

QIAOXIN N-Channel Super Trench Power MOSFET

Description

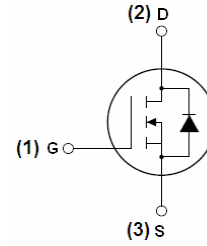
The VCRRP85T35T uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- $V_{DS} = 85V, I_D = 350A$
 $R_{DS(ON)} < 1.85m\Omega @ V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification



Schematic diagram



TO-247 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package
VCRRP85T35T	VCRRP85T35T	TO-247

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	350	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	280	A
Pulsed Drain Current	I_{DM}	1400	A
Maximum Power Dissipation	P_D	520	W
Derating factor		3.47	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	3800	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.29	$^\circ C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

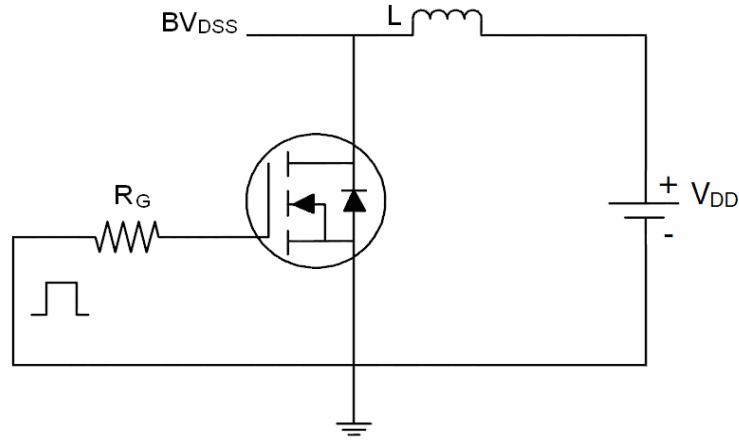
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	85	90	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	3	3.8	5	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =175A	-	1.4	1.85	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =175A	-	150	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =40V, V _{GS} =0V, F=1.0MHz	-	19500	-	PF
Output Capacitance	C _{oss}		-	2990	-	PF
Reverse Transfer Capacitance	C _{rss}		-	200	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =100A V _{GS} =10V, R _G =1.8Ω	-	35	-	nS
Turn-on Rise Time	t _r		-	98	-	nS
Turn-Off Delay Time	t _{d(off)}		-	110	-	nS
Turn-Off Fall Time	t _f		-	45	-	nS
Total Gate Charge	Q _g	V _{DS} =40V, I _D =100A, V _{GS} =10V	-	324	-	nC
Gate-Source Charge	Q _{gs}		-	123	-	nC
Gate-Drain Charge	Q _{gd}		-	88	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _F =175A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	350	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note 3)	-	155	-	nS
Reverse Recovery Charge	Q _{rr}		-	436	-	nC

Notes:

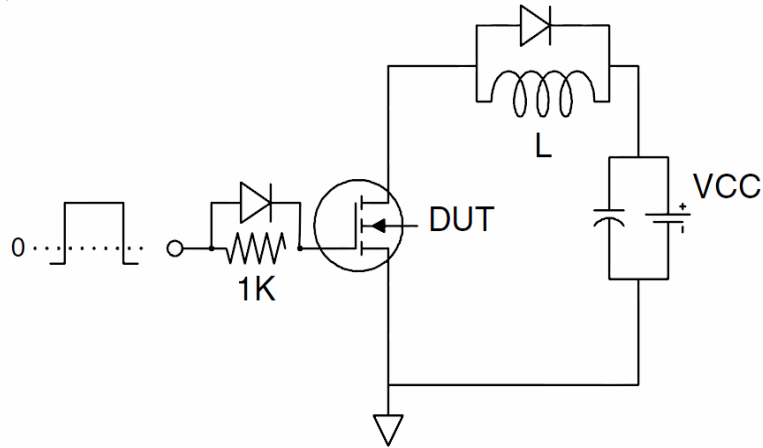
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=42.5V, V_G=10V, L=1mH, R_G=25Ω

