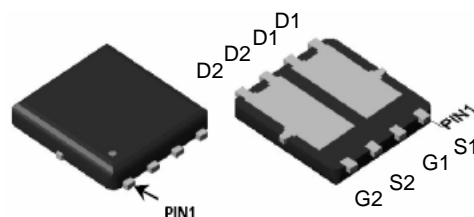


## Features

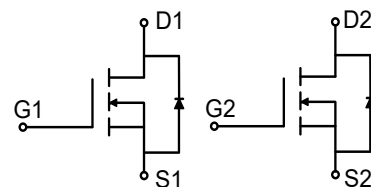
- Dual N-Channel
- Green Device Available
- 100% EAS Guaranteed
- Optimized for High Speed Smooth Switching
- 100% EAS Tested

$V_{DS}$	40	V
$R_{DS(on),TYP@ V_{GS}=10V}$	12	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	15	m $\Omega$
$I_D$	28	A

DFN3x3



Part ID	Package Type	Marking	Packing
ZT11D04Q	DFN3x3	ZT11D04Q	5000pcs/Reel



## Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (<math>T_c=25^\circ\text{C}</math> Unless Otherwise Noted)</b>				
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	40	V	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_c = 25^\circ\text{C}$ 112	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous	$T_c = 25^\circ\text{C}$	28	A
		$T_c = 100^\circ\text{C}$	18	A
$P_D$	Maximum Power Dissipation	18.4	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	6.8	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient (Note 3)	60	$^\circ\text{C/W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 2)	31.25	mJ	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.1	1.6	2.1	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance (Note 4)	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	--	12	14.5	mΩ
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	--	15	20	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =10A	--	30	--	S
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) (Note 5)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz	--	1400	--	pF
C <sub>oss</sub>	Output Capacitance		--	108	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	91	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	2.6	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	--	26	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	4	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	6.5	--	nC
<b>Switching Characteristics (Note 5)</b>						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =20V, I <sub>D</sub> =10A, R <sub>G</sub> =3.0Ω, V <sub>GS</sub> =10V	--	8.4	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	5.6	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	28.5	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	6.4	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
I <sub>S</sub>	Diode Forward Current		--	--	28	A
V <sub>SD</sub>	Forward on voltage (Note 4)	I <sub>S</sub> =10A, V <sub>GS</sub> =0V	--	--	1.2	V
T <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> = 10A di/dt=100A/μs	--	22	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	40	--	nC

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
2. The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=25A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

