BMW80N180C1

N-Channel Power MOSFET

800 V, 23 A, 180 mΩ

bestirpower

Description

BMW80N180C1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on resistance and gate charge.
It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

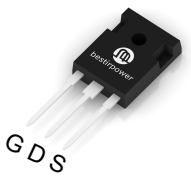
Features

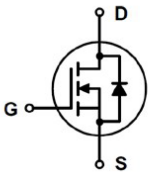
BV_{DSS} @ $T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
850 V	23 A	180 mΩ	56 nC

- Ultra-fast body diode.
- Extremely low losses due to very low FOM Rdson*Qg and Eoss.
- Very high commutation ruggedness.

Applications

- PC power.
- Server power supply.
- Telecom.
- LED lighting.
- EV Charger.
- Solar/UPS.





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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage(1)		800	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current(2)	Continuous (T_C = 25℃)	23	A
		Continuous (T_C = 125℃)	10	
I_{DM}	Drain Current	Pulsed	70	A
E_{AS}	Single Pulsed Avalanche Energy(3)		845	mJ
I_{AR}	Avalanche Current		13	A
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt(4)_		50	
P_D	Power Dissipation	(T_C = 25℃)	250	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃
I_S	Continuous diode forward current		23	A
$I_{S,pulse}$	Diode pulse current(2)		70	A
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds		260	℃

1) Limited by Tj max. Maximum duty cycle D=0.75.
2) Pulse width tp limited by Tj,max.
3) VDD=50V, RG=25Ω, Starting Tj=25° C.
4) *V*DClink=400V; *V*DS,peak<*V*(BR)DSS; identical low side and high side switch with identical *R*G.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.5	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BMW80N180C1	BMW80N180C1	TO247	Tube	30 units

Electrical Characteristics (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250μA	800			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V, V_{GS} = 0 V			10	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS} , I_D = 250μA	2.5	3.5	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 12 A T_j = 25℃		150	180	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, f = 250 kHz		2440		pF
C_{oss}	Output Capacitance			83		pF
C_{rss}	Reverse transfer capacitance			1.9		pF
$C_{o(tr)}$	Time Related Output Capacitance(2)	V_{DS} = 0 to 500 V, V_{GS} = 0 V		214		pF
$C_{o(er)}$	Energy Related Output Capacitance			66		pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DS} = 640 V, I_D = 24 A, V_{GS} = 0 to10 V		56		nC
Q_{gs}	Gate Charge total			15		nC
Q_{gd}	Gate to Drain “Miller” Charge			21		nC
$V_{plateau}$	Gate plateau voltage			5.5		V
R_G	Gate Resistance	f = 1 MHz		4		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 400 V, I_D = 12 A, V_{GS} = 10 V		20		ns
t_r	Turn-On Rise Time			13		ns
$t_{d(off)}$	Turn-Off Delay Time			117		ns
t_f	Turn-Off Fall Time			12		ns
Source-Drain Diode Characteristics						
I_{rrm}	Peak reverse recovery current			29		A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_F = 12A T_f = 25℃		0.8		V
t_{rr}	Reverse Recovery Time	V_R = 60 V, I_F = 24 A, di_F/dt = 100 A/μs		375		ns
Q_{rr}	Reverse Recovery Charge			6.7		μC

※Notes:
1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I_{AS} = 4 A, R_G = 25 Ω,starting T_J = 25℃ .
3. I_{SD} ≤ 8.5 A, di/dt ≤ 100 A/μs, V_{DD} ≤ 400 V, starting T_J = 25℃ .

