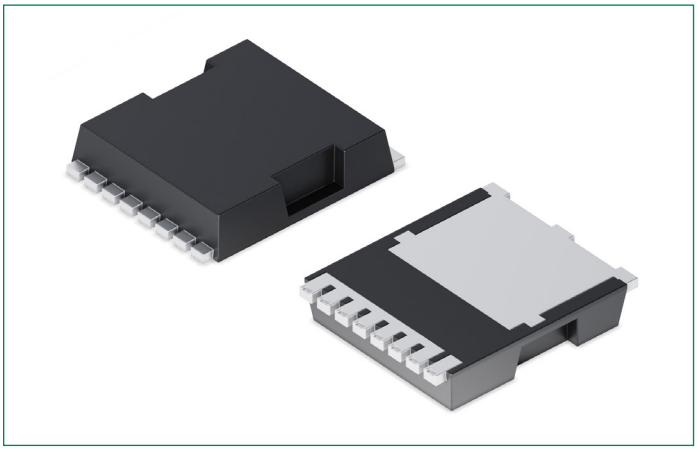
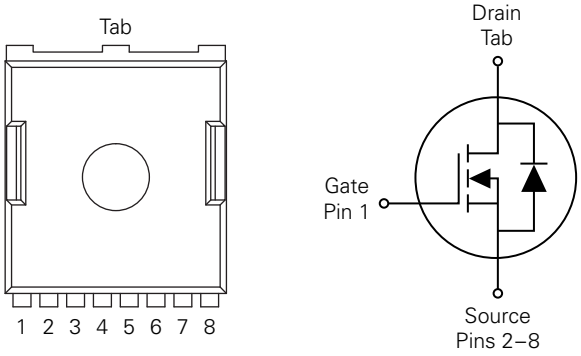
IXTG86N20X4

200 V, 13.5 mΩ, 86 A, X4-Class Power MOSFET

N-Channel Enhancement Mode | Avalanche Rated



Pinout Diagram (TO-Leadless)



G: Gate, **S:** Source; **Tab:** Drain

Features

- Low on-state resistance
- High nominal current rating
- Low gate charge
- Low package parasitics
- Compact surface mount package with low profile

Benefits

- Low conduction losses, improved efficiency
- Minimized parallel connection effort
- Simplified driver design, minimal driver losses
- Better EMI performance, improved reliability
- Space savings, improved power density

Applications

- Battery energy storage systems
- DC load switch
- Battery chargers
- BLDC motor drives
- Power supplies

Product Summary

Characteristic	Value	Unit
V_{DSS}	200	V
I_D @ 25 °C	86	A
$R_{DS(on)}$	≤ 13.5	mΩ

Revised: XZ 11/03/2025 (0.3)

Maximum Ratings

Symbol	Characteristic	Conditions	Value	Unit
V_{DSS}	Drain-source voltage	T_{vj} = 25 °C to 175 °C	200	V
V_{GSS}	Gate-source voltage	Continuous	±20	V
V_{GSM}		Transient	±30	V
I_{D25}	Drain current	T_c = 25 °C	86	A
I_{DM}	Peak drain current	T_c = 25 °C, Pulse width limited by $T_{vj(max)}$	160	A
I_A	Avalanche current	T_c = 25 °C	43	A
E_{AS}	Avalanche energy	T_c = 25 °C	500	mJ
dv/dt	Reverse diode dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_{vj} \le 150$ °C	50	V/ns
P_D	Power dissipation	T_c = 25 °C	300	W
T_{vj}	Virtual junction temperature range	–	–55 ... +175	°C
$T_{vj(max)}$	Maximum virtual junction temperature	–	175	°C
T_{stg}	Storage temperature range	–	–55 ... +175	°C
T_{sold}	Maximum temperature for soldering	Plastic Body for 10 s	260	°C
W	Package weight	–	1	g

Thermal Characterstic

Symbol	Characteristic	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance junction to case	–	–	0.50	K/W

