

N-Channel 60V MOSFET

E060N3P5DH1

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

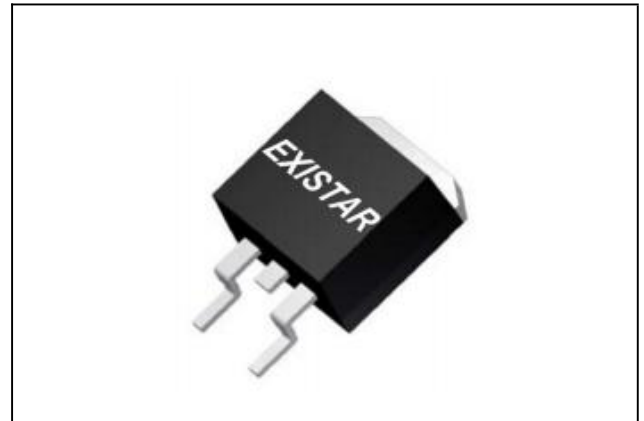
Features

- 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

TO-263



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
V _{DS} , min @ T _j (max)	60	V
I _D , pulse	390	A
R _{DS(ON)} , max @ V _{GS} =10V	3.5	mΩ
Q _g	56.8	nC

Absolute Maximum Ratings at T_j=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	°C

Thermal Characteristics

Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	R _{θJC}	0.89	°C/W
Thermal resistance, junction-to-ambient	Steady state	R _{θJA}	62	

Electrical Characteristics at T_j=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	g _{fs}		-		S	V _{DS} = 5 V, I _D = 30 A
Gate resistance	R _g		2.5		Ω	f=1MHz

Gate Charge						
Total gate charge	Qg		56.8		nC	V _{DS} = 50 V, I _D = 50 A, V _{GS} = 10 V
Gate-source charge	Qgs		17.8			
Gate-drain charge	Qgd		6.3			
Dynamic						
Turn-on delay time	t _{d(on)}		31.4		ns	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			
Fall time	t _f		112.5			
Input capacitance	C _{iSS}		5411		pF	V _{DS} =25 V, V _{GS} = 0 V, f = 100kHz
Output capacitance	C _{oSS}		1522			
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

