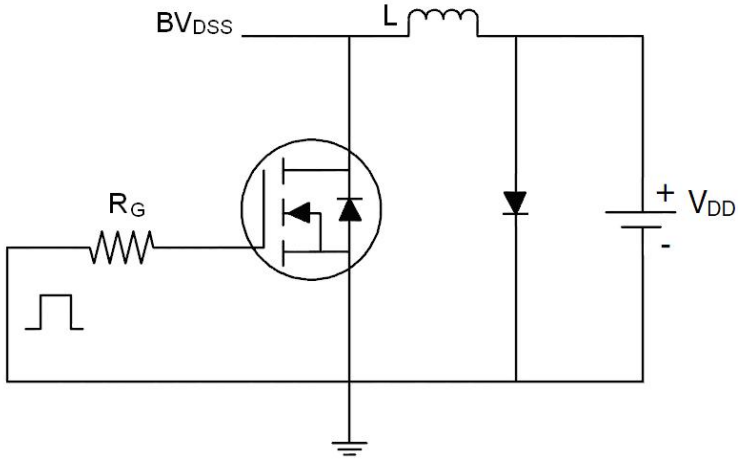
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1 | 1.5 | 2.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=20A | - | 2.7 | 3.2 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | | 3.9 | 5.2 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=20A | 20 | - | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=15V,$V_{GS}$=0V, F=1.0MHz | - | 3009 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 451 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 403 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=15V,$I_D$=20A $V_{GS}$=10V,$R_{GEN}$=3Ω | - | 11 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 14 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 36 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 12 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$I_D$=20A, $V_{GS}$=10V | - | 66.3 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 7.0 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 17.2 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=20A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 110 | A |
| Reverse Recovery Time | $t_{rr}$ | TJ = 25°C, IF = 20A di/dt = 100A/μs (Note3) | - | 29 | - | nS |
| Reverse Recovery Charge | Qrr | | - | 32 | - | nC |

## Notes:

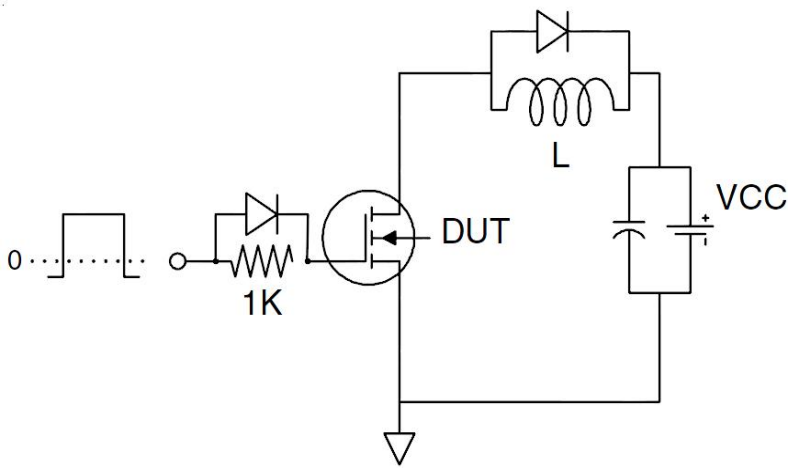
**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production
**5.** EAS condition：Tj=25℃, $V_{DD}$=15V,$V_G$=10V,L=0.5mH, Rg=25Ω;