### Typical Characteristics

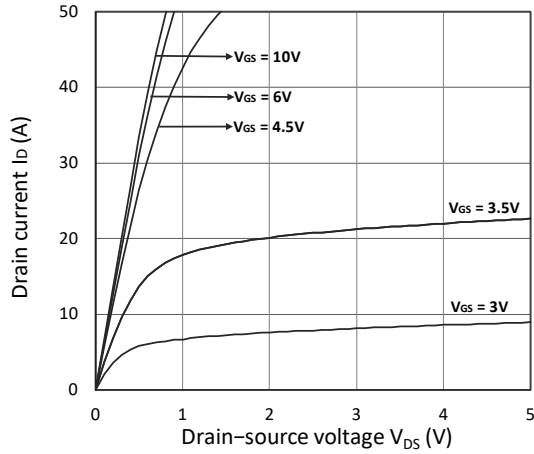


Figure 1. Output Characteristics

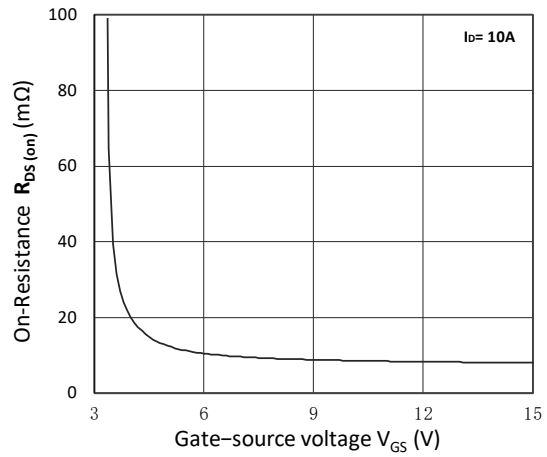


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

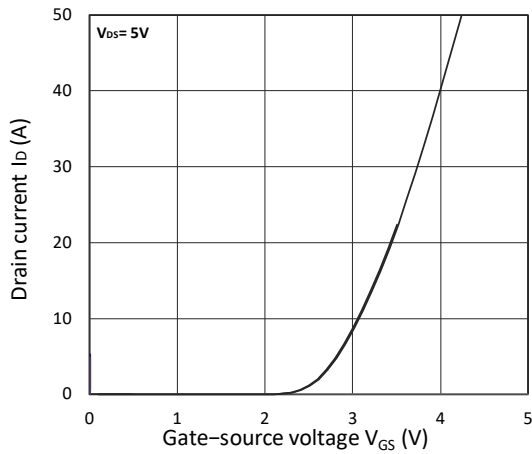


Figure 2. Transfer Characteristics

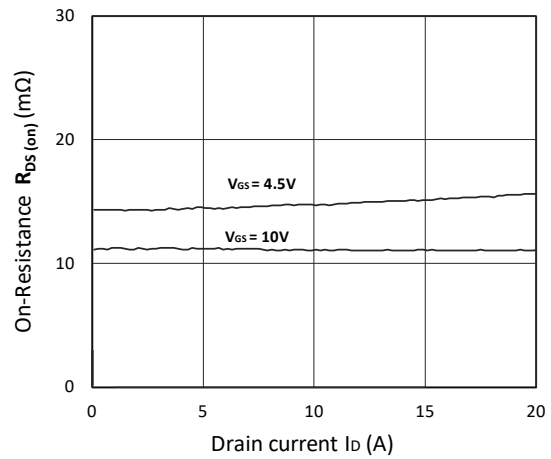


Figure 5.  $R_{DS(ON)}$  vs.  $I_D$