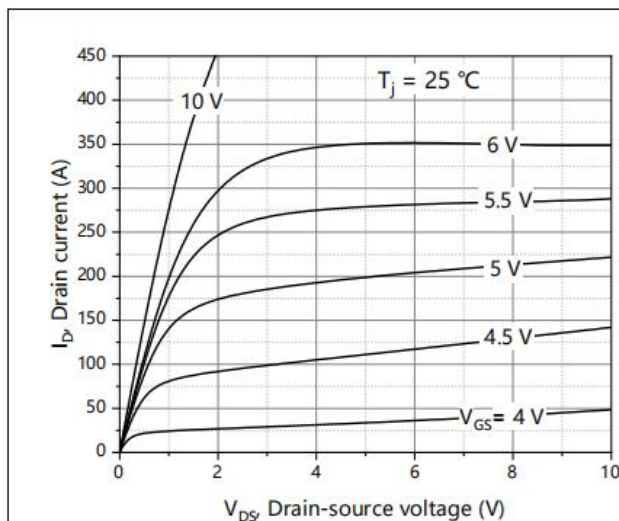


Figure 1. Typ. output characteristics

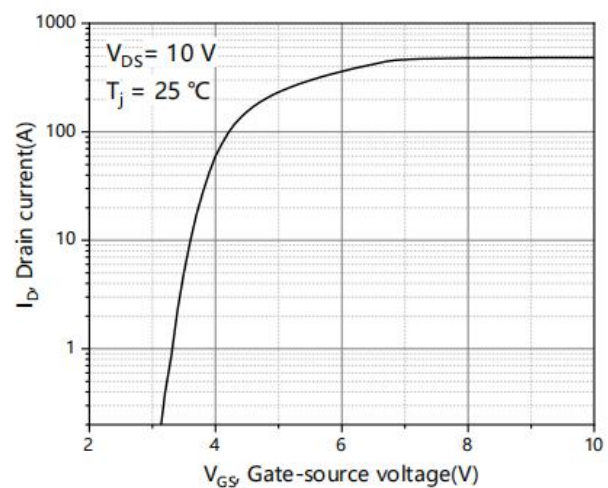


Figure 2. Typ. transfer characteristics

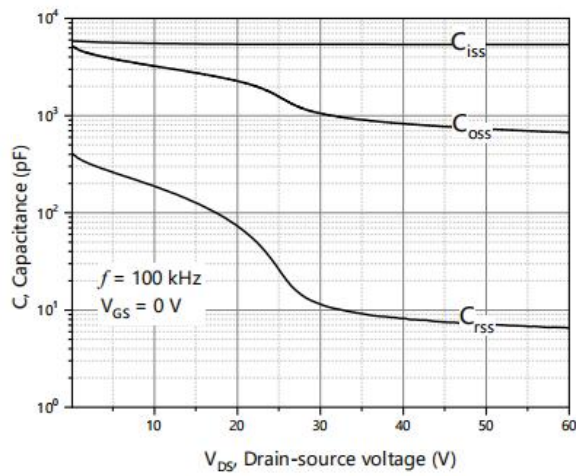


Figure 3. Typ. capacitances

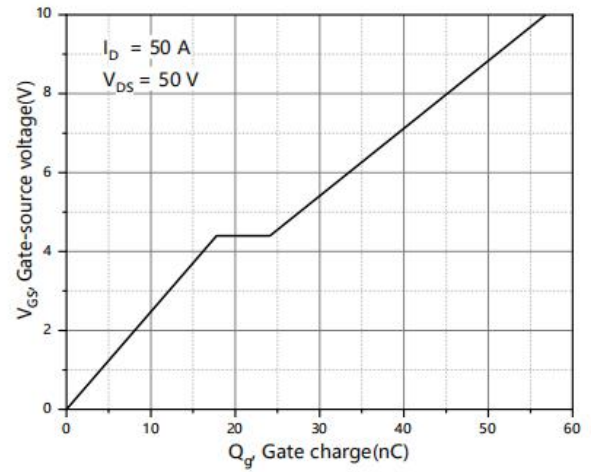


Figure 4. Typ. gate charge

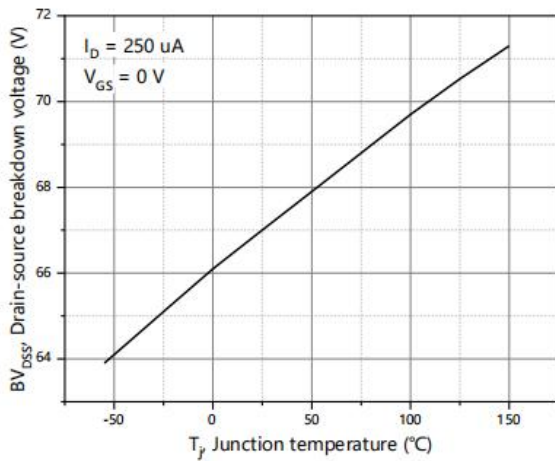


Figure 5. Drain-source breakdown voltage

