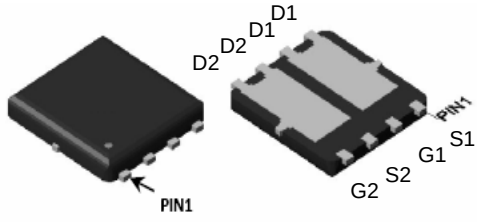
## Features

- Dual N-Channel
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation
- 100% EAS Tested

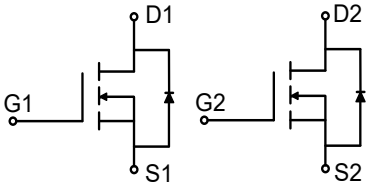
| | | |
|---|---|---|
| $V_{DS}$ | 30 | V |
| $R_{DS(on),TYP}$@ $V_{GS}$=10 V | 9.3 | mΩ |
| $R_{DS(on),TYP}$@ $V_{GS}$=4.5 V | 15 | mΩ |
| $I_D$ | 22 | A |

DFN3x3




RoHS HF

| Part ID | Package Type | Marking | Packing |
|---|---|---|---|
| ZT10D03Q | DFN3x3 | ZT10D03Q | 5000pcs/Reel |




## Absolute Maximum Ratings $T_A$ =25°C, unless otherwise specified

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| **Common Ratings ($T_C$=25°C Unless Otherwise Noted)** | | | | |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | V |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | | 30 | V |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | °C |
| $I_{DM}$ | Drain Current-Continuous@ Current-Pulsed (Note 1) | $T_C$ =25°C | 80 | A |
| **Mounted on Large Heat Sink** | | | | |
| $I_D$ | Drain Current-Continuous | $T_C$ =25°C | 22 | A |
| | | $T_C$ =100°C | 14 | A |
| $P_D$ | Maximum Power Dissipation | | 40 | W |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | | 3.2 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | | 48 | °C/W |
| **Drain-Source Avalanche Ratings** | | | | |
| EAS | Avalanche Energy, Single Pulsed (Note 2) | | 25 | mJ |

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

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_j$=25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 30 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V,$V_{GS}$=0V | -- | -- | 1 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | 1.5 | 2.0 | V |
| $R_{DS(on)}$ | Drain-Source On-State Resistance | $V_{GS}$=10V, $I_D$=15A | -- | 9.3 | 13 | mΩ |
| $R_{DS(on)}$ | Drain-Source On-State Resistance | $V_{GS}$=4.5V, $I_D$=10A | -- | 15 | 21 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V ,$I_D$=15A | 10 | -- | -- | S |
| **Dynamic Electrical Characteristics @ $T_j$ = 25°C (unless otherwise stated)** (Note 3,4) | | | | | | |
| Ciss | Input Capacitance | $V_{DS}$=15V,$V_{GS}$=0V, f=1MHz | -- | 810 | -- | pF |
| Coss | Output Capacitance | | -- | 110 | -- | pF |
| Crss | ReverseTransferCapacitance | | -- | 93 | -- | pF |
| Rg | Gate Resistance | f=1MHz | -- | 2.6 | -- | Ω |
| Qg | Total Gate Charge | $V_{DS}$=15V,$I_D$=10A, $V_{GS}$=10V | -- | 14 | -- | nC |
| Qgs | Gate-SourceCharge | | -- | 4 | -- | nC |
| Qgd | Gate-DrainCharge | | -- | 3.5 | -- | nC |
| **Switching Characteristics** (Note 3,4) | | | | | | |
| Td(on) | Turn-on Delay Time | $V_{DS}$=15V, $I_D$ =15A, $R_G$=3.0Ω, $V_{GS}$=10V | -- | 5.1 | -- | ns |
| Tr | Turn-on Rise Time | | -- | 4.1 | -- | ns |
| Td(off) | Turn-Off Delay Time | | -- | 20.2 | -- | ns |
| Tf | Turn-Off Fall Time | | -- | 6.4 | -- | ns |
| **Source- Drain Diode Characteristics@ $T_j$ = 25°C (unless otherwise stated)** | | | | | | |
| $I_S$ | Diode Forward Current | | -- | -- | 22 | A |
| $V_{SD}$ | Forward on voltage | $I_S$ =22A,$V_{GS}$=0V | -- | -- | 1.2 | V |
| Trr | Reverse Recovery Time | $T_j$=25℃,$I_F$ =10A di/dt=100A/μs | -- | 5.6 | -- | ns |
| Qrr | Reverse Recovery Charge | | -- | 5.1 | -- | nC |

