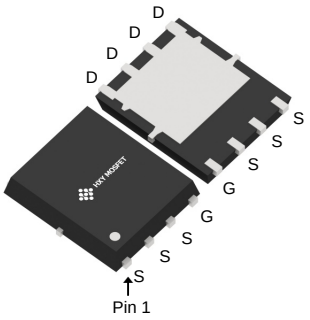
# DMTH4014LPSWQ-13

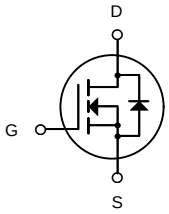
N-Channel Enhancement Mode MOSFET

## Description

The DMTH4014LPSWQ-13 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.




DFN5X6-8L




N-Channel MOSFET

## General Features

$V_{DS}$ = 40V $I_D$ = 40A

$R_{DS(ON)}$ < 14mΩ $V_{GS}$=10V

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| DMTH4014LPSWQ-13 | DFN5X6-8L | HXY MOSFET | 5000 |

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 40 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 28 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 160 | A |
| EAS | Single Pulse Avalanche Energy[3] | 50 | mJ |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |

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

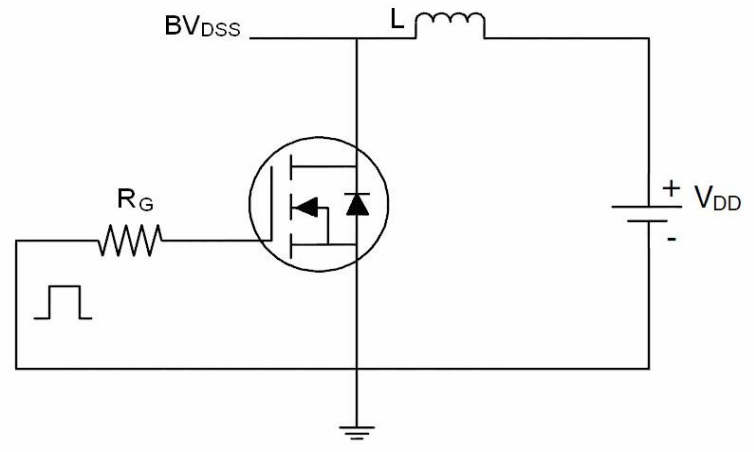
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V,$V_{GS}$=0V | - | - | 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 | 1.6 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=30A | - | 11 | 14 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=20A | 30 | - | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=25V,$V_{GS}$=0V, F=1.0MHz | - | 1540 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 171 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 115 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=20V,$I_D$=20A,$R_L$=1Ω $V_{GS}$=10V,$R_{GEN}$=3Ω | - | 5.0 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 24 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 38 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 12 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=30V,$I_D$=30A, $V_{GS}$=10V | - | 24 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 5.9 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.6 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=30A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 40 | A |
| Reverse Recovery Time | $t_{rr}$ | TJ = 25°C, IF =30A di/dt = 100A/μs (Note3) | - | 9 | | nS |
| Reverse Recovery Charge | Qrr | | - | 15 | | nC |
| Forward Turn-On Time | $t_{on}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

## Notes:

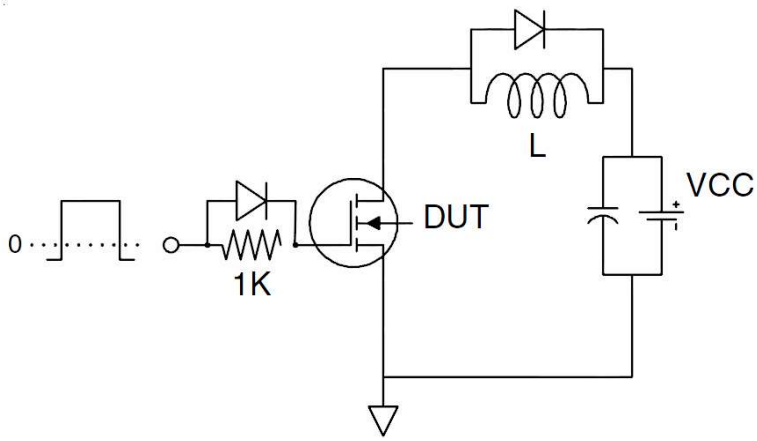
**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production
**5.** $E_{AS}$ condition: Tj=25℃,$V_{DD}$=30V,$V_G$=10V,L=0.5mH,Rg=25Ω