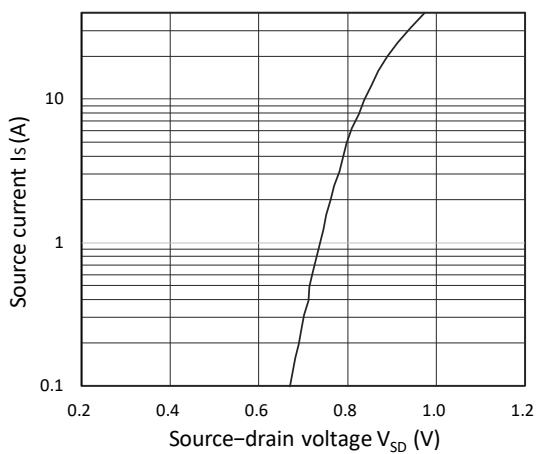


Figure 3. Forward Characteristics of Reverse

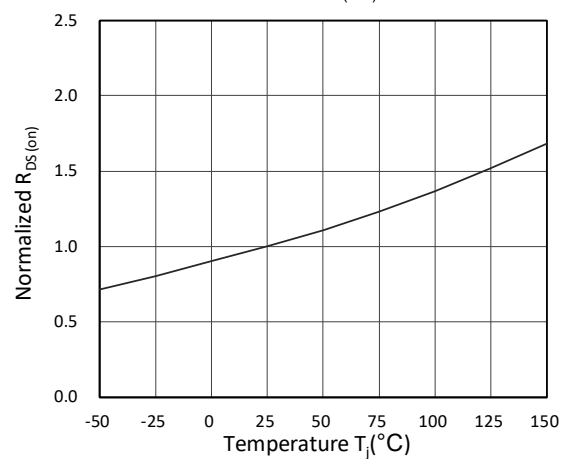


Figure 6. Normalized  $R_{DS(ON)}$  vs. Temperature

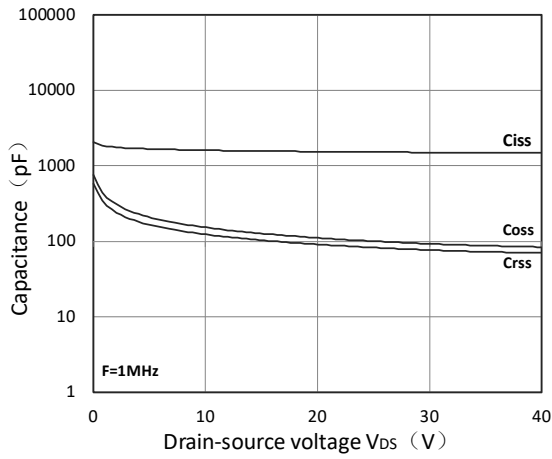


Figure 7. Capacitance Characteristics

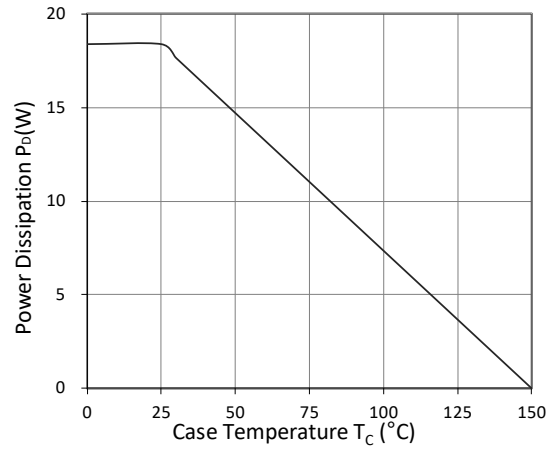


Figure 9. Power Dissipation

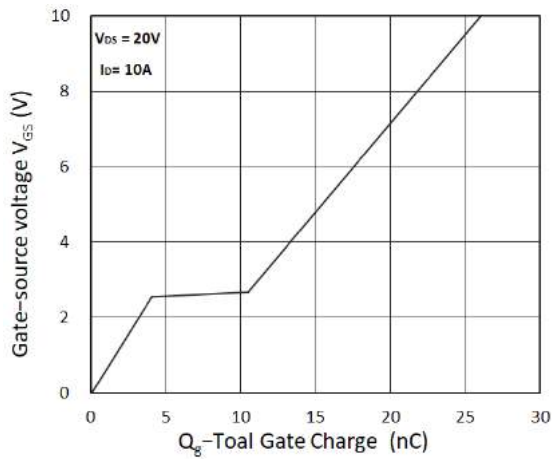


Figure 8. Gate Charge Characteristics