Test Circuit

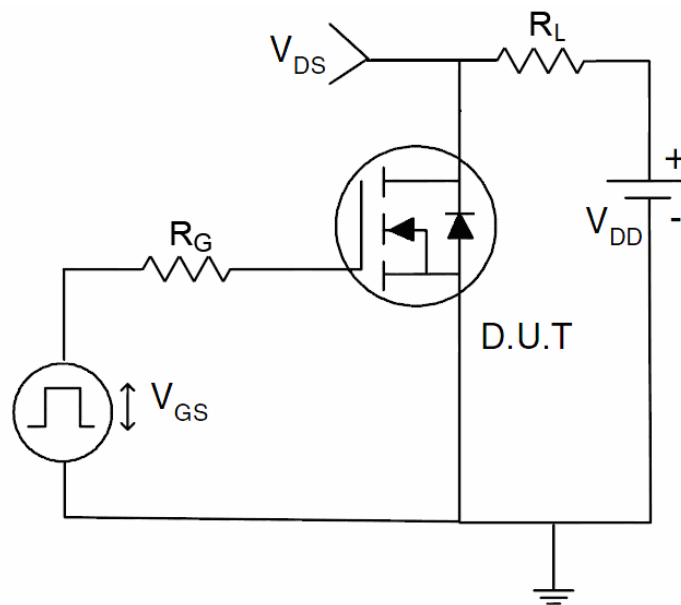
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