Typical Performance Characteristics

Figure 1: Power dissipation (Non FullPAK)

*P*tot=f(*TC*)

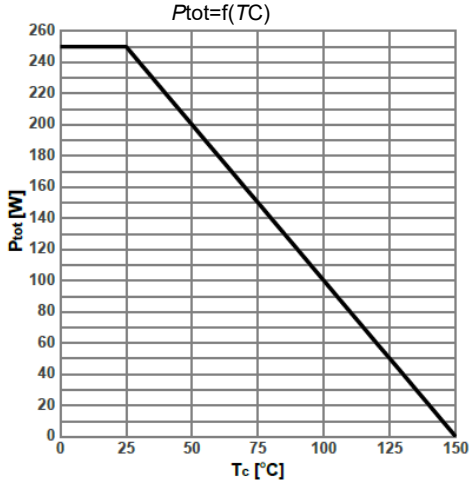


Figure 2: Max. transient thermal impedance

*Z*thJC=f(*tp*); parameter: D= *tp*/*T*

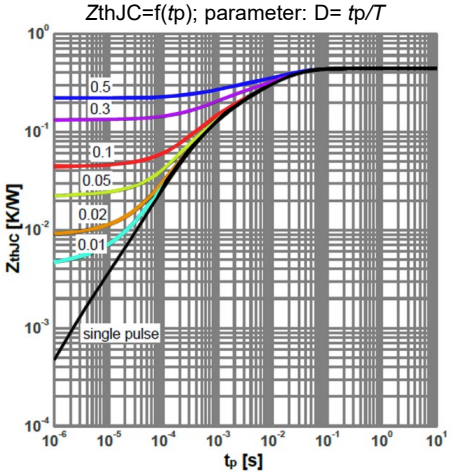


Figure 3: Safe operating area

*I*D=f(*V*DS); *T*j=25°C; D=0; parameter: *t*p

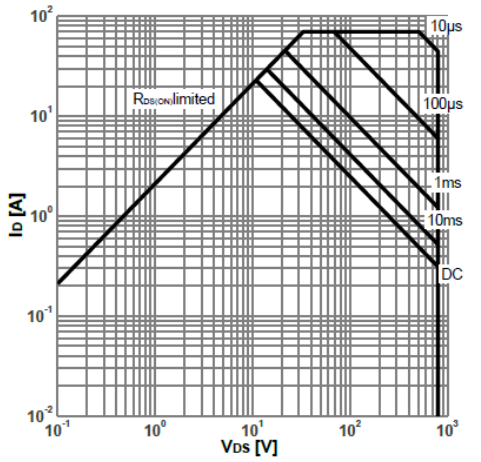


Figure 4: Typ. output characteristics

*I*D=f(*V*DS); *T*j=25°C; parameter: *V*GS

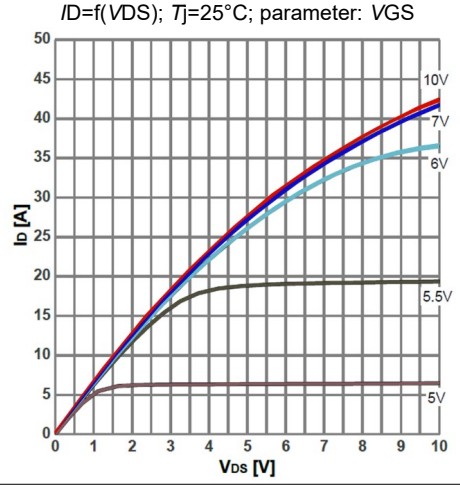


Figure 5: Typ. output characteristics

*I*D=f(*V*DS); *T*j=125°C; parameter: *V*GS

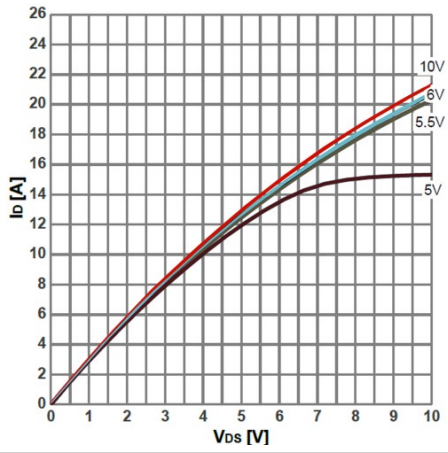
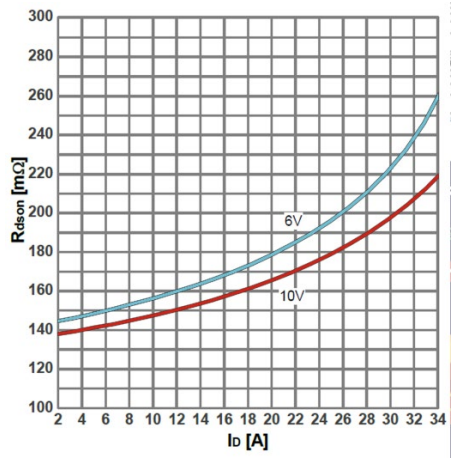