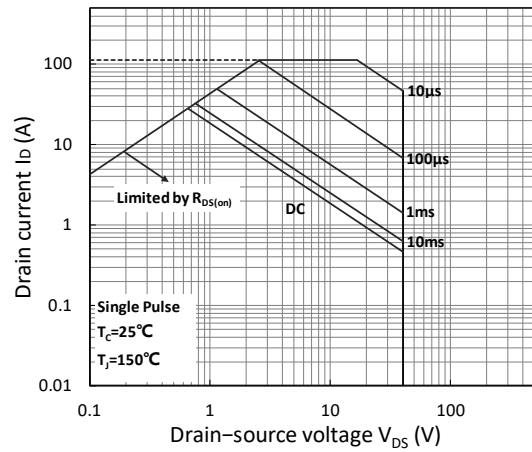


Figure 10. Safe Operating Area

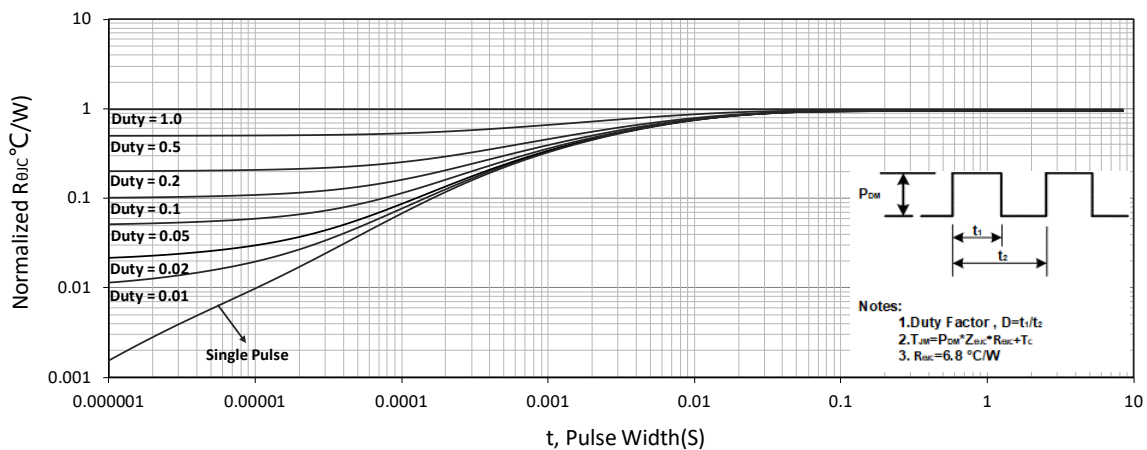


Figure 11. Normalized Maximum Transient Thermal Impedance

### Test Circuit

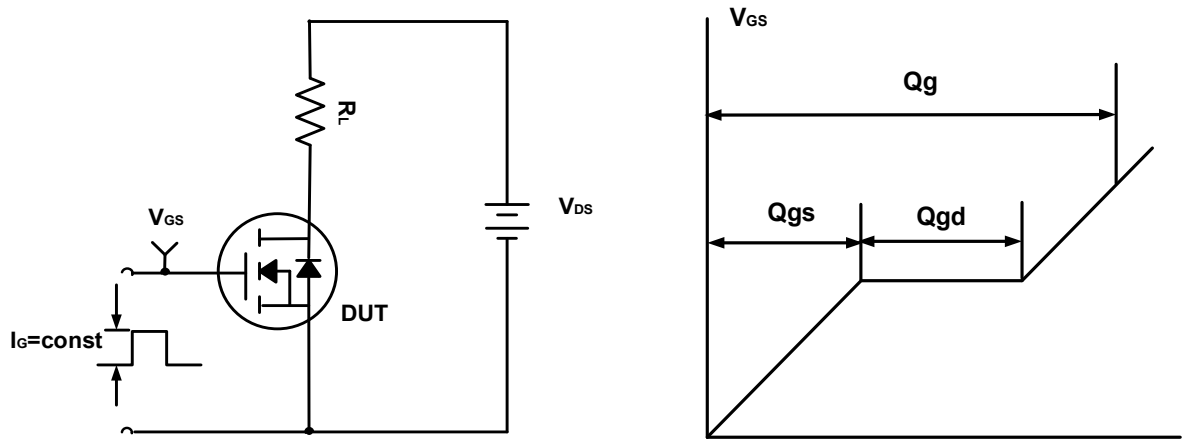


Figure A. Gate Charge Test Circuit & Waveforms

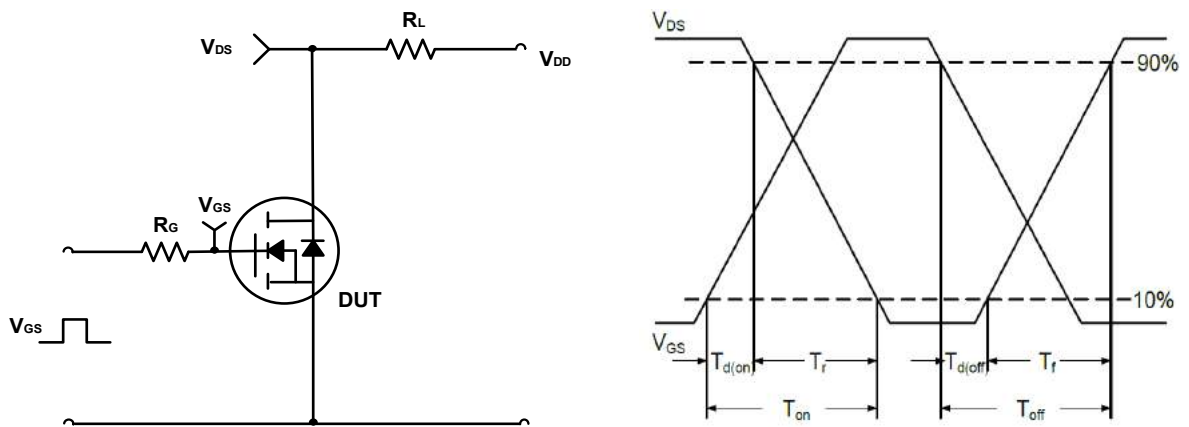


Figure B. Switching Test Circuit & Waveforms