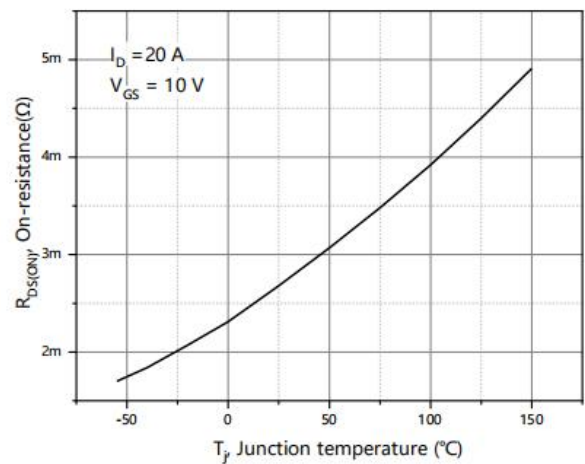


Figure 6. Drain-source on-state resistance

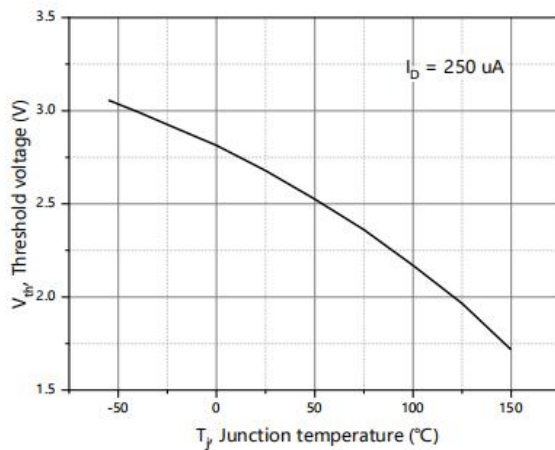


Figure 7. Threshold voltage

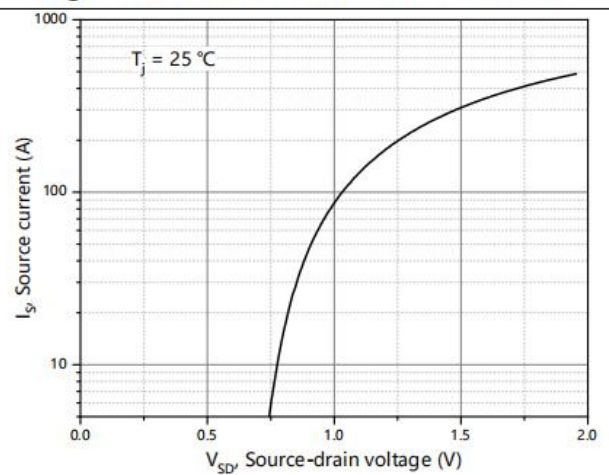


Figure 8. Forward characteristic of body diode

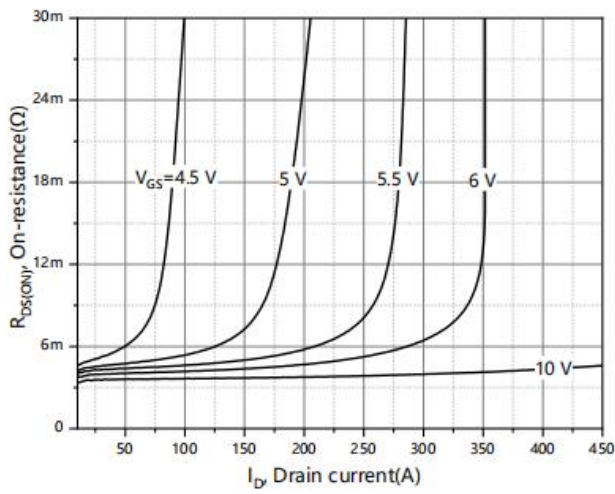


Figure 9. Drain-source on-state resistance

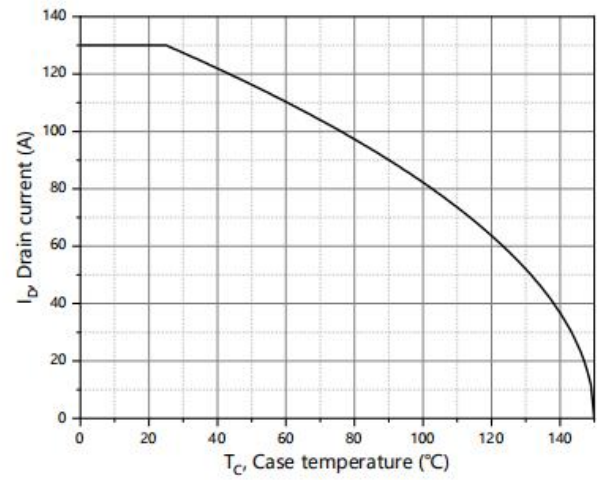


