N-Channel 60V MOSFET

E060N3P5DH1

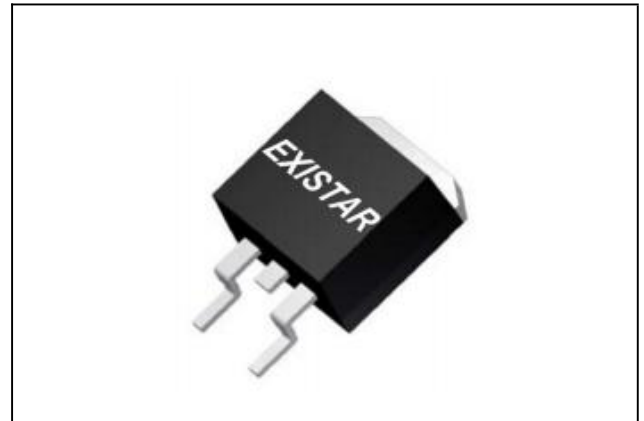| V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
60V	3.5 @ V_{GS} = 10V	130

TO-263

Features

- Low $R_{DS(on)}$ trench technology

- Low thermal impedance

- Fast switching speed

- 100% avalanche tested

Applications

- DC/DC conversion

- Power switch

- PD charger

- Moto driver

Package And Ordering Information

Ordering code	Package	Marking
E060N3P5DH1	TO-263	E060N3P5DH1

Ordering Information

Package	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box
TO-263	50	16	800

Key Performance Parameters

Parameter	Value	Unit
VDS, min @ Tj(max)	60	V
ID, pulse	390	A
RDS(ON), max @ VGS=10V	3.5	mΩ
Qg	56.8	nC

Absolute Maximum Ratings at Tj=25°C Unless Otherwise Noted

Parameter		Symbol	Limit	Unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25°C	I_D	130	A
	T_C=100°C		-	
Pulsed drain current		$I_{D,pulse}$	390	
Avalanche energy, single pulse		E_{AS}	94	mJ
Power dissipation	T_C=25°C	P_D	140	W
	T_A=25°C		-	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	0.89	°C/W
Thermal resistance, junction-to-ambient	Steady state	$R_{\theta JA}$	62	

Electrical Characteristics at Tj=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Static						
Drain to source breakdown voltage	$V_{(BR)DSS}$	60			V	V_{GS} = 0, I_D = 250 µA
Gate-source threshold voltage	$V_{GS(th)}$	2	2.75	3.75	V	V_{DS} = V_{GS}, I_D = 250 µA
Gate-body leakage	I_{GSS}			±100	nA	V_{DS} = 0 V, V_{GS} = ±20 V
Zero gate voltage drain current	I_{DSS}			1	µA	V_{DS} = 60 V, V_{GS} = 0 V
Drain-source on-resistance	$R_{DS(on)}$		2.5	3.5	mΩ	V_{GS} = 10 V, I_D = 20 A
Forward transconductance	gfs		-		S	V_{DS} = 5 V, I_D = 30 A
Gate resistance	Rg		2.5		Ω	f=1MHz

Gate Charge						
Total gate charge	Qg		56.8			V_{DS} = 50 V, I_D = 50 A, V_{GS} = 10 V
Gate-source charge	Qgs		17.8		nC	
Gate-drain charge	Qgd		6.3			
Dynamic						
Turn-on delay time	$t_{d(on)}$		31.4			V_{DS} = 50 V, I_D =50 A, V_{GS} = 10 V, R_{GEN} = 2 Ω
Rise time	t_r		54.8			
Turn-off delay time	$t_{d(off)}$		60.5		ns	
Fall time	t_f		112.5			
Input capacitance	C_{iss}		5411			V_{DS} =25 V, V_{GS} = 0 V, f = 100kHz
Output capacitance	C_{oss}		1522		pF	
Reverse transfer capacitance	C_{rss}		24.2			
Body Diode						
Diode forward voltage	V_{SD}			1.3	V	V_{GS} = 0 V, I_F = 20 A
Reverse recovery time	t_{rr}		70		ns	V_R= 50 V, I_S =50 A, di/dt = 100 A/µs
Reverse recovery charge	Q_{rr}		95		nC	