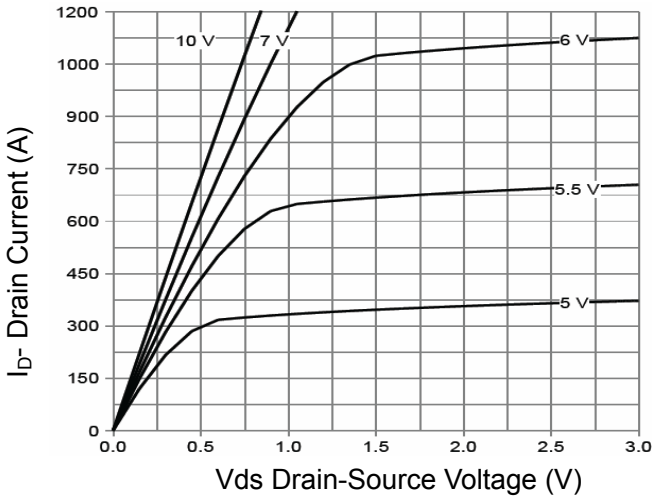


Figure 1 Output Characteristics

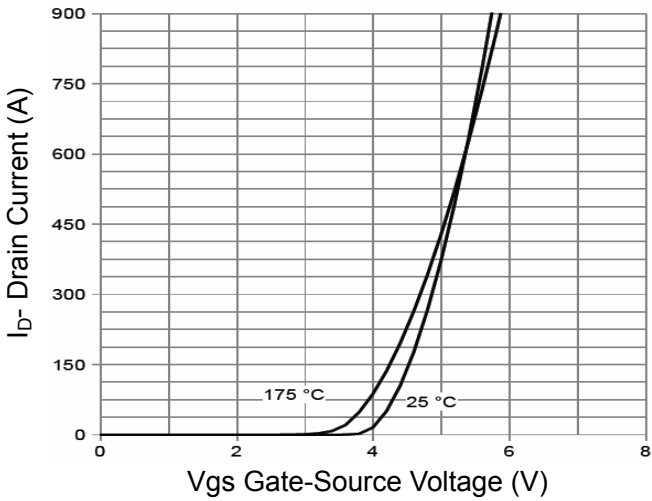


Figure 2 Transfer Characteristics

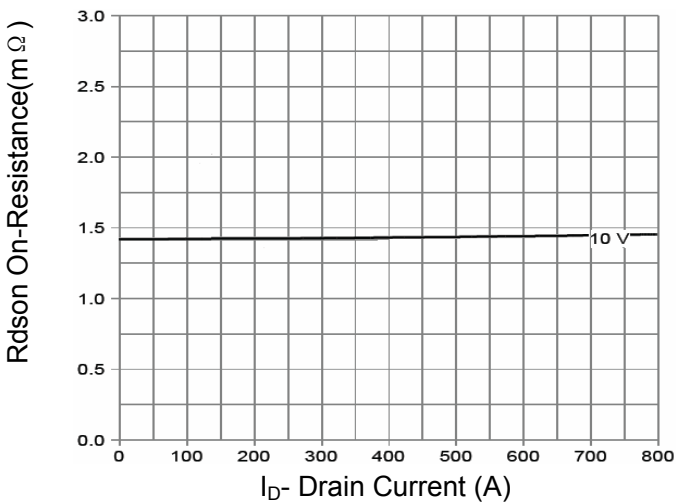


Figure 3 Rds(on)- Drain Current

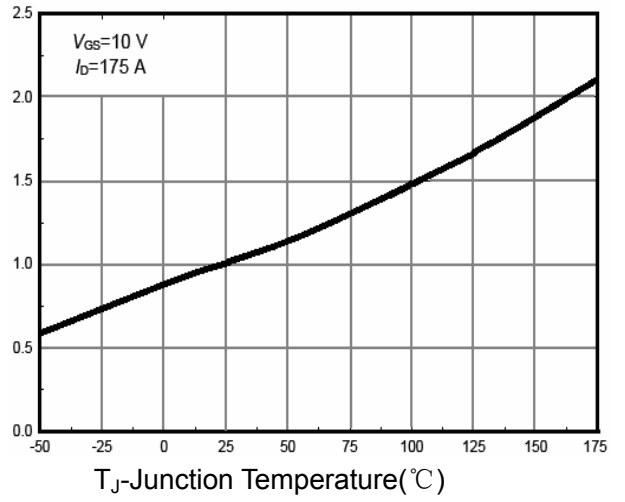


Figure 4 Rds(on)-Junction Temperature

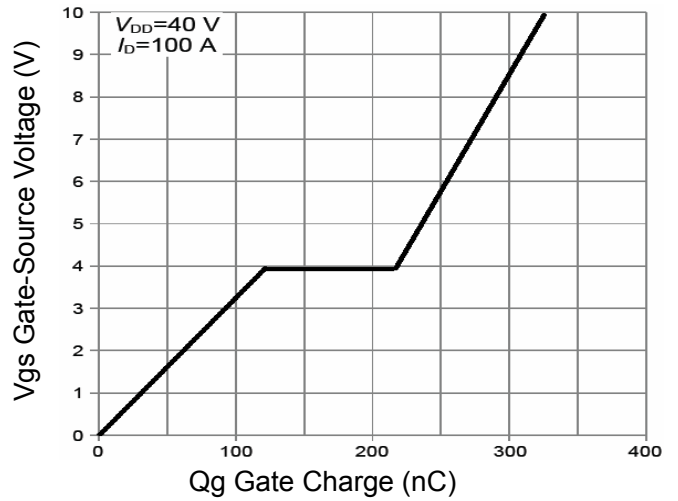


Figure 5 Gate Charge

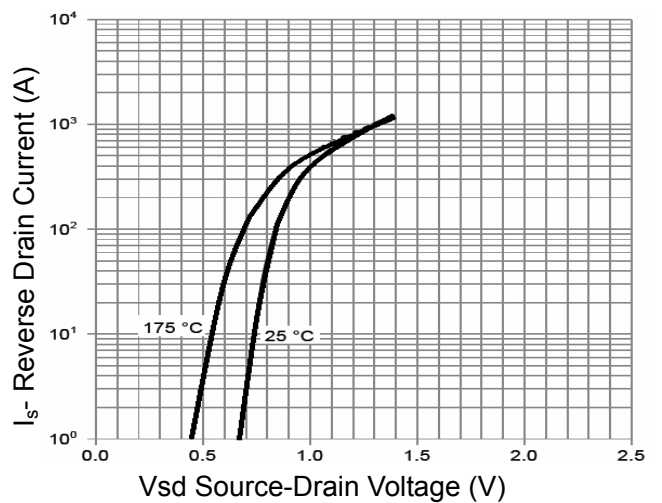


Figure 6 Source- Drain Diode Forward