Figure 10. Drain current

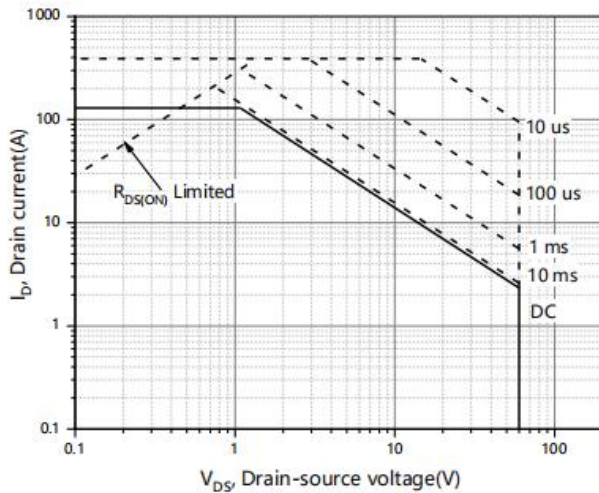


Figure 11. Safe operation area $T_C = 25^{\circ}\text{C}$

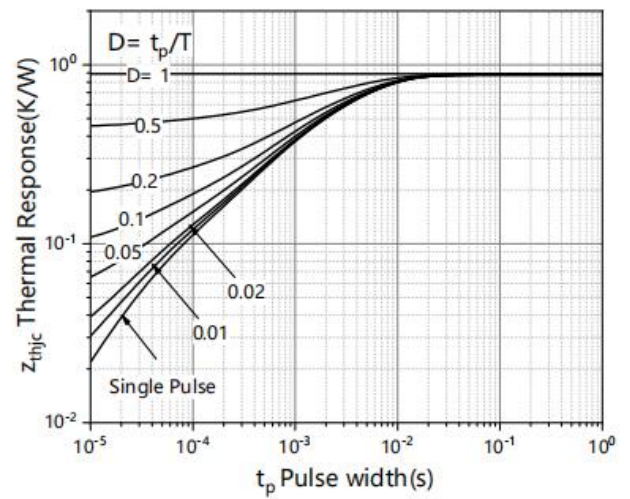


Figure 12. Max transient thermal impedance

Test circuits and waveforms

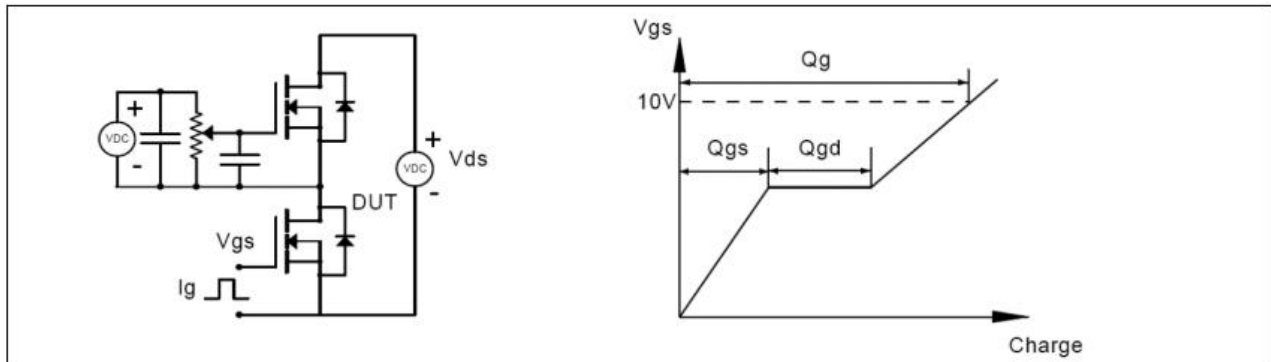


Figure 1. Gate charge test circuit & waveform

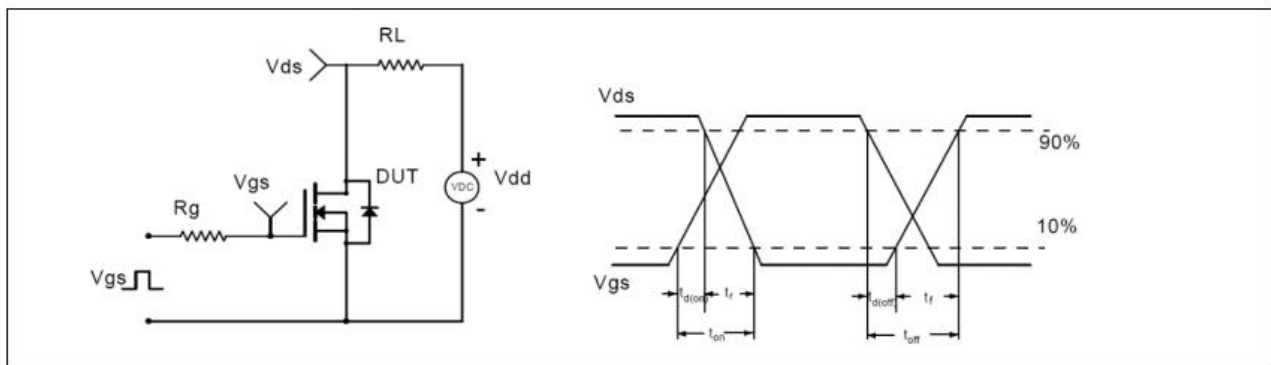