Electrical Characteristics Diagrams
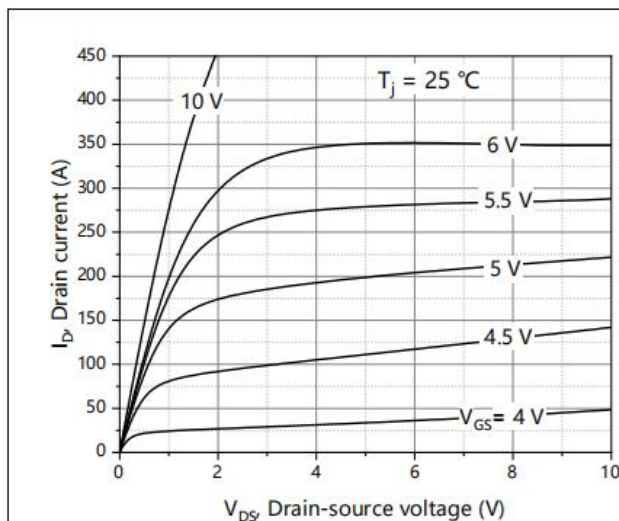
Figure 1. Typ. output characteristics
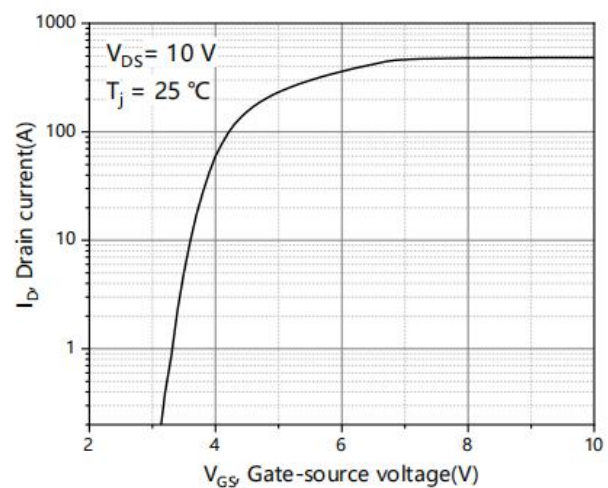
Figure 2. Typ. transfer characteristics
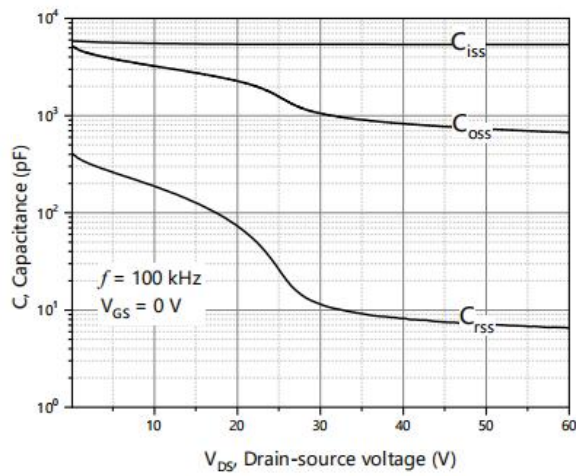
Figure 3. Typ. capacitances