# Test Circuit

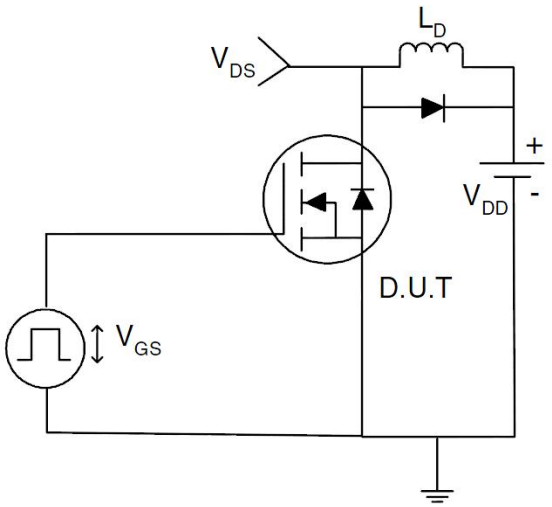
**1) $E_{AS}$ Test Circuit**




**2) Gate Charge Test Circuit**




**3) Switch Time Test Circuit**



## Typical Electrical and Thermal Characteristics (Curves)

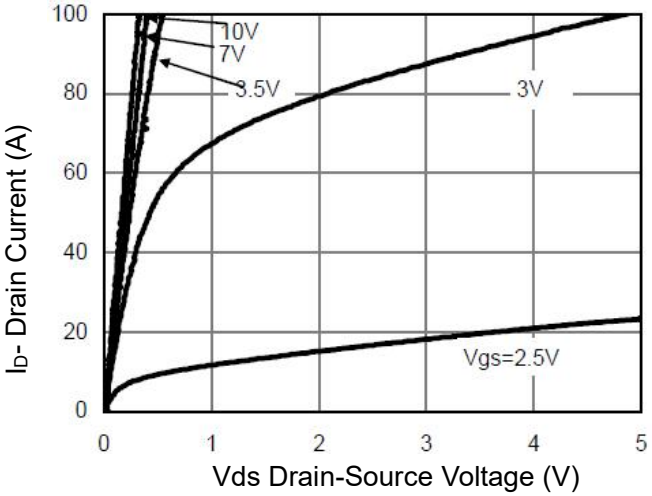



**Figure 1 Output Characteristics**

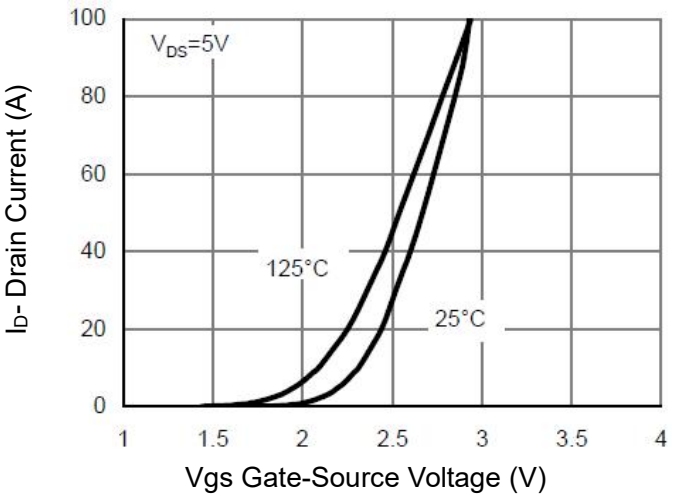



**Figure 2 Transfer Characteristics**

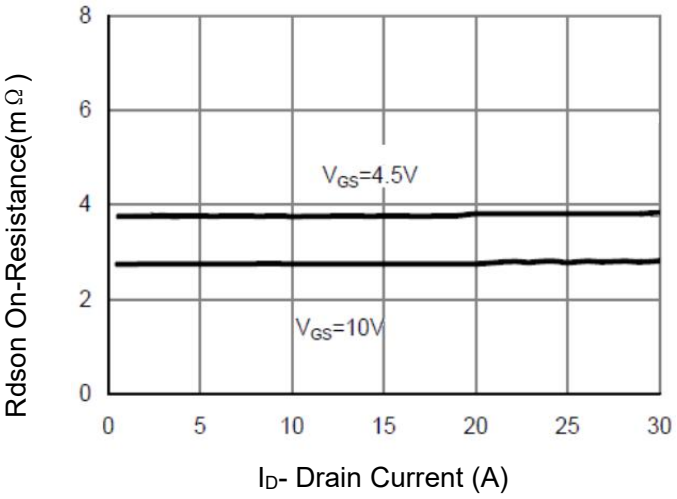