Figure 6: Typ. drain-source on-state resistance

*R*DS(on)=f(*I*D); *T*j=25°C; parameter: *V*GS



Typical Performance Characteristics

Figure 7: Drain-source on-state resistance

*R*DS(on)=f(*T*j); *I*D=12A; *V*GS=10V

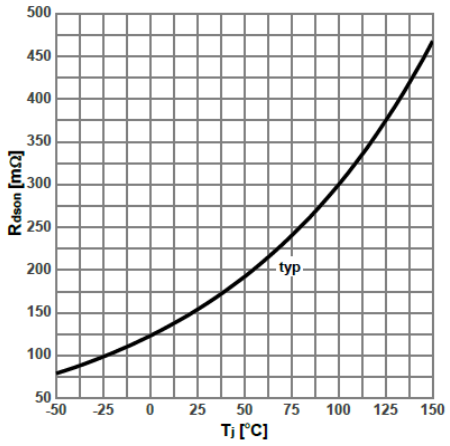


Figure 8: Typ. transfer characteristics

*I*D=f(*V*GS); *V*DS=20V; parameter: *T*j

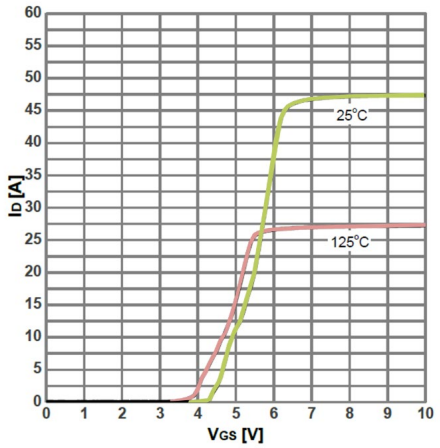


Figure 9: Typ. gate charge

*V*GS=f(*Q*gate); *I*D=24A pulsed; *V*DS=640V

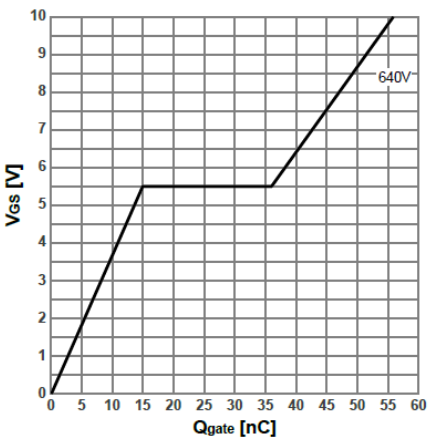