Figure 2. Switching time test circuit & waveforms

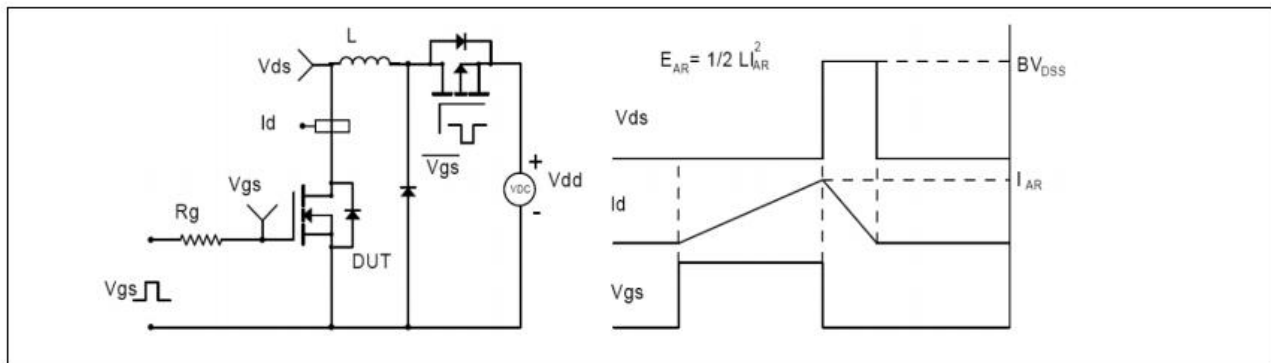


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

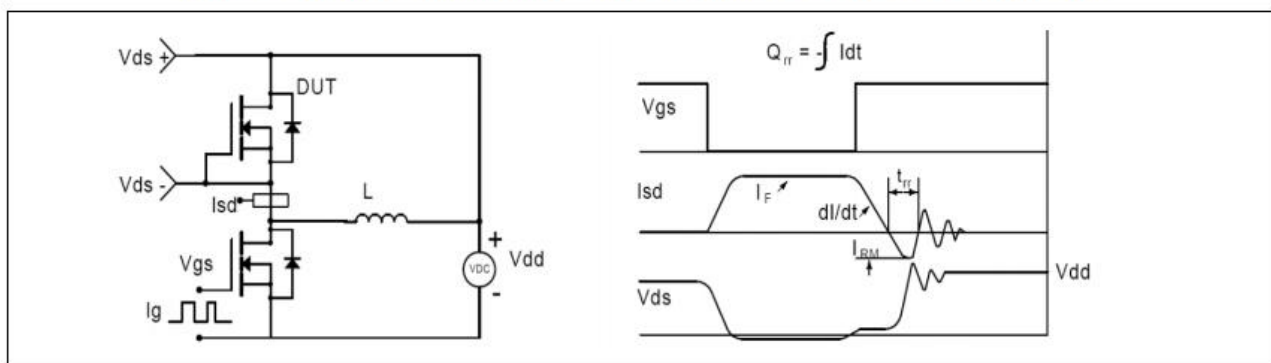
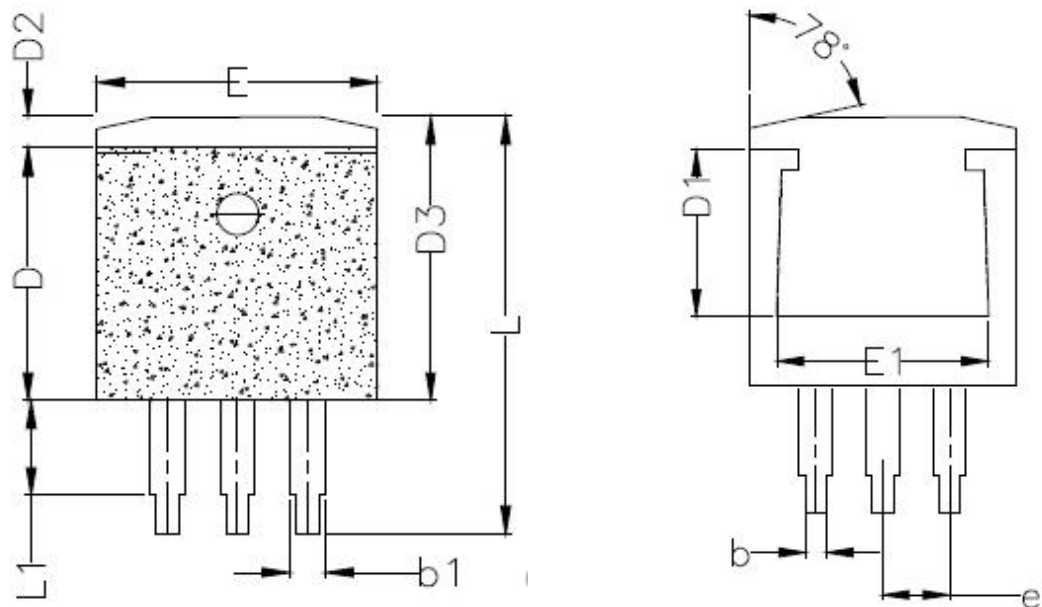


Figure 4. Diode reverse recovery test circuit & waveforms

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°
θ1	3°	5°	8°

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