**Figure 3 Rdson- Drain Current**

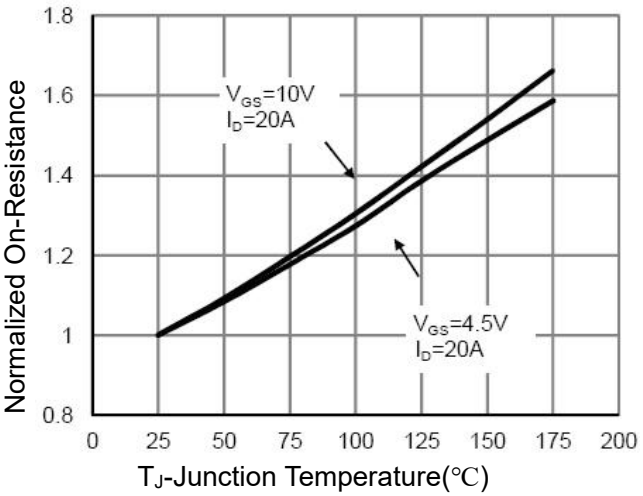



**Figure 4 Rdson-Junction Temperature**

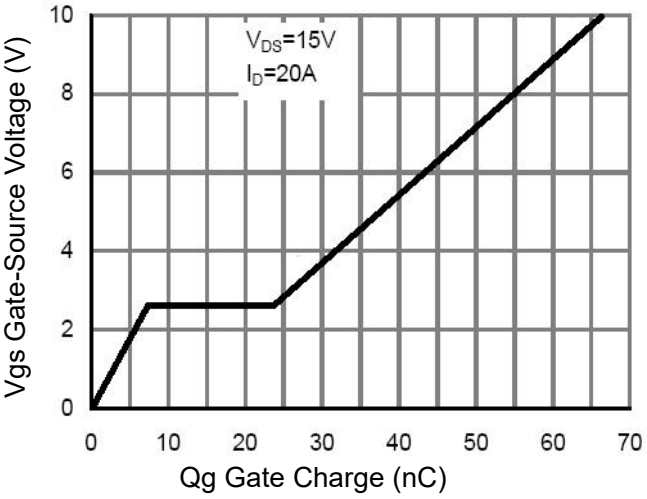



**Figure 5 Gate Charge**

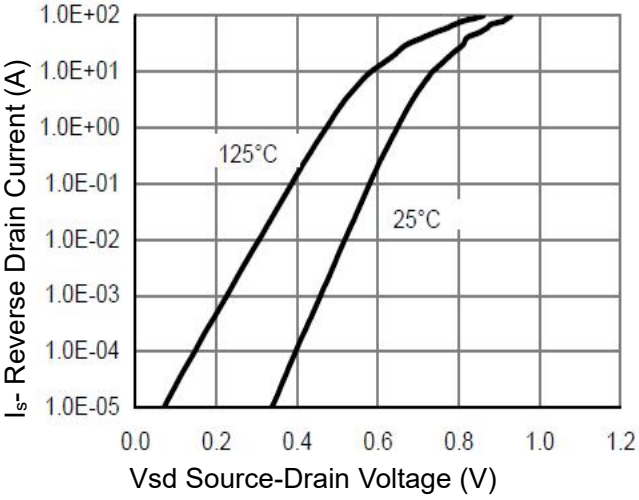



**Figure 6 Source- Drain Diode Forward**

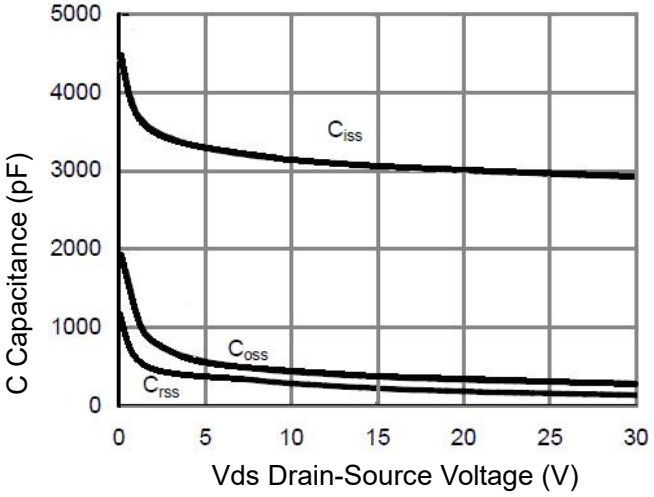



**Figure 7 Capacitance vs Vds**

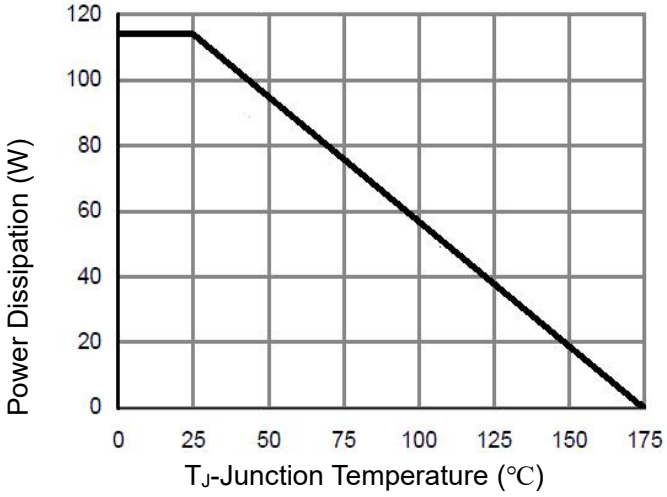