Electrical Characterstics – Static (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 250 µA	200	–	–	V
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS} , I_D = 250 µA	2.5	–	4.5	V
I_{GSS}	Gate-source leakage current	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	±100	nA
I_{DSS}	Drain-source leakage current	V_{DS} = V_{DSS}, V_{GS} = 0 V	–	–	5	µA
		V_{DS} = V_{DSS}, V_{GS} = 0 V, T_{vj} = 150 °C	–	–	300	µA
$R_{DS(on)}$	Drain-source on-resistance[1]	V_{GS} = 10 V, I_D = 0.5 x I_{D25}	–	–	13.5	mΩ

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Electrical Characterstics – Dynamic (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
g_{fs}	Transconductance [1]	V_{DS} = 10 V, I_D = 0.5 x I_{D25}	50	82	–	S
$R_{g(int)}$	Gate input resistance	–	–	4.75	–	Ω
C_{iss}	Input capacitance	V_{GS} = 0 V, V_{DS} = 25 V, f = 1MHz	–	4030	–	pF
C_{oss}	Output capacitance		–	655	–	
C_{rss}	Reverse transfer capacitance		–	510	–	
$C_{o(er)}$	Effective output capacitance – energy related	V_{GS} = 0 V, V_{DS} = 0.8 × V_{DSS}	–	343	–	pF
$C_{o(tr)}$	Effective output capacitance – time related		–	1280	–	
Q_G	Total gate charge	V_{GS} = 10 V, V_{DS} = 0.5 × V_{DSS}, I_D = 0.5 × I_{D25}	–	59	–	nC
Q_{GS}	Gate-source charge		–	17	–	
Q_{GD}	Gate-drain charge		–	20	–	
$t_{d(on)}$	Turn-on delay time	**Resistive Switching** V_{GS} = 10 V, V_{DS} = 0.5 × V_{DSS}, I_D = 0.5 × I_{D25}, $R_{G(ext)}$ = 10 Ω	–	27	–	ns
t_r	Rise time		–	38	–	
$t_{d(off)}$	Turn-off delay time		–	76	–	
t_f	Fall time		–	35	–	

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Source-Drain Diode Characterstics (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
I_S	Continuous diode forward current	V_{GS} = 0 V	–	–	86	A
I_{SM}	Diode pulse current	Repetitive, Pusle width limited by T_{JM}	–	–	344	A
V_{SD}	Diode forward voltage[1]	I_F = I_S, V_{GS} = 0 V	–	–	1.4	V
t_{rr}	Reverse recovery time	I_F = 43 A, –di/dt = 200 A/µs, V_R = 100 V, V_{GS} = 0 V	–	96	–	ns
I_{rrm}	Peak reverse recovery current		–	16.7	–	A
Q_{rr}	Reverse recovery charge		–	0.80	–	µC