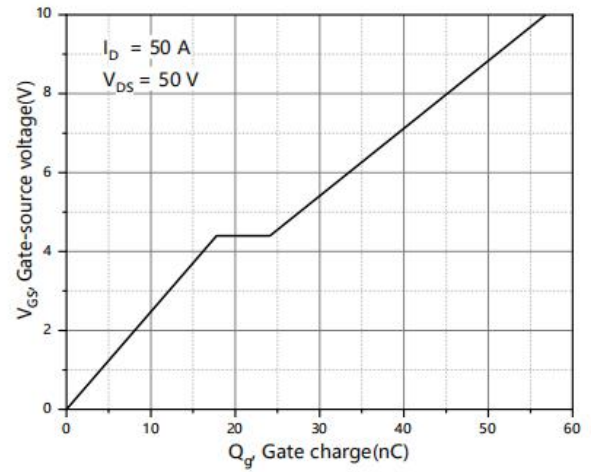
Figure 4. Typ. gate charge
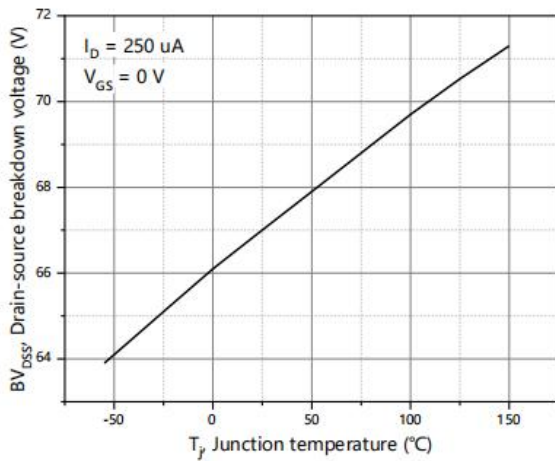
Figure 5. Drain-source breakdown voltage
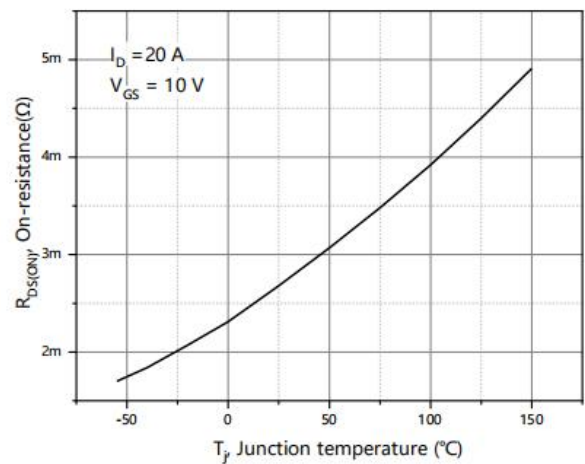
Figure 6. Drain-source on-state resistance
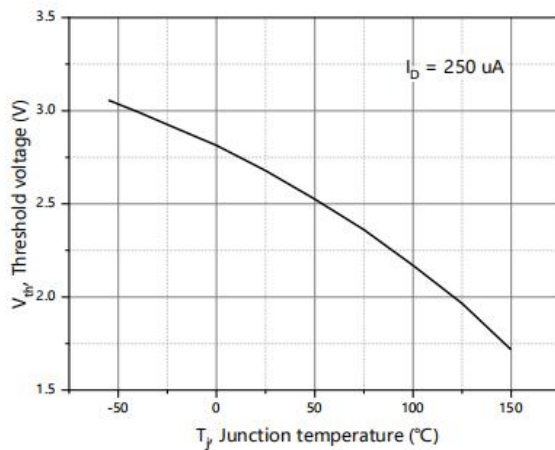