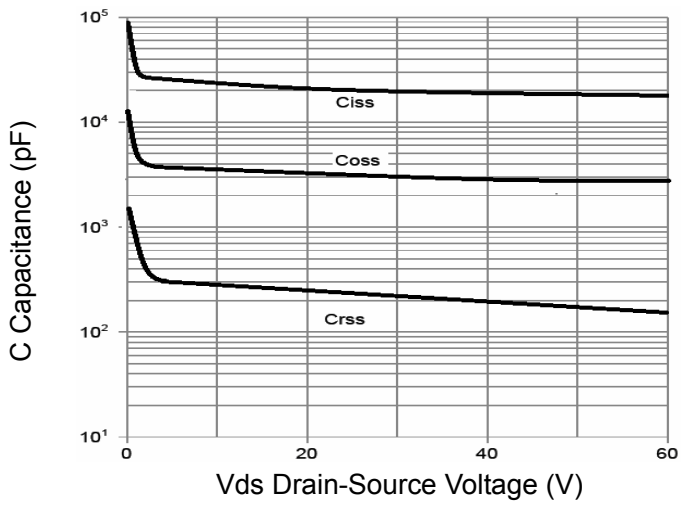


Figure 7 Capacitance vs Vds

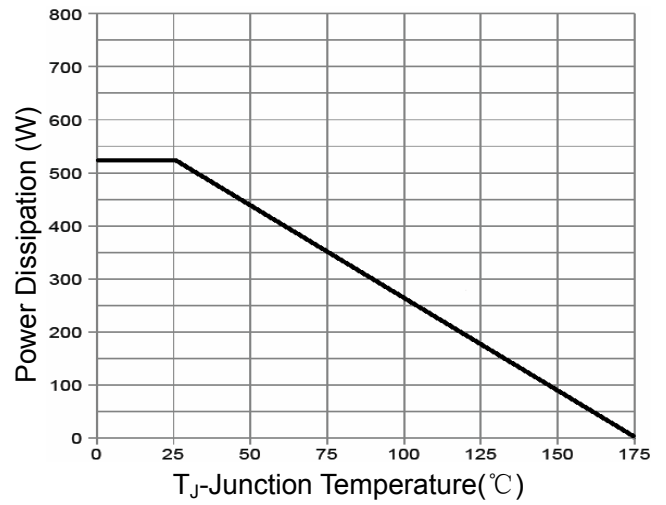


Figure 9 Power De-rating

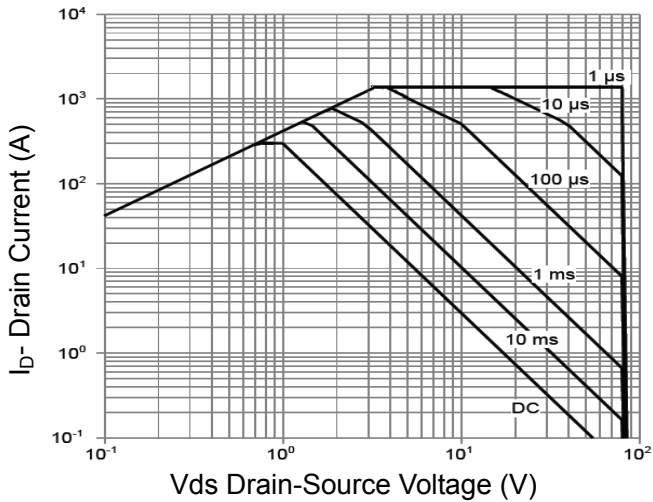


Figure 8 Safe Operation Area

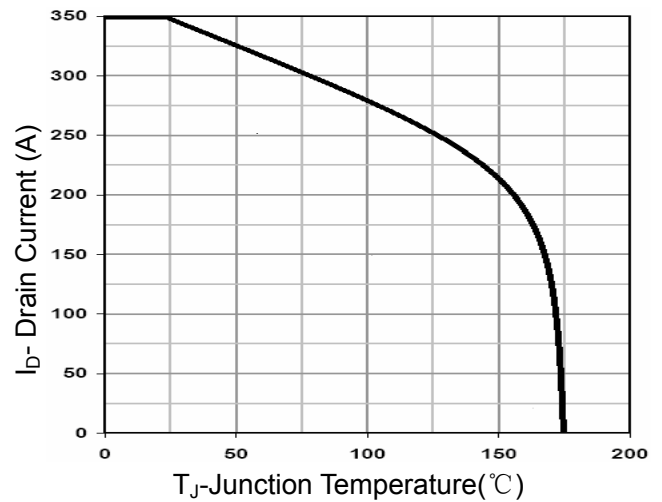


Figure 10 Current De-rating

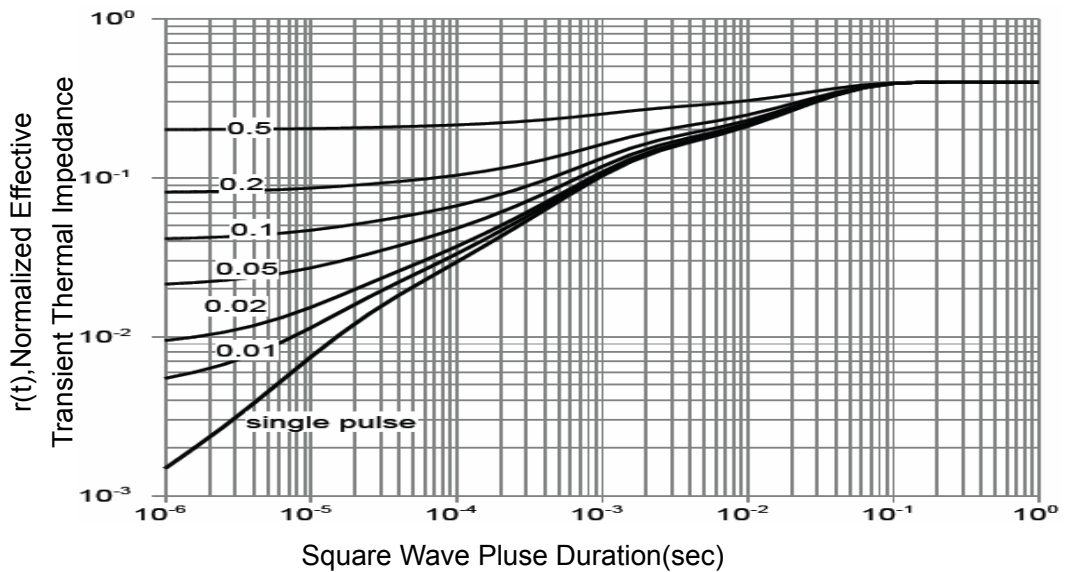
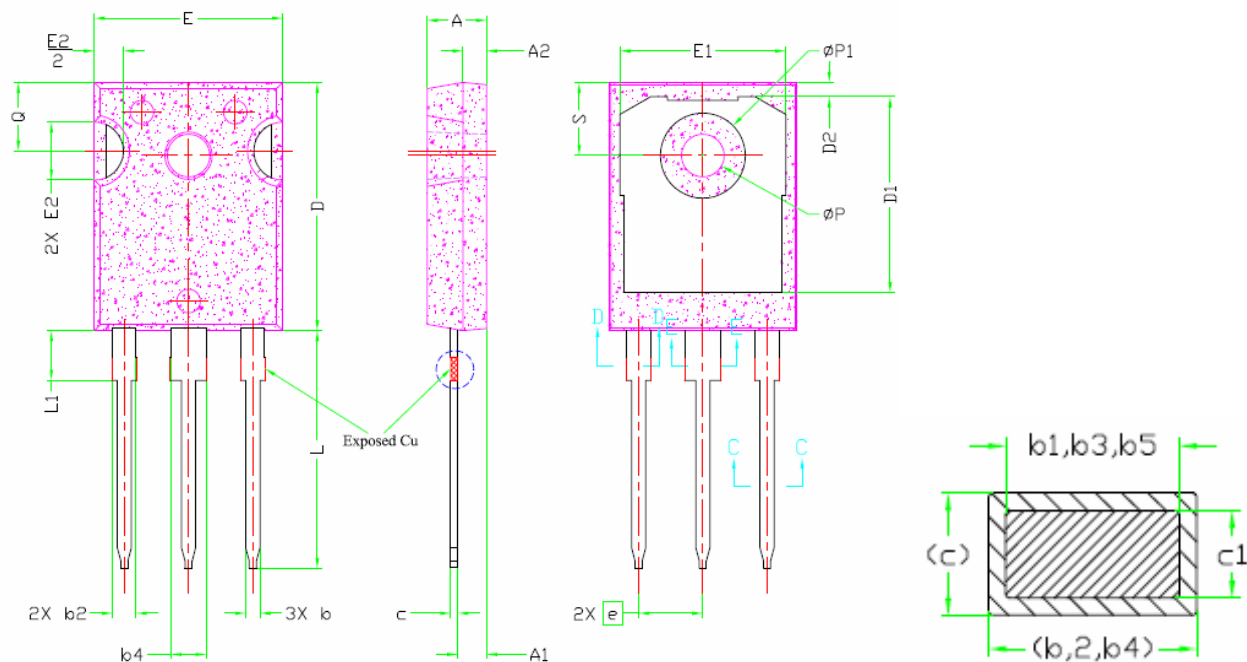


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	4.83	5.02	5.21
A1	2.29	2.41	2.55
A2	1.50	2.00	2.49
b	1.12	1.20	1.33
b1	1.12	1.20	1.28
b2	1.91	2.00	2.39
b3	1.91	2.00	2.34
b4	2.87	3.00	3.22
b5	2.87	3.00	3.18
c	0.55	0.60	0.69
c1	0.55	0.60	0.65
D	20.80	20.95	21.1
D1	16.25	16.55	17.65
D2	0.51	1.19	1.35
E	15.75	15.94	16.13
E1	13.46	14.02	14.16
E2	4.32	4.91	5.49
L	19.81	20.07	20.32
L1	4.10	4.19	4.40
Q	5.39	5.79	6.20
ΦP	3.56	3.61	3.65
S	6.04	6.17	6.30

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