**Notes:**
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.5 mH, $V_{DD}$ = 15V, $V_{GS}$=10V,$R_G$ = 25 Ω, Starting $T_j$ = 25°C
3. $I_{SD}$ ≤ IMax, di/dt = 100A/us, $V_{DD}$ ≤ $BV_{DSS}$, Staring $T_j$ =25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

## Typical Characteristics

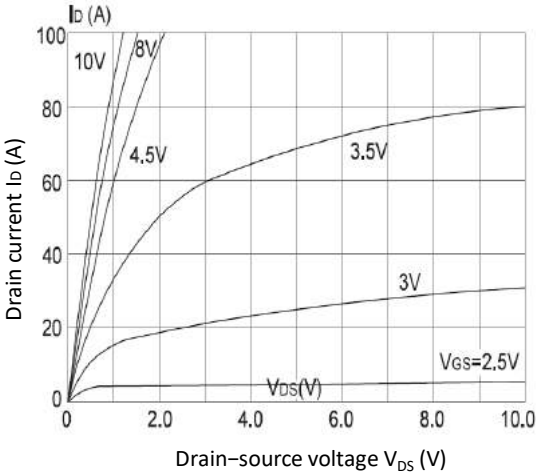



Figure 1. Output Characteristics

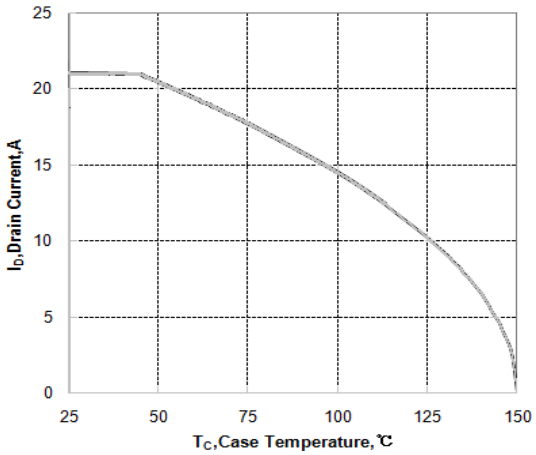



Fig.4 Maximum Continuous Drain Current VS. Case Temperature

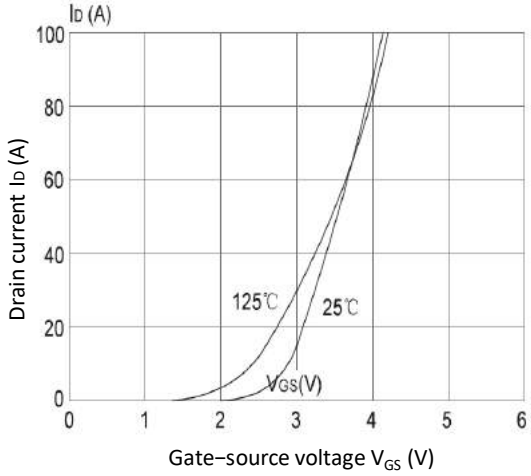