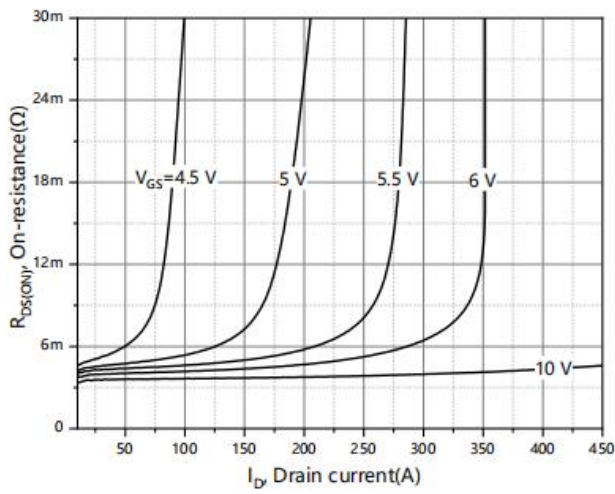Figure 7. Threshold voltage
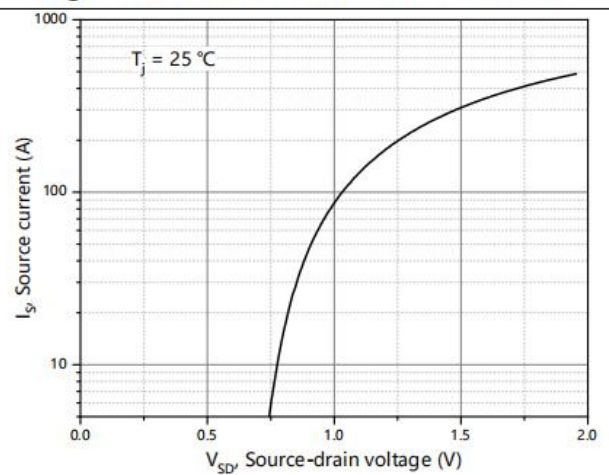
Figure 8. Forward characteristic of body diode
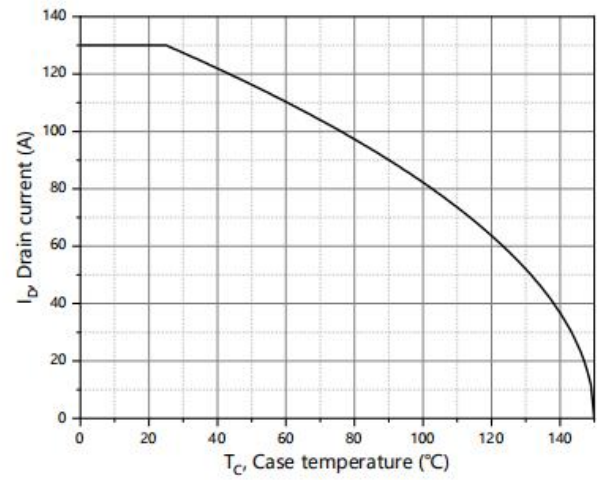
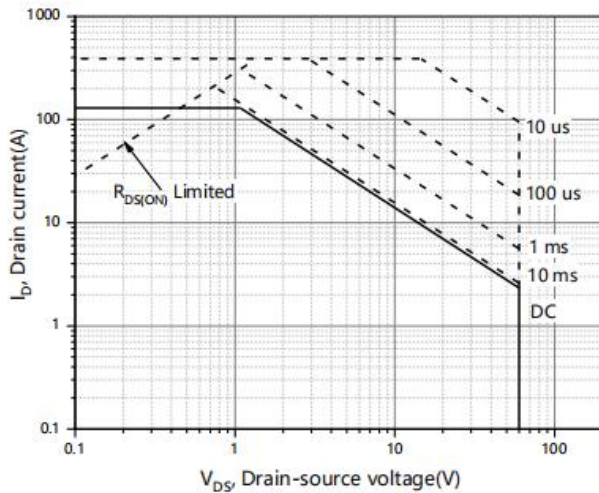Figure 9. Drain-source on-state resistance