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%

Characteristic Curves

Fig. 1. Output Characteristics @ T_{vj} = 25 ºC

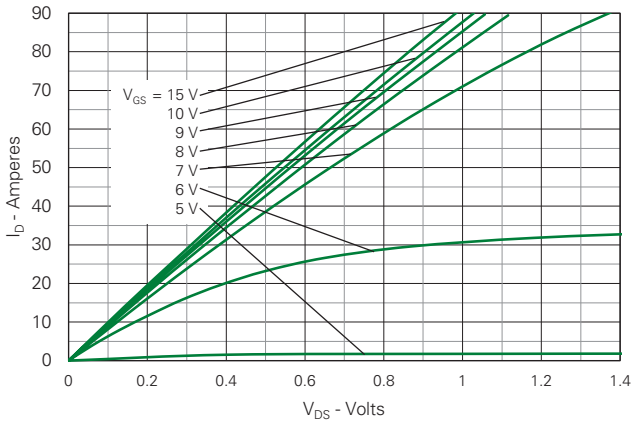


Fig. 2. Extended Output Characteristics @ T_{vj} = 25 ºC

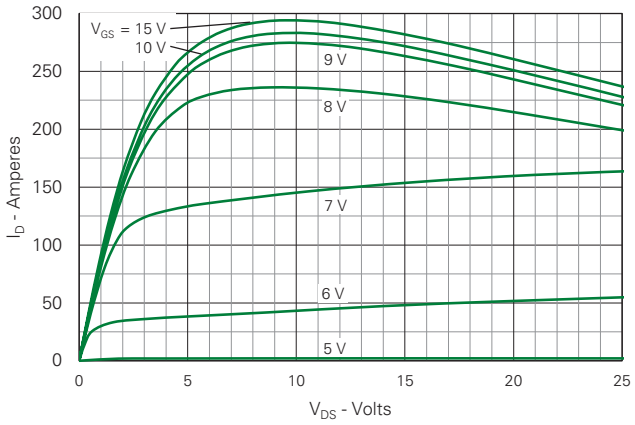


Fig. 3. Output Characteristics @ T_{vj} = 150 ºC

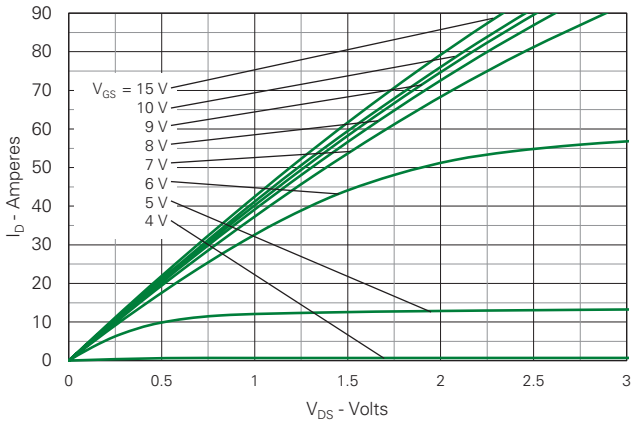


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 43A Value vs. Junction Temperature

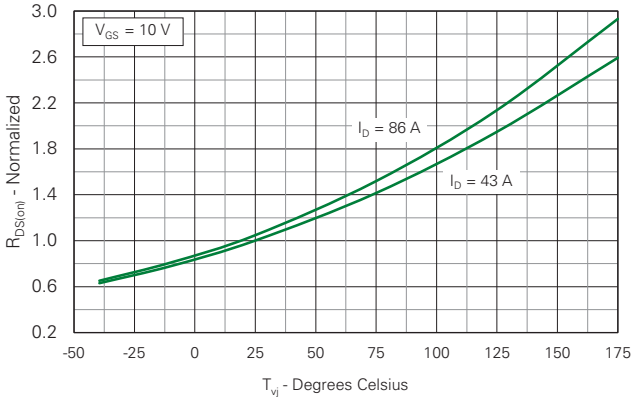


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 43 A Value vs. Drain Current