Figure 10: Forward characteristics of reverse diode

*I*F=f(*V*SD); parameter: *T*j

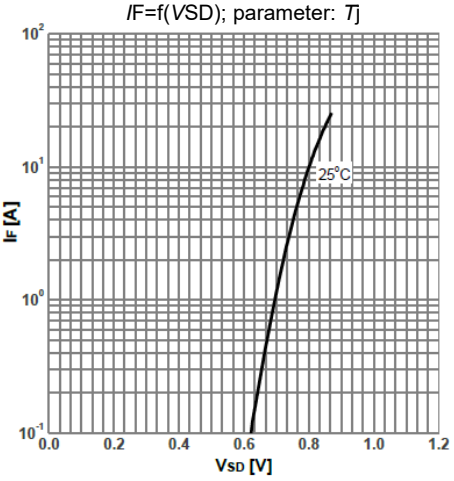


Figure 11: Drain-source breakdown voltage

*V*BR(DSS)=f(*T*j); *I*D=1mA

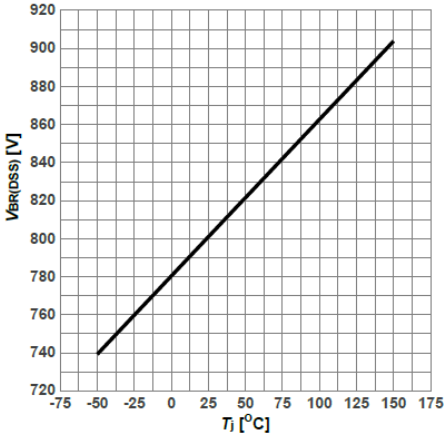
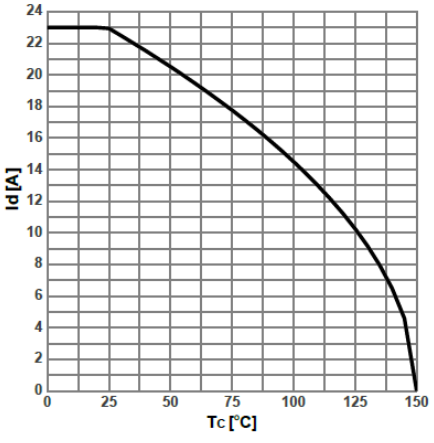


Figure 12: Maximum Drain Current

ID= f(Tc); VGS=10V



Typical Performance Characteristics

Figure 13: Typ. capacitances

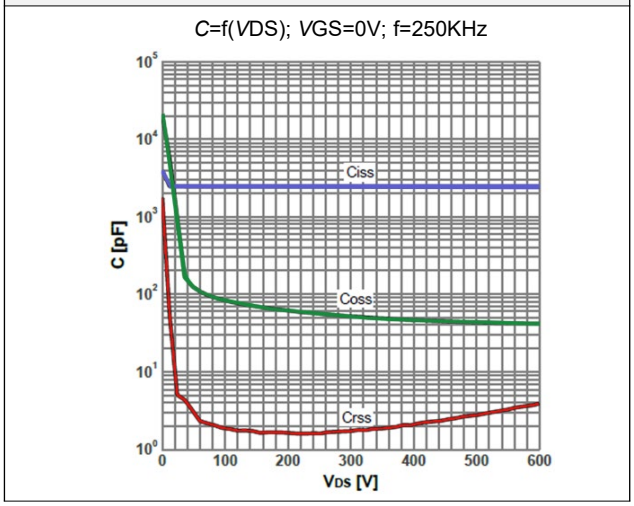
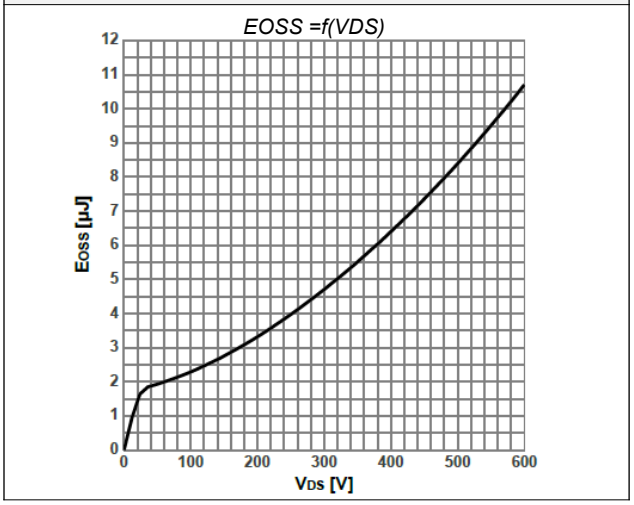