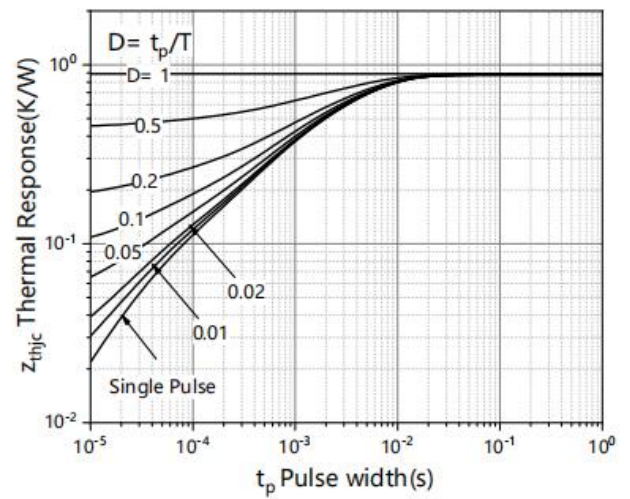Figure 10. Drain current

Figure 11. Safe operation area T_C=25 °C

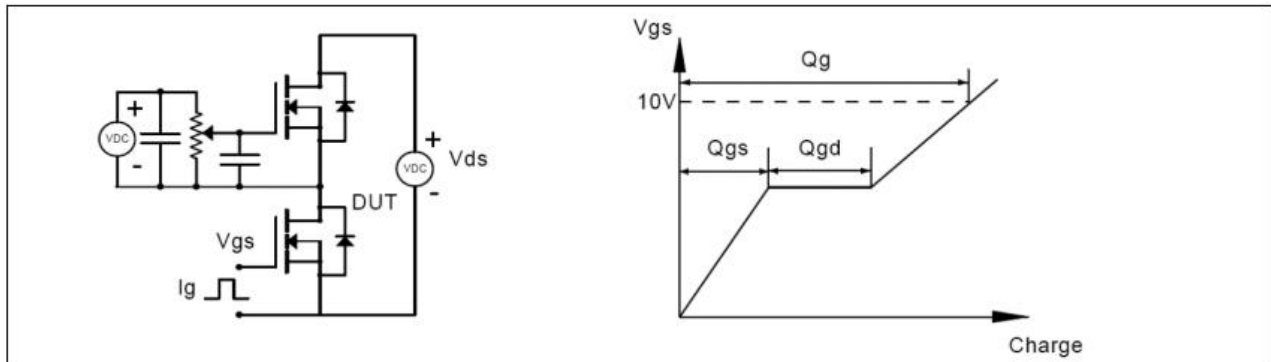Figure 12. Max transient thermal impedance

Test circuits and waveforms
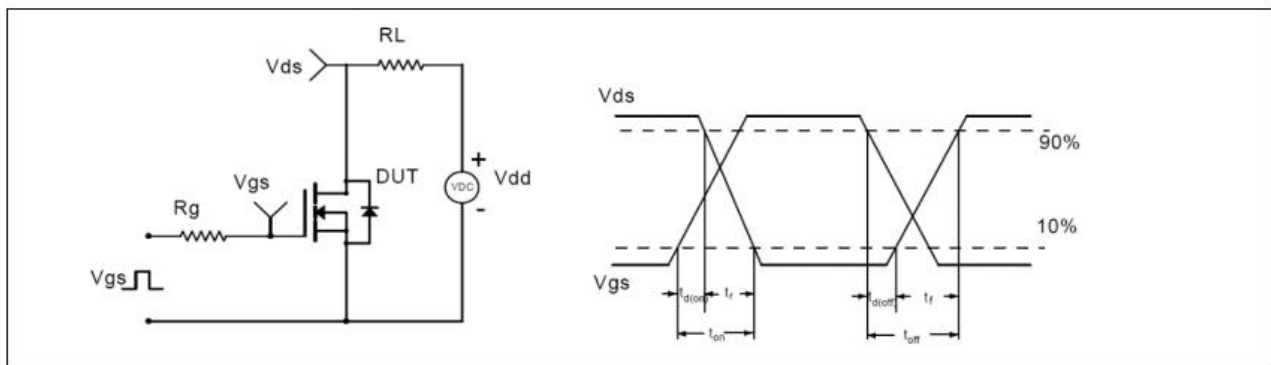

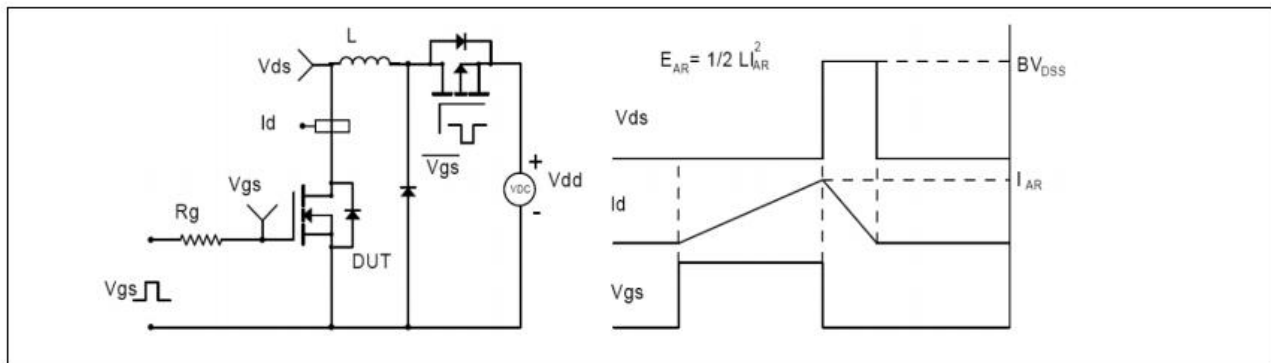Figure 1. Gate charge test circuit & waveform