**Figure 9 Power De-rating**

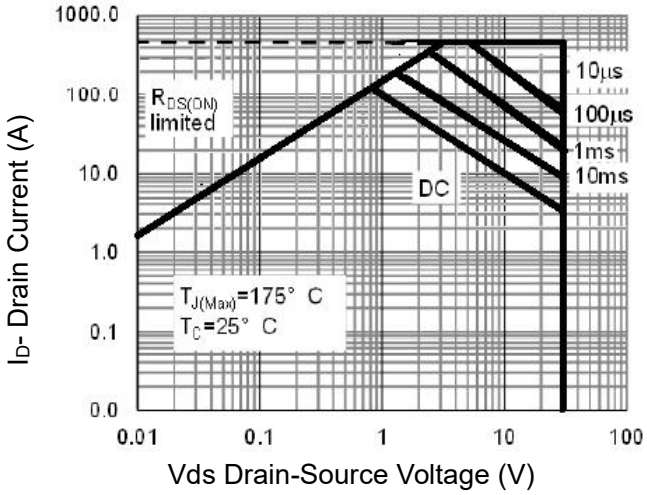



**Figure 8 Safe Operation Area**

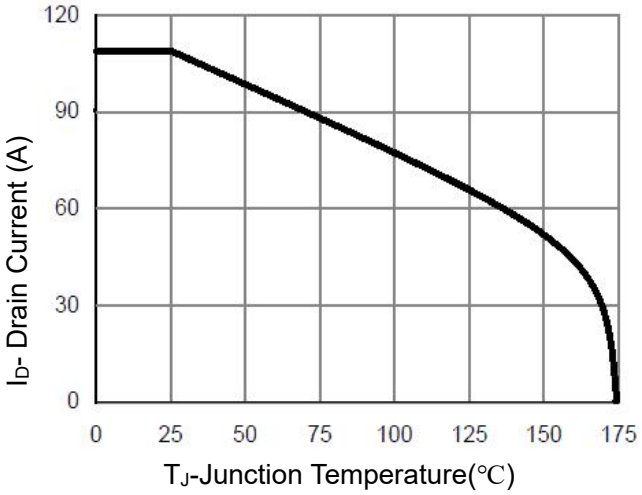



**Figure 10 ID Current Derating**

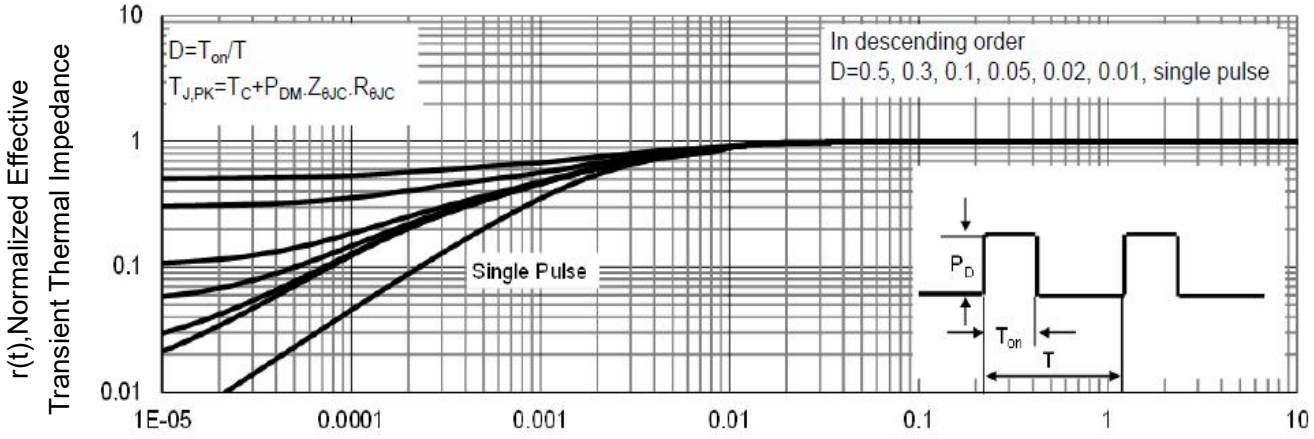
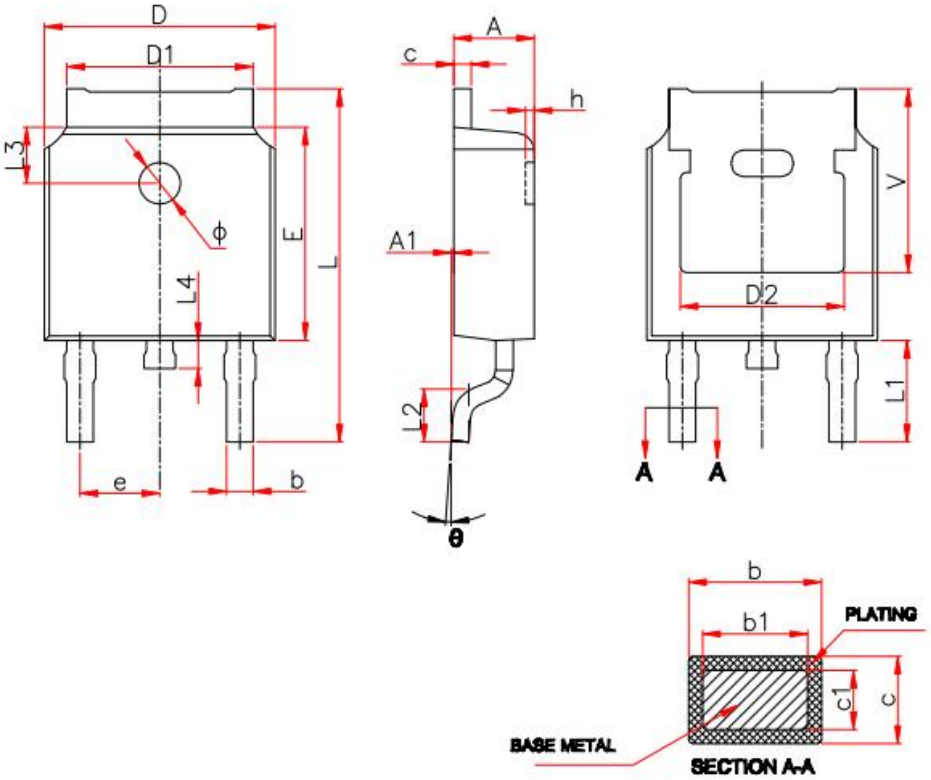



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## TO-252 Package Information




| Symbol | Millimeters | |
|---|---|---|
| | Min. | Max. |
| A | 2.20 | 2.40 |
| A1 | 0.00 | 0.13 |
| b | 0.66 | 0.86 |
| b1 | 0.73 | 0.79 |
| c | 0.46 | 0.58 |
| c1 | 0.50 | 0.52 |
| D | 6.50 | 6.70 |
| D1 | 5.10 | 5.46 |
| D2 | 4.83 REF. | |
| E | 6.00 | 6.20 |
| e | 2.19 | 2.39 |
| L | 9.80 | 10.40 |
| L1 | 2.90 REF. | |
| L2 | 1.40 | 1.70 |
| L3 | 1.60 REF. | |
| L4 | 0.60 | 1.00 |
| Φ | 1.10 | 1.30 |
| θ | 0° | 8° |

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