Figure 14: Typ. Coss stored energy



Test Circuits

Figure 15. Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

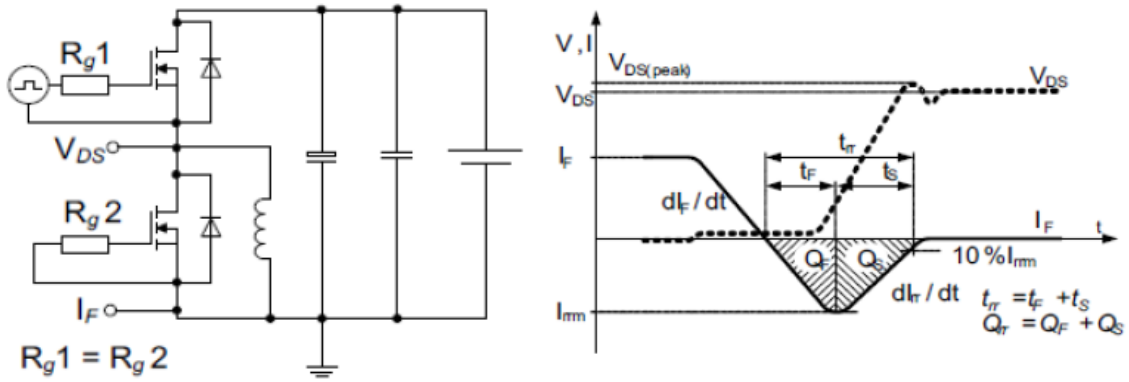


Figure 16. Switching Times

Switching times test circuit for inductive load and Switching times waveform

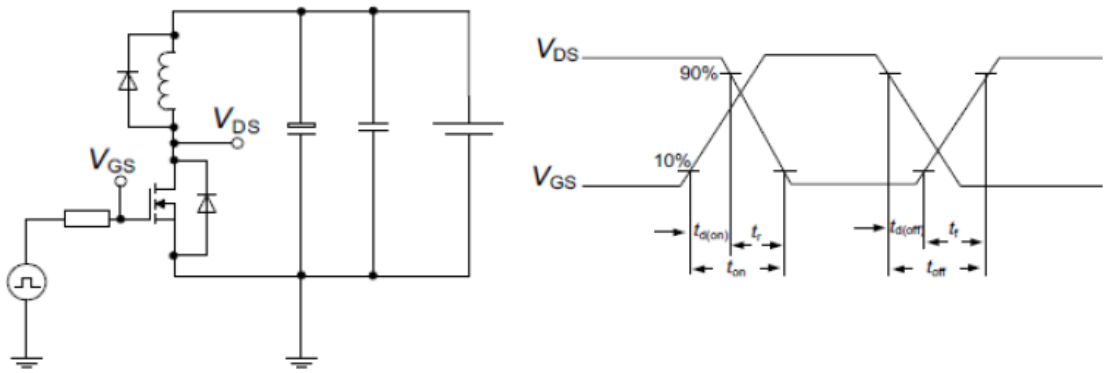
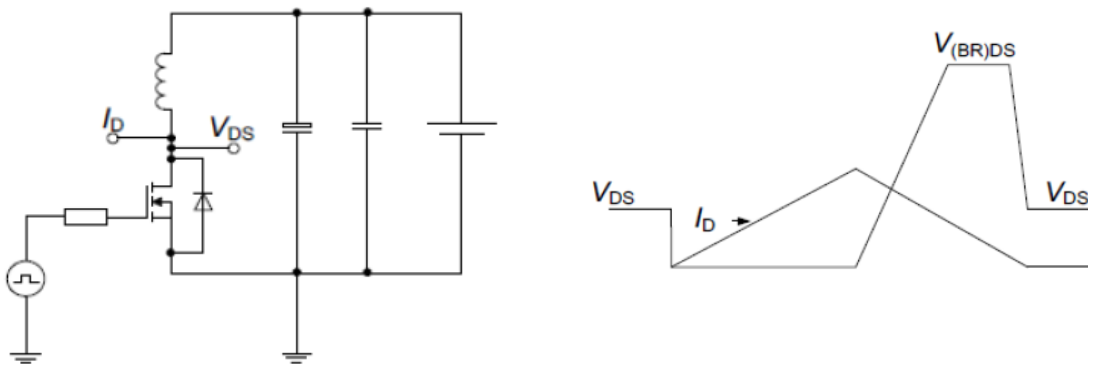