Figure 2. Transfer Characteristics

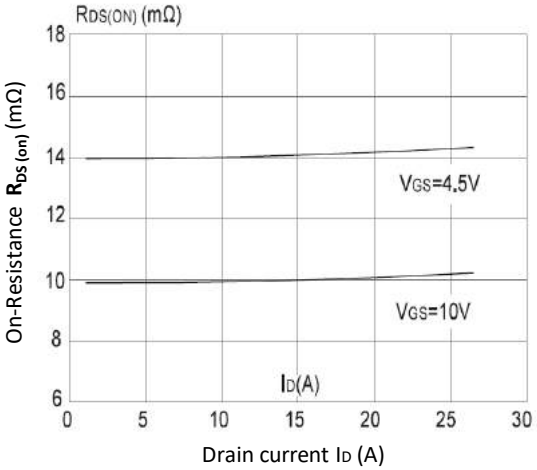



Figure 5. $R_{DS(ON)}$ vs. $I_D$

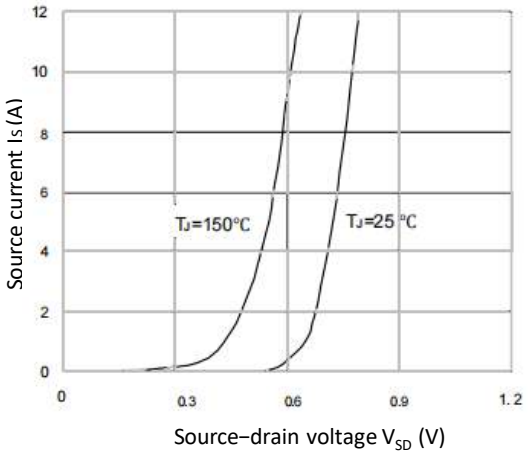



Figure 3. Forward Characteristics of Reverse

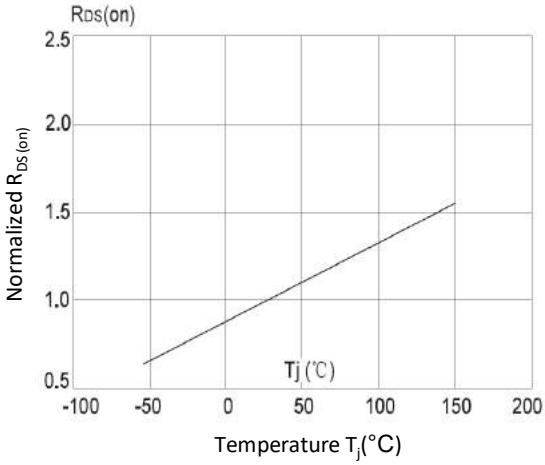



Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

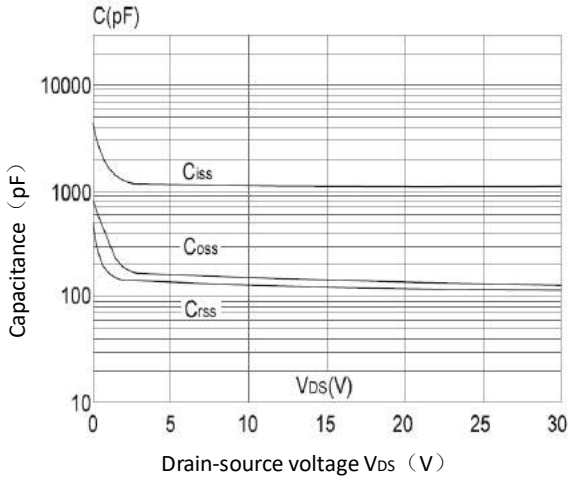



Figure 7. Capacitance Characteristics

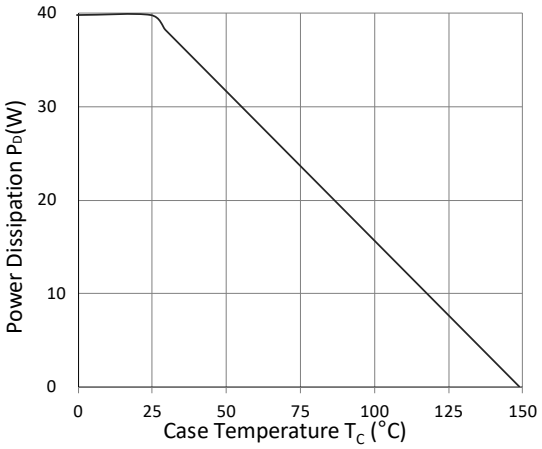



Figure 9. Power Dissipation

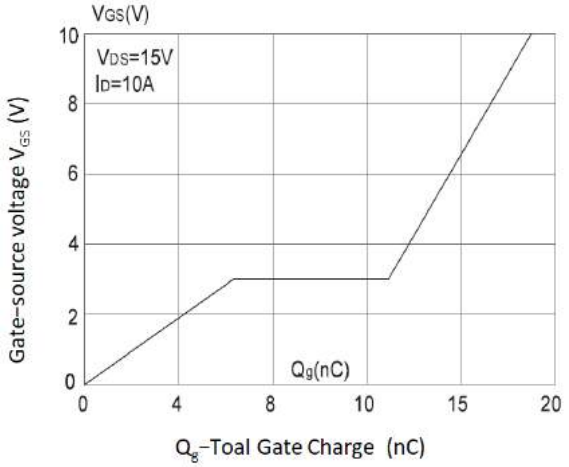



Figure 8. Gate Charge Characteristics