Figure 2. Switching time test circuit & waveforms

Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms
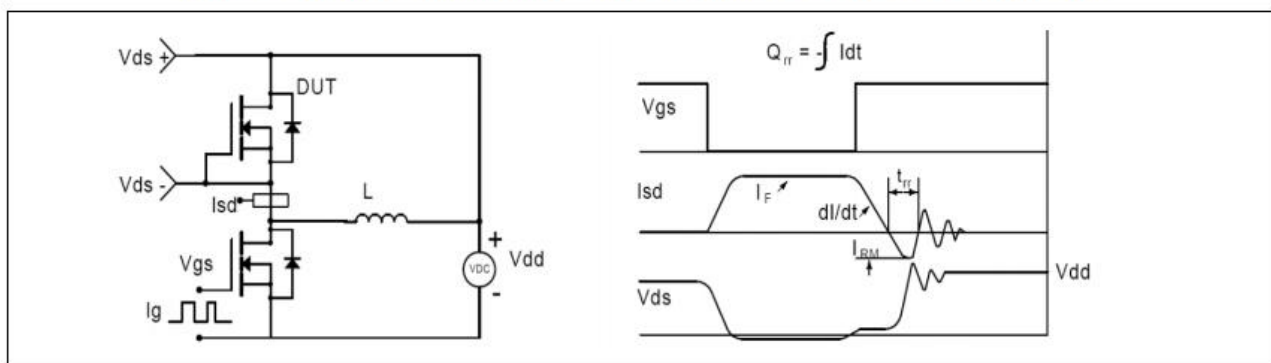
Figure 4. Diode reverse recovery test circuit & waveforms

Package Outline Dimensions
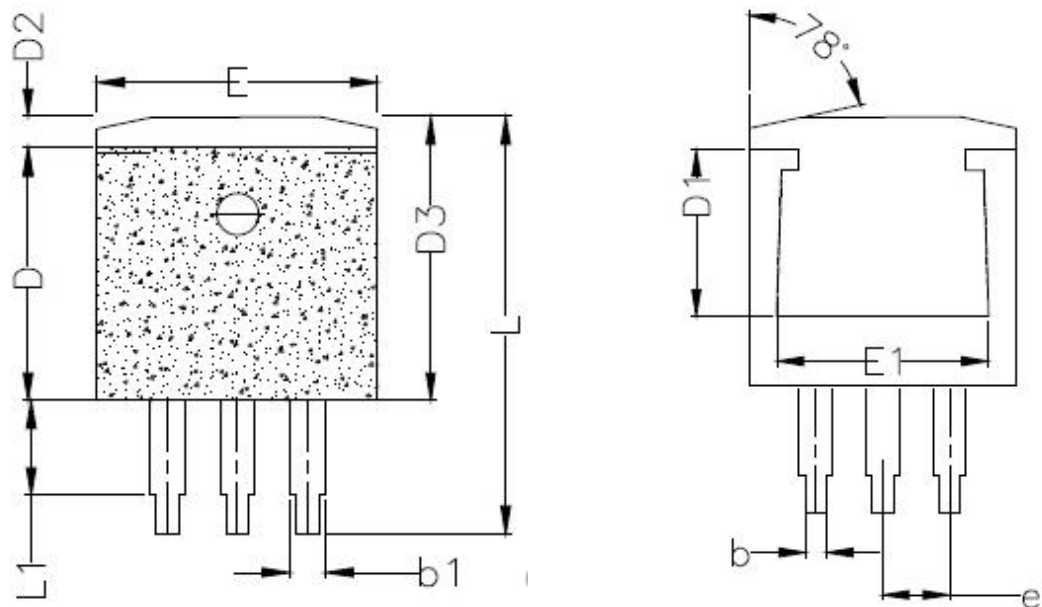
SYMBOL	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	2.59	2.69	2.79
A2	1.40	1.50	1.60
b	0.71	0.81	0.91
b1	1.17	1.27	1.37
c	1.17	1.27	1.37
c1	0.30	0.38	0.45
D	9.00	9.15	9.30
D1	6.10	6.30	6.50
D2	0.91	1.11	1.31
D3	10.06	10.26	10.46
E	10.00	10.16	10.40
E1	7.92	8.02	8.12
L	14.90	15.10	15.40
L1	3.23	3.43	3.63
L2	2.20	2.30	2.40
e	2.54BSC		
θ	0°	—	8°
$\theta 1$	3°	5°	8°

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