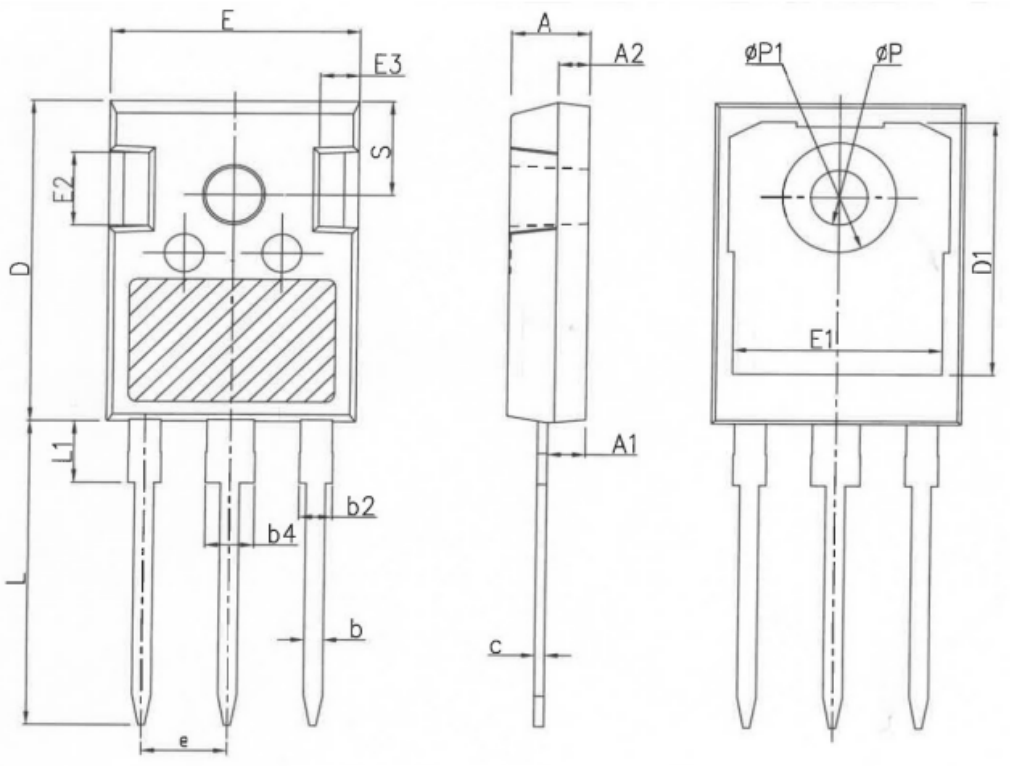
Figure 17. Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO247-3L



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.29	2.42	2.54
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b1	1.91	2.06	2.20
b2	2.92	3.06	3.20
c	0.50	0.60	0.70
D	20.80	21.07	21.34
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.06	13.26	13.46
E2	4.32	4.58	4.83
e		5.45 BSC	
L	19.85	20.05	20.25
L1	4.05	4.27	4.49
ΦP	3.55	3.60	3.65
Q	5.59	5.89	6.19
S		6.15 BSC	

* Dimensions in millimeters

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