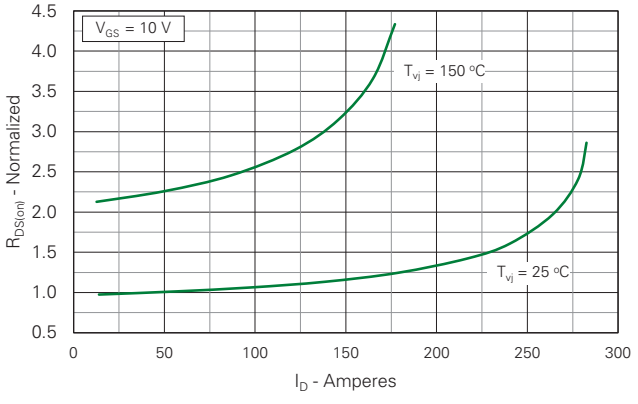


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

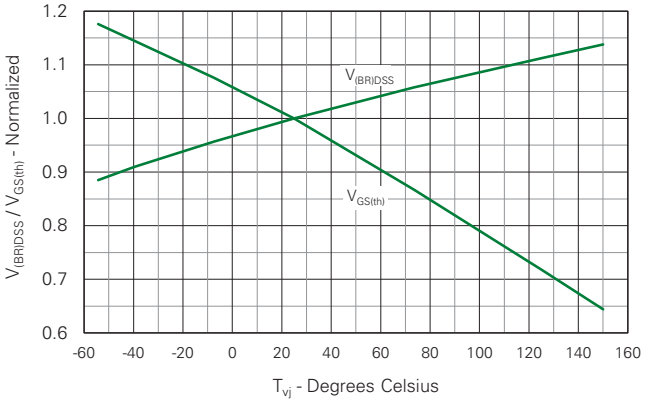


Fig. 7. Maximum Drain Current vs. Case Temperature

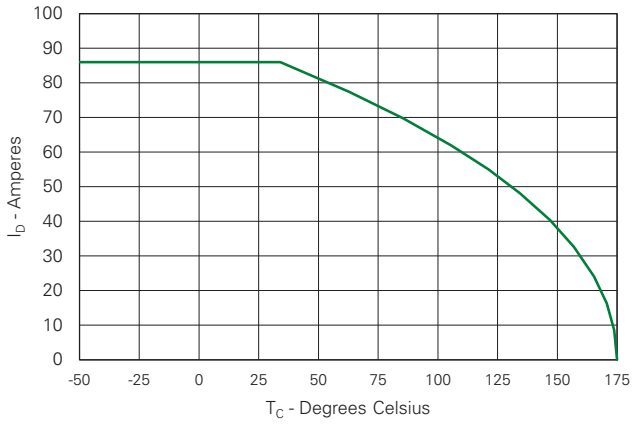


Fig. 8. Input Admittance

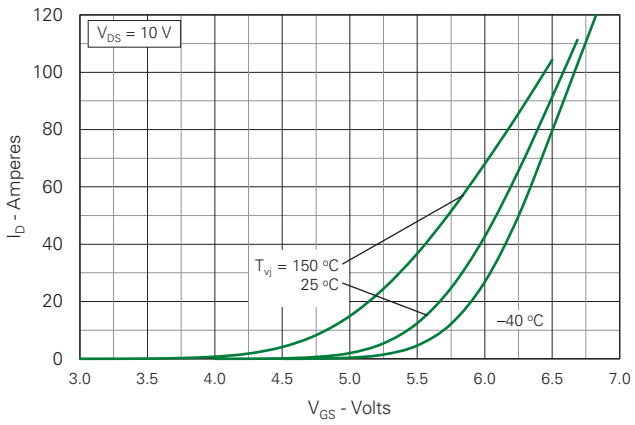


Fig. 9. Transconductance

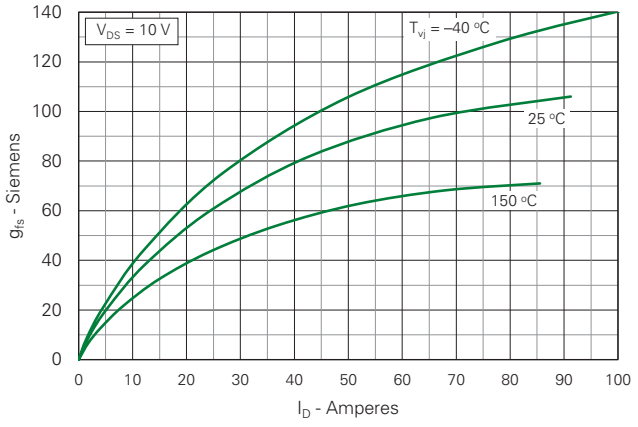


Fig. 10. Forward Voltage Drop of Intrinsic Diode

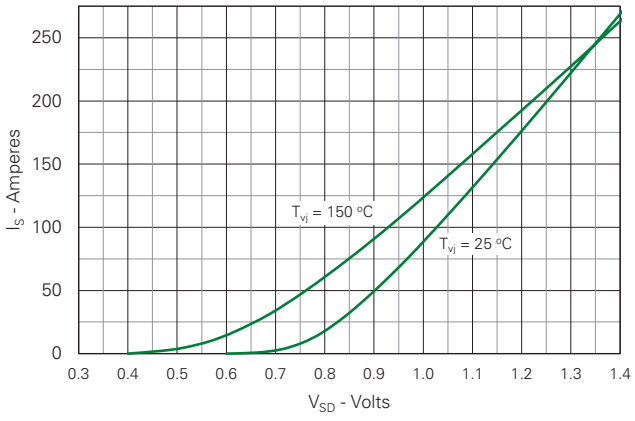


Fig. 11. Gate Charge

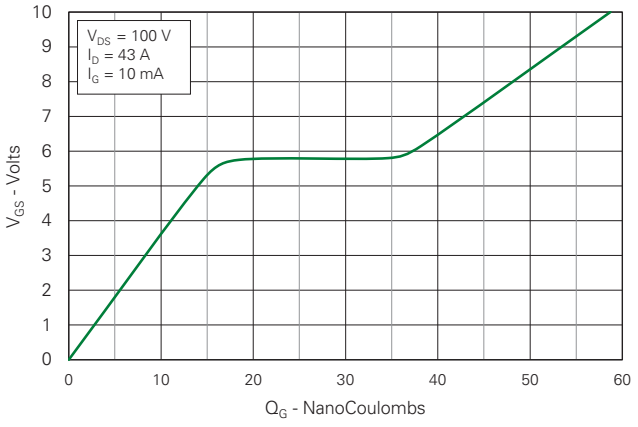


Fig. 12. Capacitance