## Test circuit

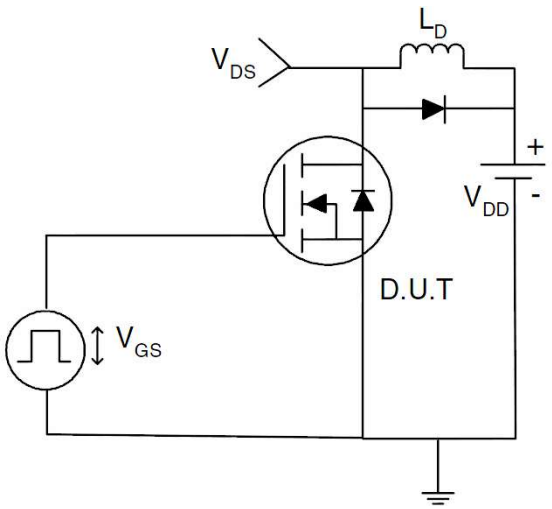
### 1) $E_{AS}$ test Circuits




### 2) Gate charge test Circuit

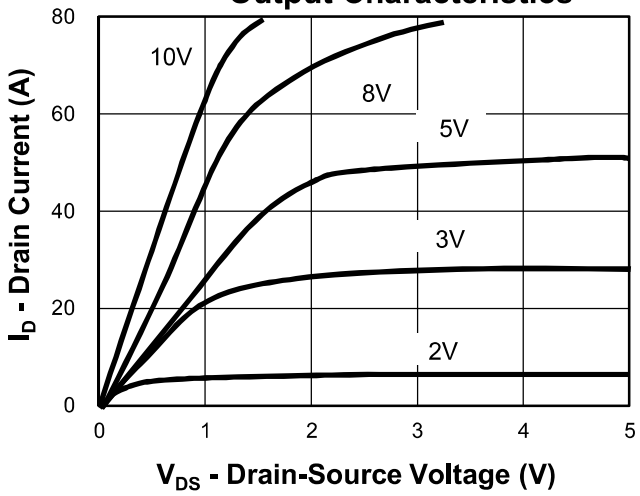



### 3) Switch Time Test Circuit

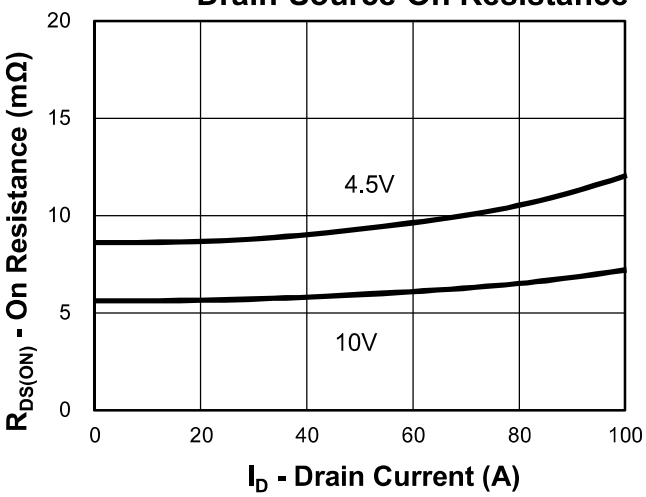


## Typical Performance Characteristics

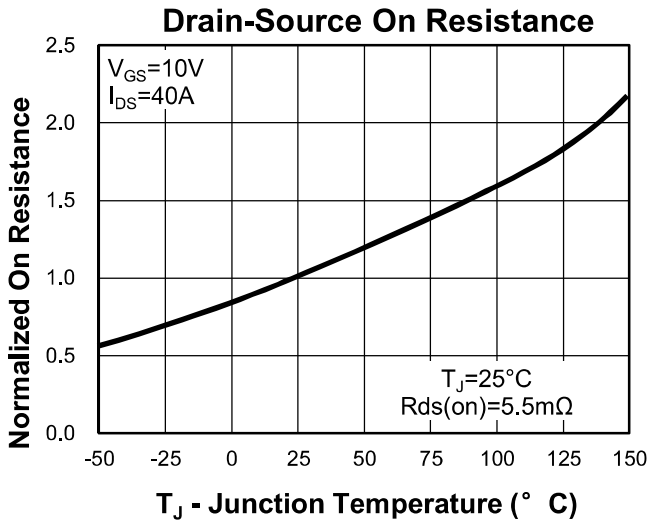
### Output Characteristics



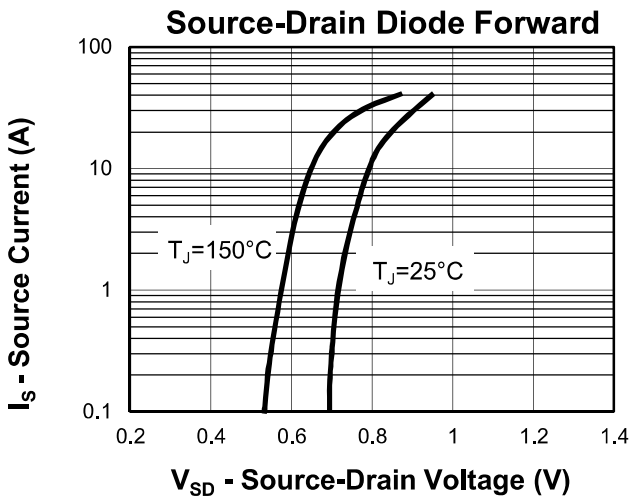

### Drain-Source On Resistance



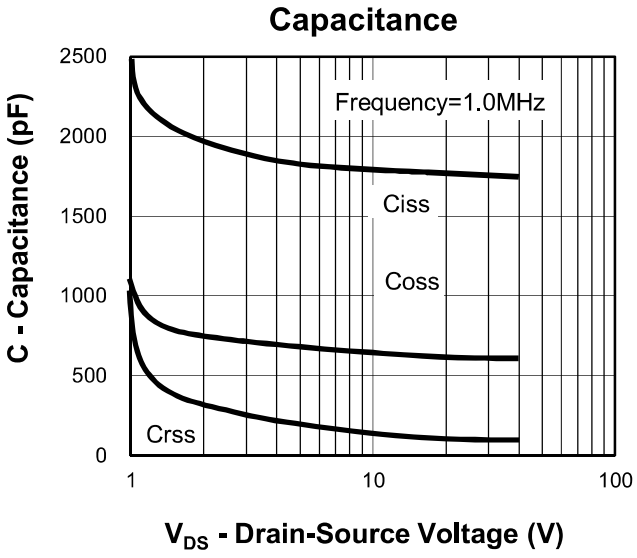

