

NCE N-Channel Super Trench II Power MOSFET

Description

The series of devices uses **Super Trench II** 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.

Application

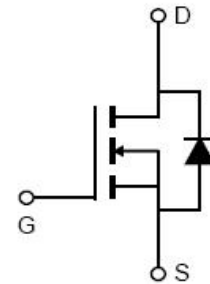
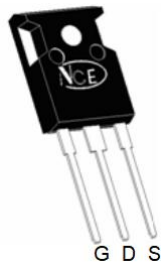
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- $V_{DS} = 100V, I_D = 340A$
 $R_{DS(ON)} = 2.0m\Omega$, typical@ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔVds TESTED!

TO-247-3L



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP019N10T	NCEP019N10T	TO-247-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	340	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	238	A
Pulsed Drain Current	I_{DM}	1360	A
Maximum Power Dissipation	P_D	520	W
Derating factor		3.47	W/°C
Single pulse avalanche energy (Note 1)	E_{AS}	3100	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.29	°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	100		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	2.0	2.25	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =80A		90	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, F=1.0MHz	-	10800	-	PF
Output Capacitance	C _{oss}		-	1800	-	PF
Reverse Transfer Capacitance	C _{rss}		-	45	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V, I _D =80A V _{GS} =10V, R _G =1.6Ω	-	82	-	nS
Turn-on Rise Time	t _r		-	99	-	nS
Turn-Off Delay Time	t _{d(off)}		-	146	-	nS
Turn-Off Fall Time	t _f		-	42	-	nS
Total Gate Charge	Q _g	V _{DS} =50V, I _D =20A, V _{GS} =10V	-	163	-	nC
Gate-Source Charge	Q _{gs}		-	50.8		nC
Gate-Drain Charge	Q _{gd}		-	42.6		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-		1.2	V
Diode Forward Current	I _S		-	-	340	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 80A di/dt = 100A/μs	-	134	-	nS
Reverse Recovery Charge	Q _{rr}		-	689	-	nC

Notes:

1. EAS condition : T_j=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

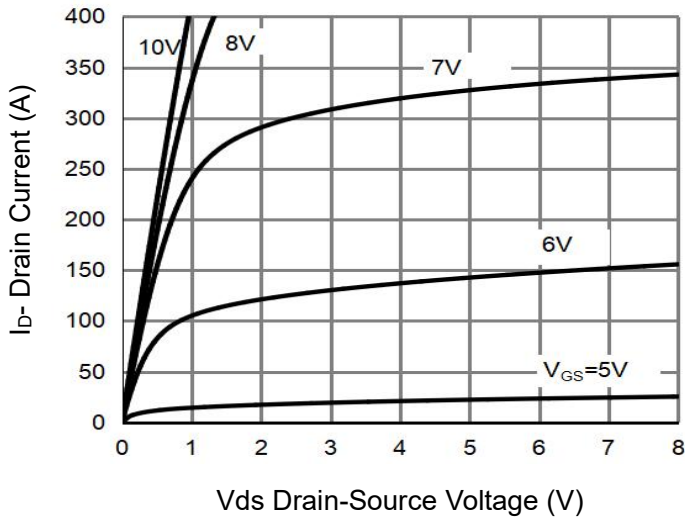


Figure 1 Output Characteristics

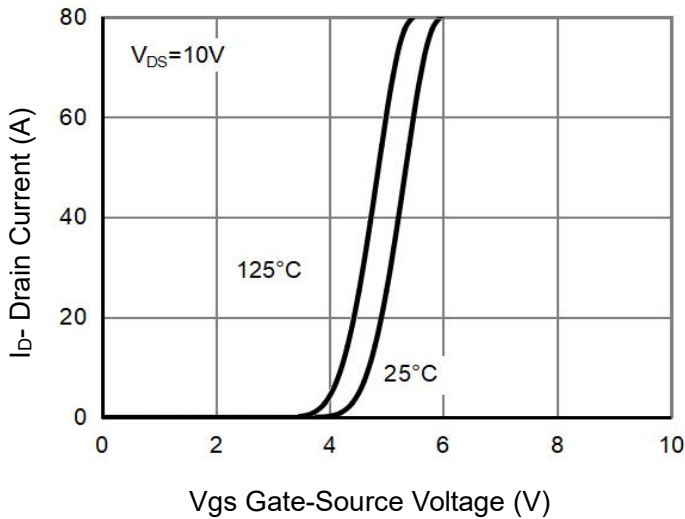


Figure 2 Transfer Characteristics

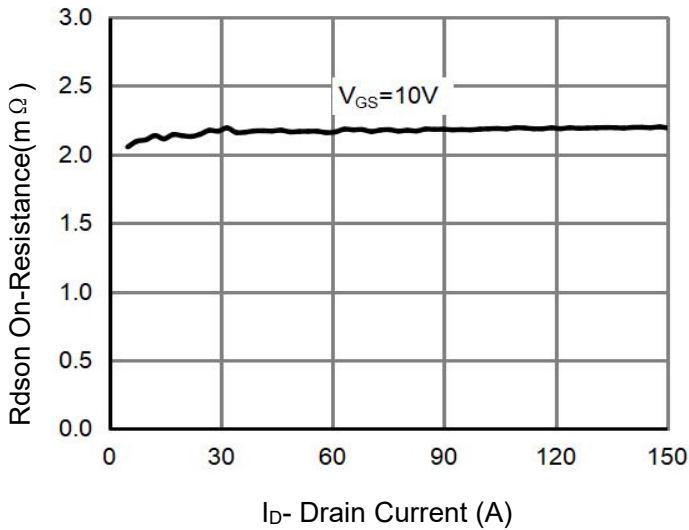


Figure 3 Rdson- Drain Current

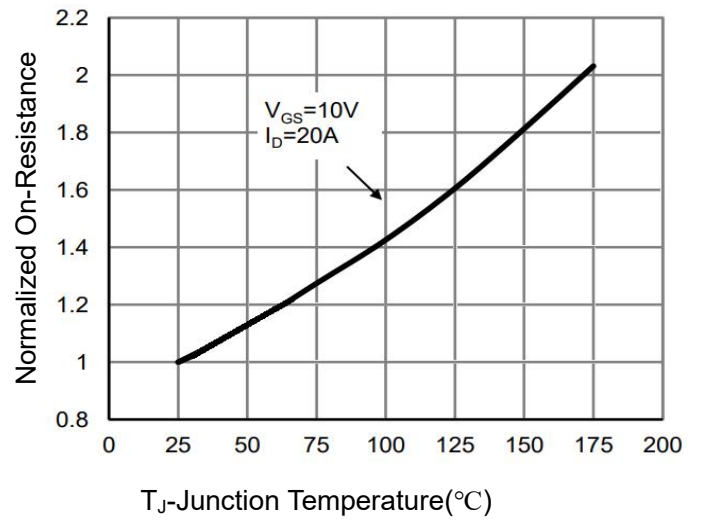


Figure 4 Rdson-Junction Temperature