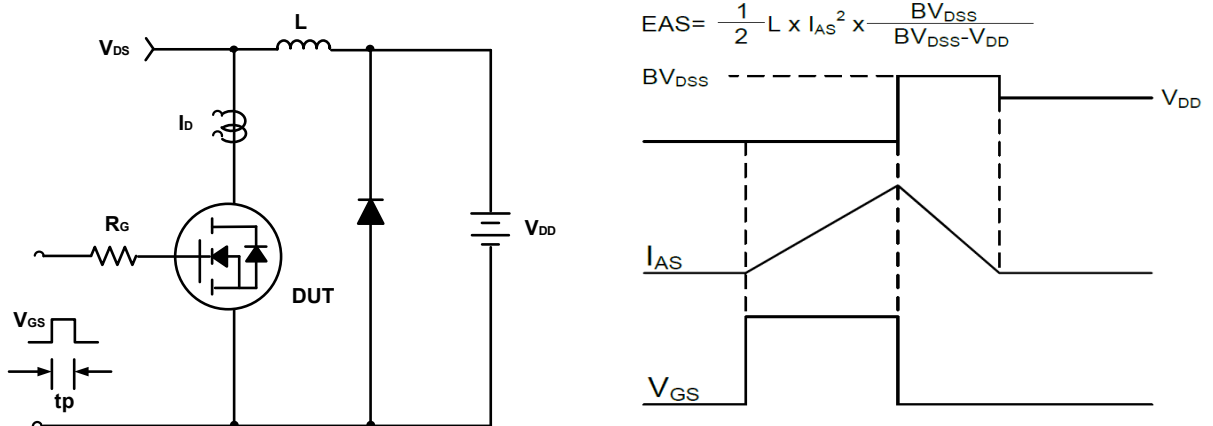
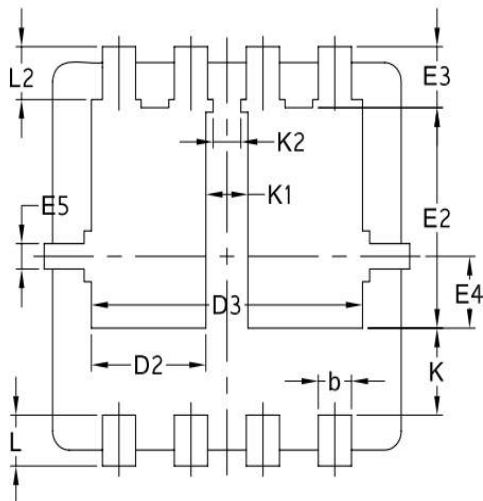
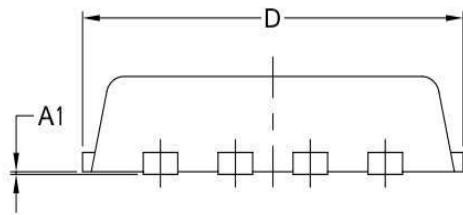
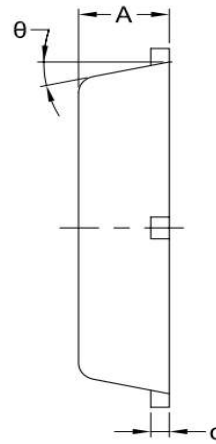
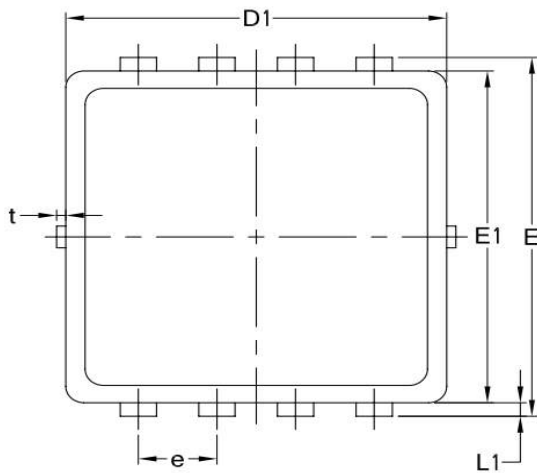


Figure C. Unclamped Inductive Switching Circuit & Waveforms

## 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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