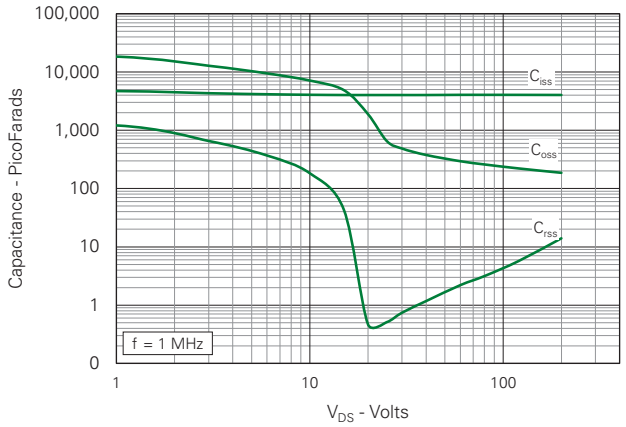


Fig. 13. Output Capacitance Stored Energy

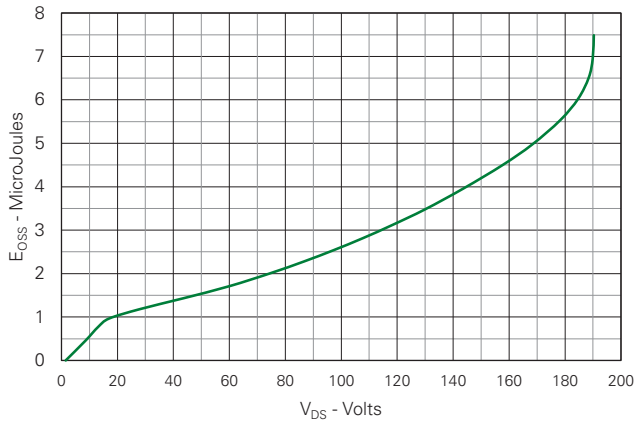


Fig. 14. Forward-Bias Safe Operating Area

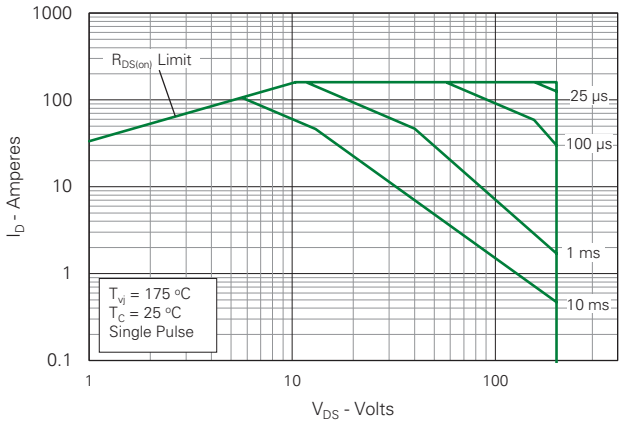
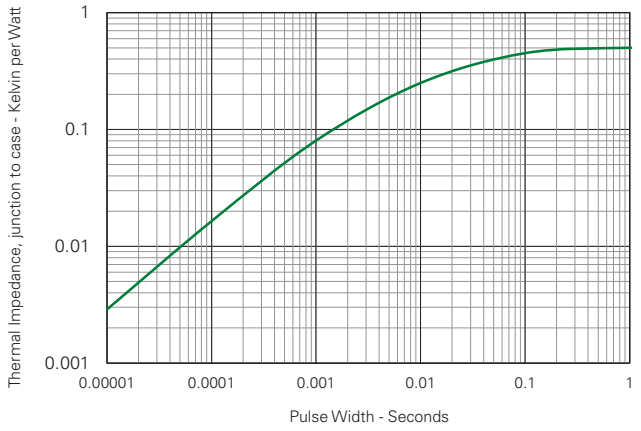
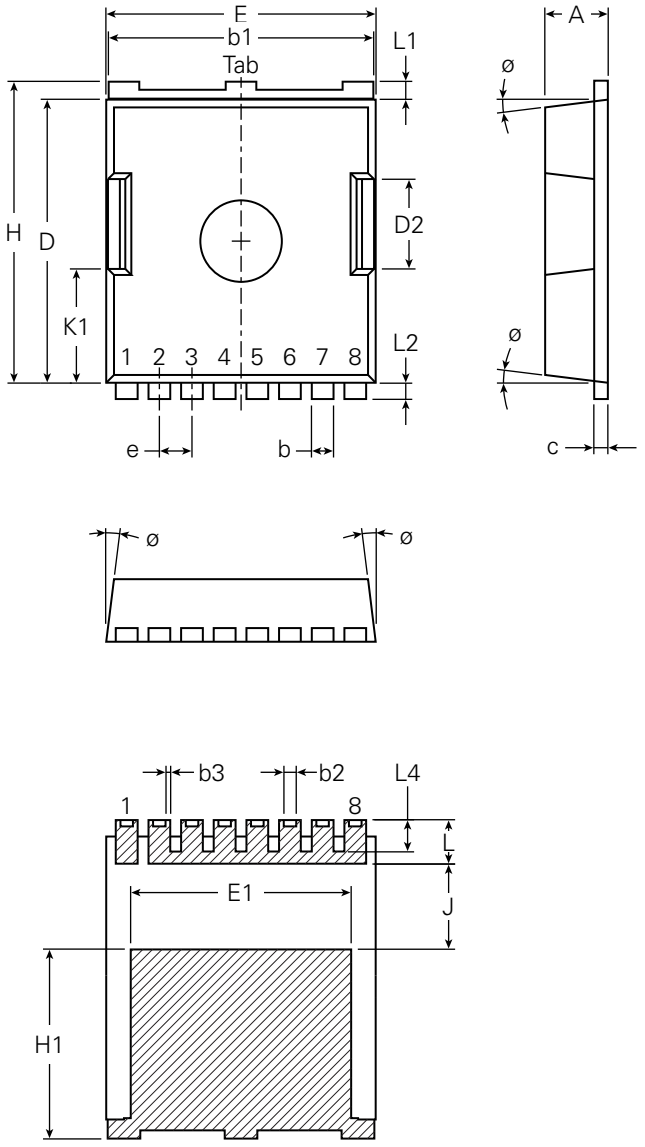


Fig. 15. Maximum Transient Thermal Impedance



Part Outline Drawing (TO-Leadless)



Symbol	Inches			Millimeters		
	Min.	Typical	Max.	Min.	Typical	Max
A	0.087	–	0.094	2.20	–	2.40
b	0.028	–	0.035	0.70	–	0.90
b1	0.382	–	0.390	9.70	–	9.90
b2	0.017	–	0.020	0.42	–	0.50
b3	0.003	0.007	0.011	0.07	0.17	0.27
c	0.016	–	0.024	0.40	–	0.60
D	0.405	–	0.417	10.28	–	10.58
D2	0.122	0.130	0.138	3.10	3.30	3.50
E	0.382	0.390	0.398	9.70	9.90	10.10
E1	0.311	0.319	0.327	7.90	8.10	8.30
e	0.047 BSC			1.20 BSC		
H	0.452	0.460	0.468	11.48	11.68	11.88
H1	0.266	0.274	0.281	6.75	6.95	7.15
J	0.118	0.124	0.130	3.00	3.15	3.30
K1	0.157	0.165	0.172	3.98	4.18	4.38
L	0.055	0.063	0.071	1.40	1.60	1.80
L1	0.024	0.028	0.031	0.60	0.70	0.80
L2	0.020	0.024	0.028	0.50	0.60	0.70
L4	0.039	0.045	0.051	1.00	1.15	1.30
ø	4°	7°	10°	4°	7°	10°