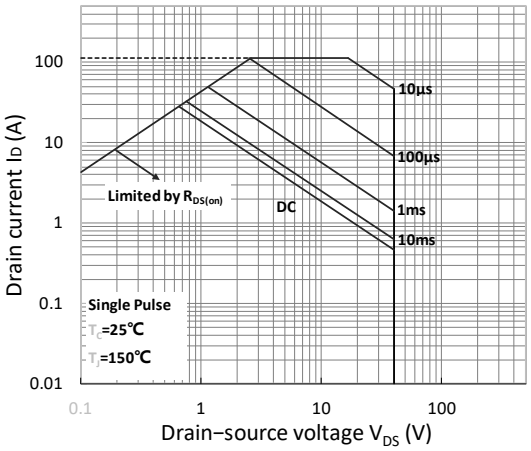



Figure10. Safe Operating Area

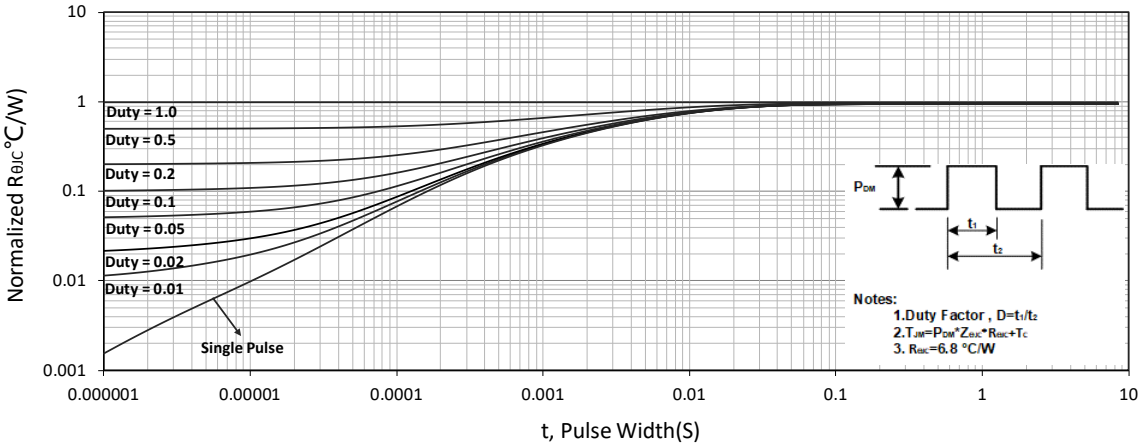



Figure 11. Normalized Maximum Transient Thermal Impedance

## Test Circuit

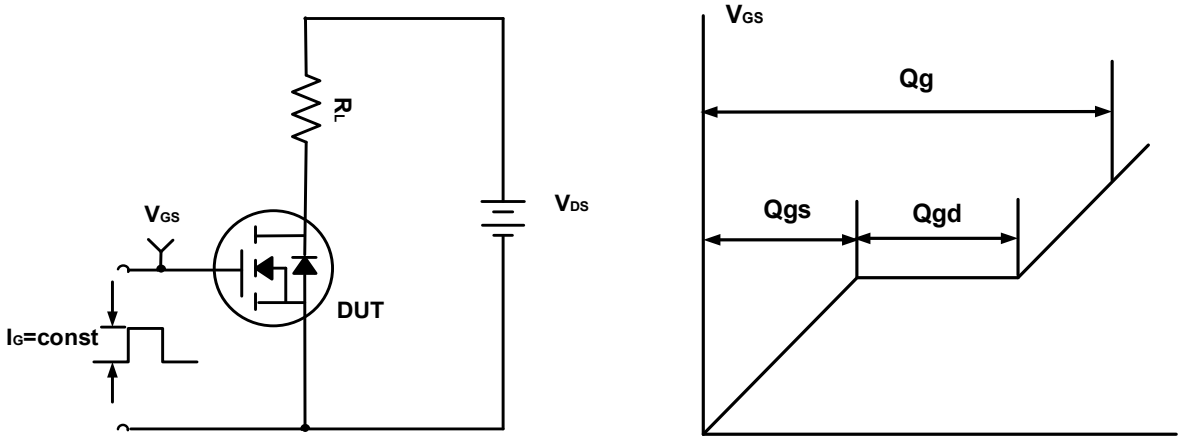



**Figure A. Gate Charge Test Circuit & Waveforms**

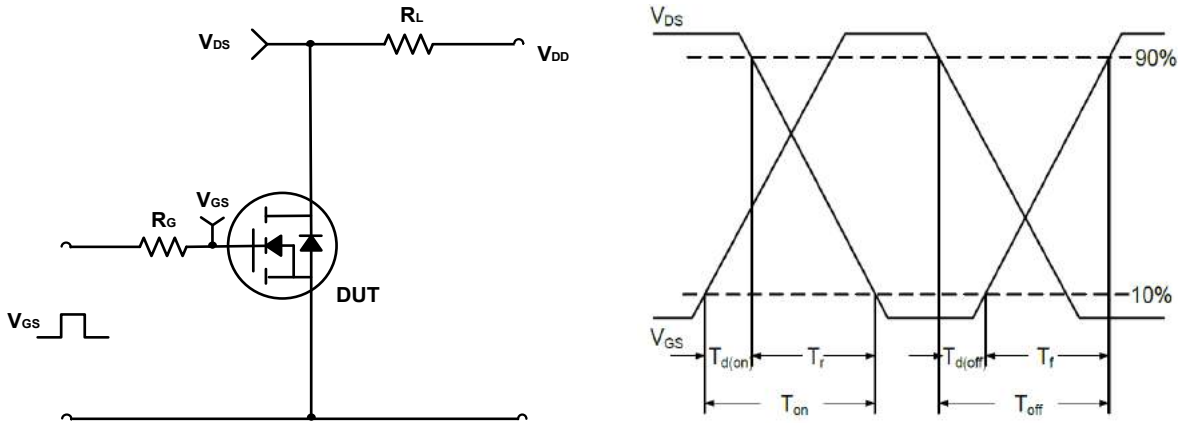



**Figure B. Switching Test Circuit & Waveforms**

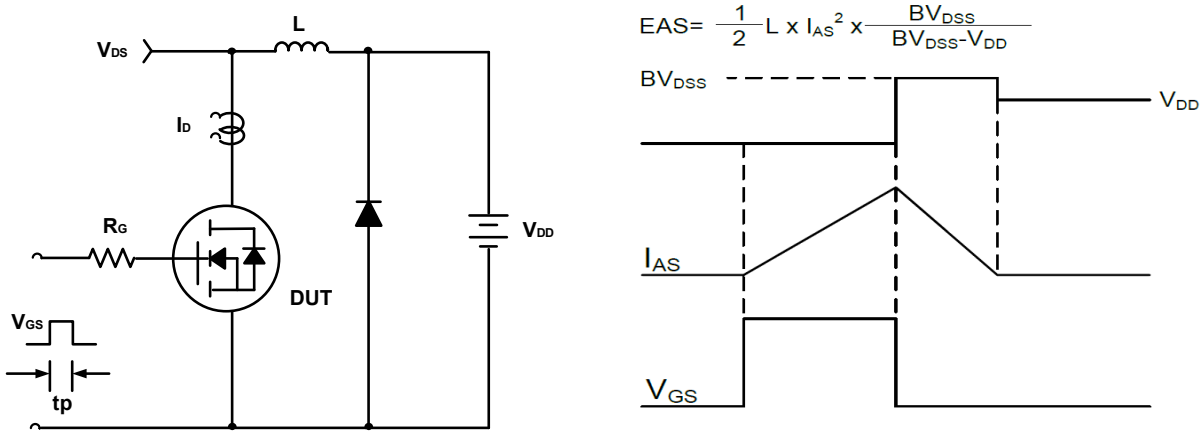
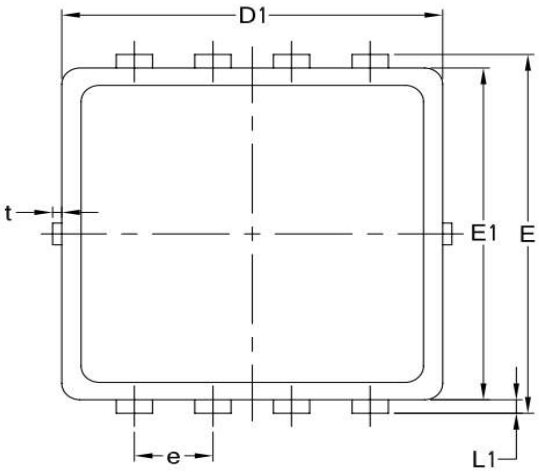
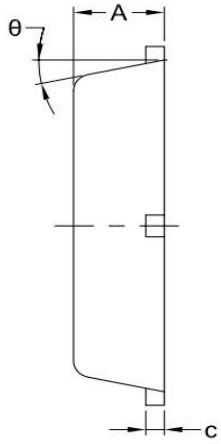