### Drain-Source On Resistance



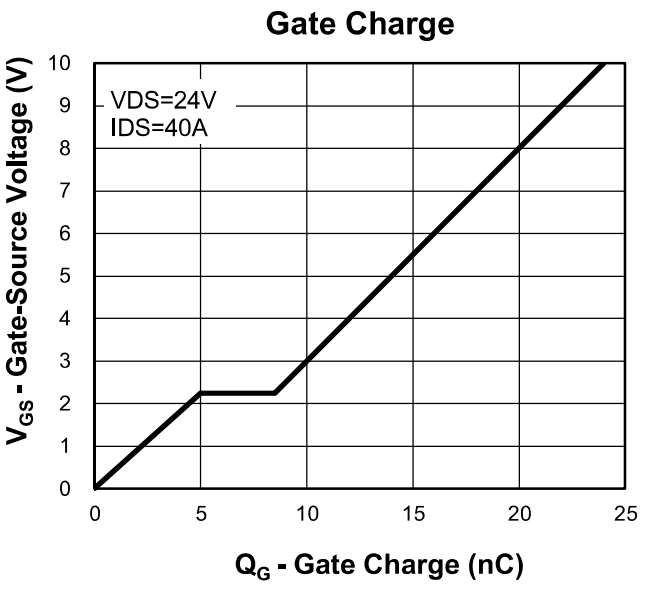

### Source-Drain Diode Forward



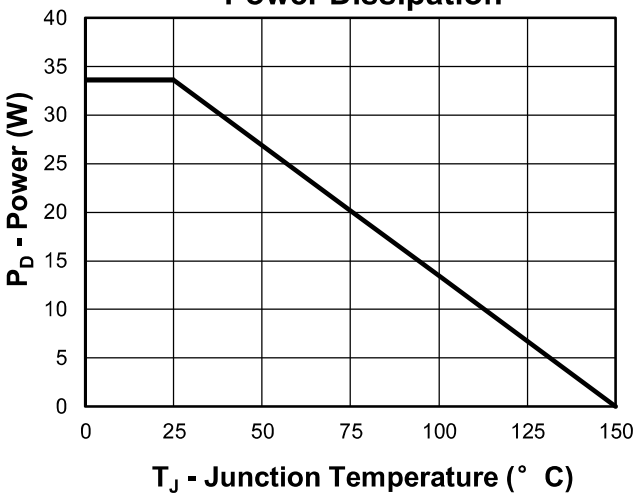

### Capacitance



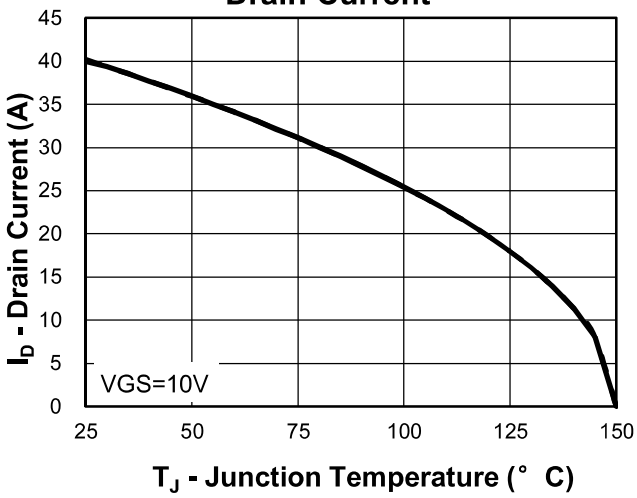

### Gate Charge



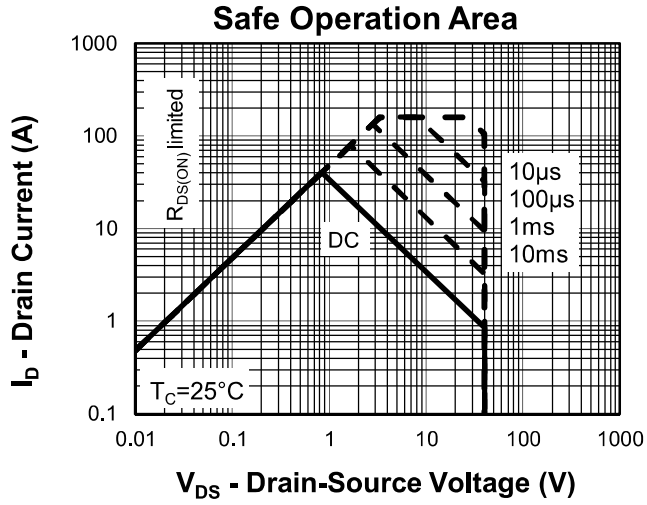
## Power Dissipation



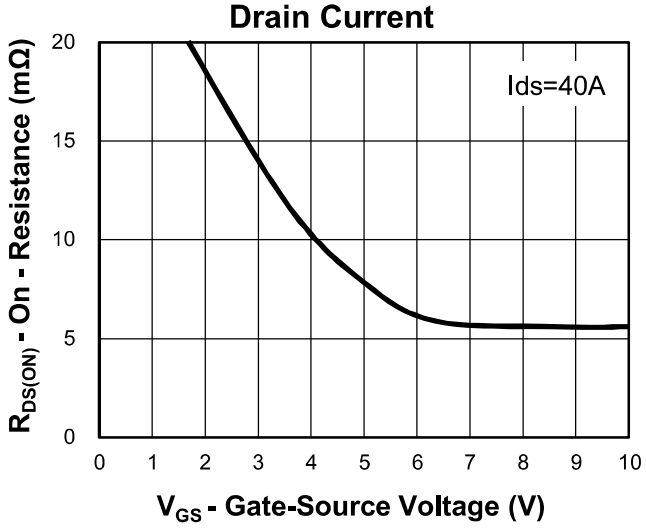

## Drain Current



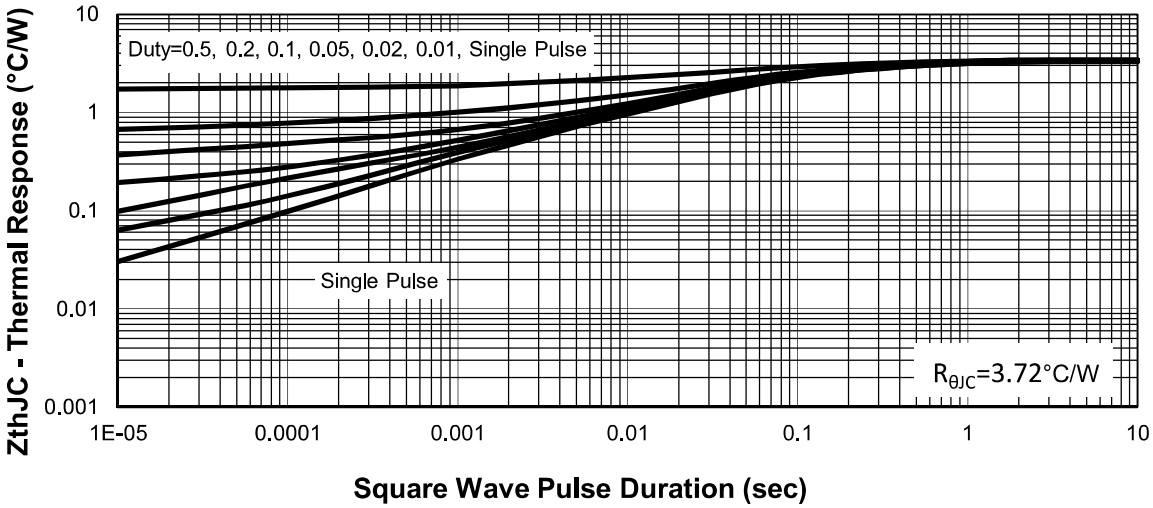

## Safe Operation Area



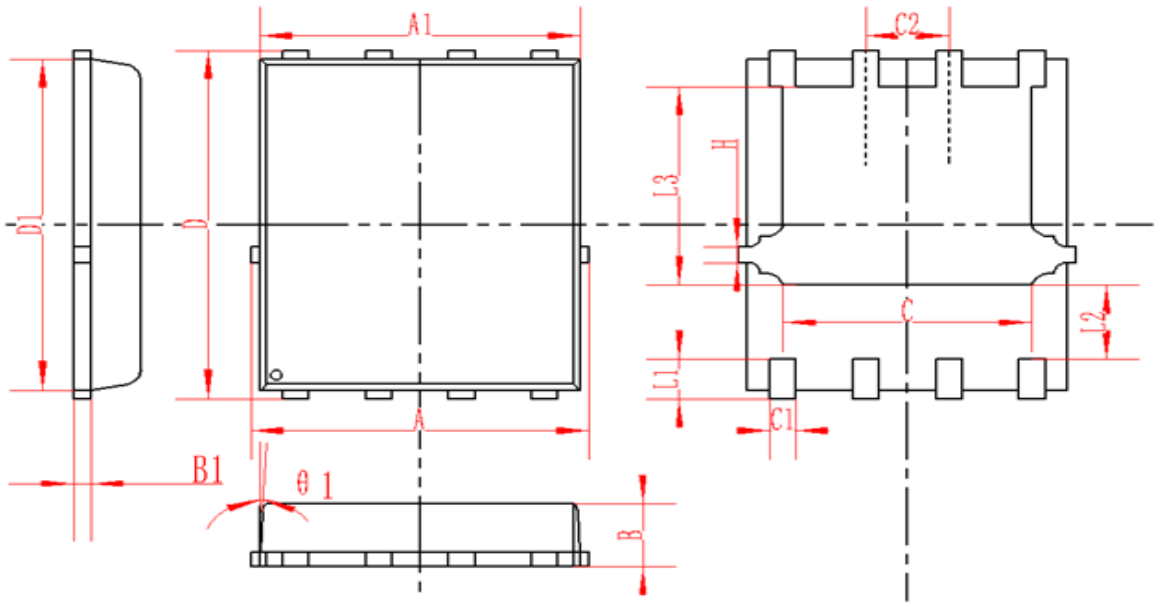