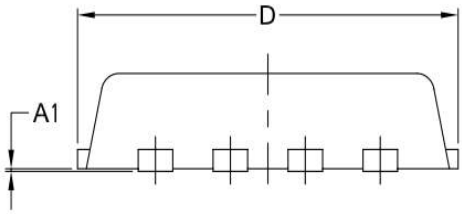


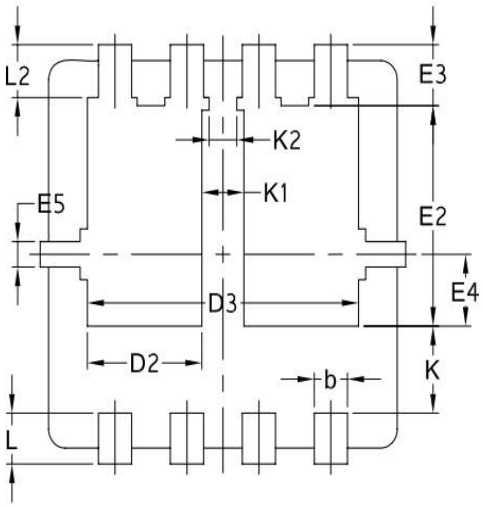

**Figure C. Unclamped Inductive Switching Circuit & Waveforms**

# DFN3x3-8L Package Information




| SYMBOL | COMMON | | |
|---|---|---|---|
| | MM | | |
| | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.85 |
| A1 | / | / | 0.05 |
| b | 0.25 | 0.30 | 0.39 |
| c | 0.14 | 0.152 | 0.20 |
| D | 3.20 | 3.30 | 3.45 |
| D1 | 3.05 | 3.15 | 3.25 |
| D2 | 0.84 | 1.04 | 1.24 |
| D3 | 2.30 | 2.45 | 2.60 |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 2.95 | 3.05 | 3.15 |
| E2 | 1.60 | 1.74 | 1.90 |
| E3 | 0.28 | 0.48 | 0.68 |
| E4 | 0.37 | 0.57 | 0.77 |
| E5 | 0.10 | 0.20 | 0.30 |
| e | 0.60 | 0.65 | 0.70 |
| K | 0.50 | 0.69 | 0.80 |
| K1 | 0.30 | 0.38 | 0.53 |
| K2 | 0.15 | 0.25 | 0.35 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.06 | 0.125 | 0.20 |
| L2 | 0.27 | 0.42 | 0.57 |
| t | 0 | 0.075 | 0.13 |
| $\theta$ | 10° | 12° | 14° |

## Customer Service

**Sales and Service:**

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