## Drain Current




## Thermal Transient Impedance



## DFN5X6-8L Package Information




| SYMBOL | MM | | | INCH | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.95 | 5 | 5.05 | 0.195 | 0.197 | 0.199 |
| A1 | 4.82 | 4.9 | 4.98 | 0.190 | 0.193 | 0.196 |
| D | 5.98 | 6 | 6.02 | 0.235 | 0.236 | 0.237 |
| D1 | 5.67 | 5.75 | 5.83 | 0.223 | 0.226 | 0.230 |
| B | 0.9 | 0.95 | 1 | 0.035 | 0.037 | 0.039 |
| B1 | 0.254REF | | | 0.010REF | | |
| C | 3.95 | 4 | 4.05 | 0.156 | 0.157 | 0.159 |
| C1 | 0.35 | 0.4 | 0.45 | 0.014 | 0.016 | 0.018 |
| C2 | 1.27TYP | | | 0.5TYP | | |
| θ1 | 8° | 10° | 12° | 8° | 10° | 12° |
| L1 | 0.63 | 0.64 | 0.65 | 0.025 | 0.025 | 0.026 |
| L2 | 1.2 | 1.3 | 1.4 | 0.047 | 0.051 | 0.055 |
| L3 | 3.415 | 3.42 | 3.425 | 0.134 | 0.135 | 0.135 |
| H | 0.24 | 0.25 | 0.26 | 0.009 | 0.010 | 0.010 |

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