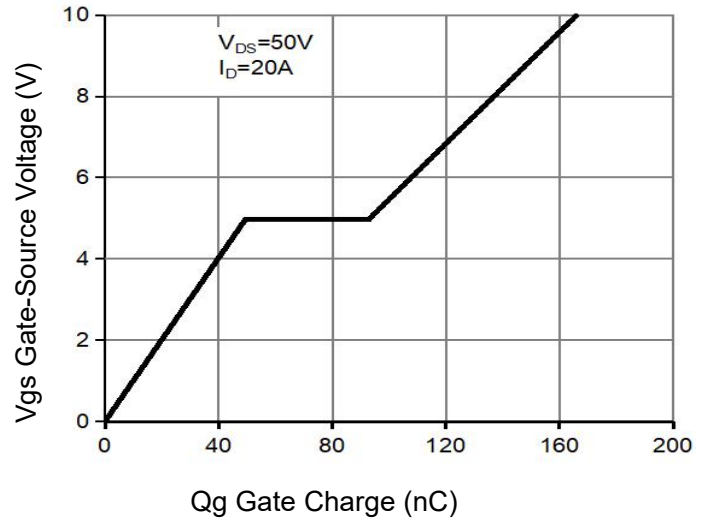


Figure 5 Gate Charge

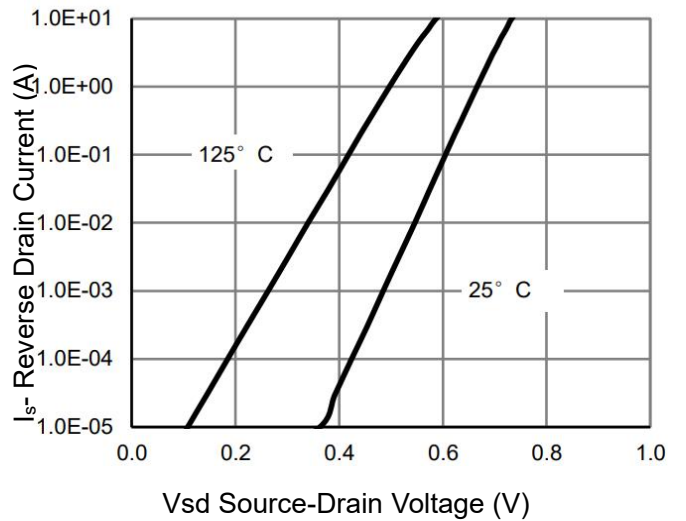
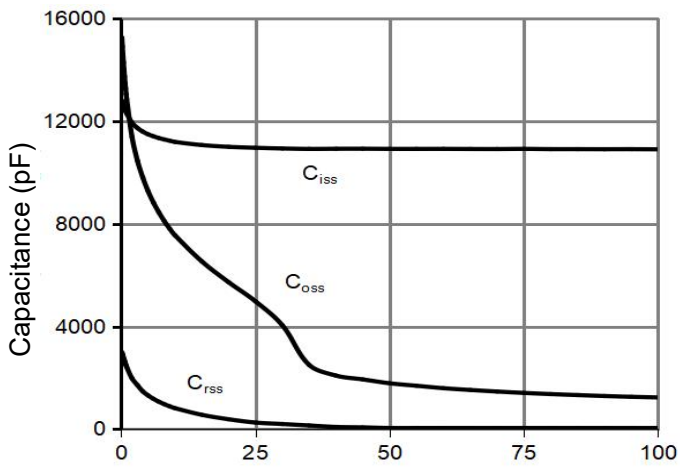
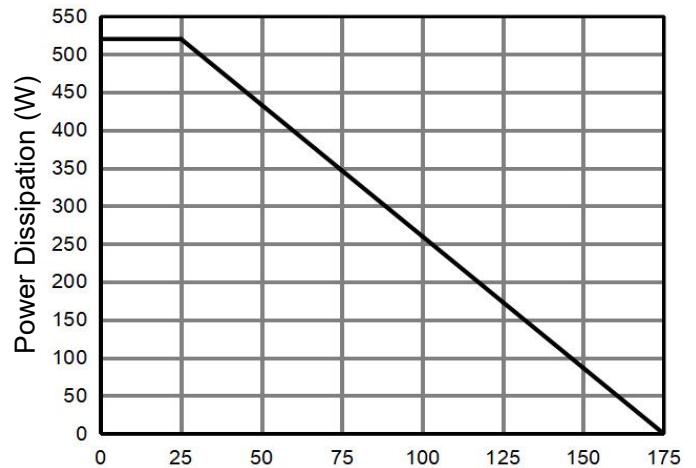


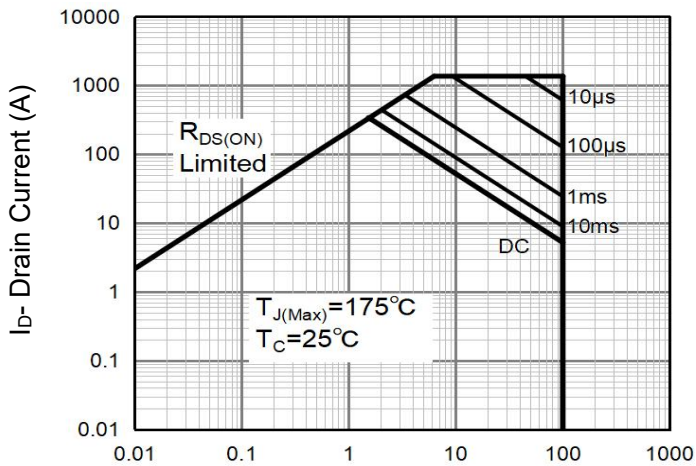
Figure 6 Source- Drain Diode Forward



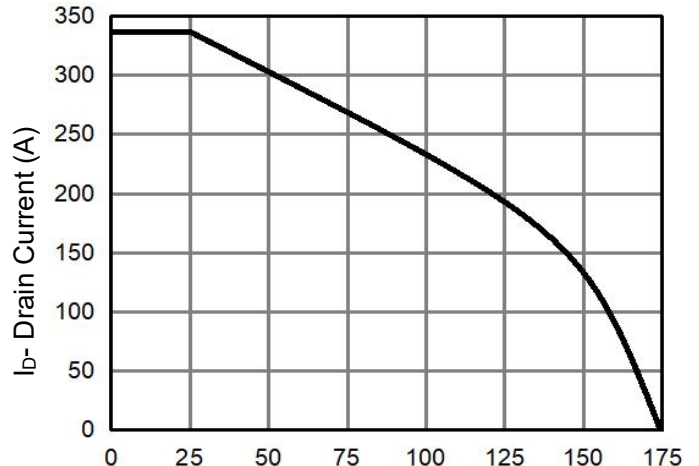
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



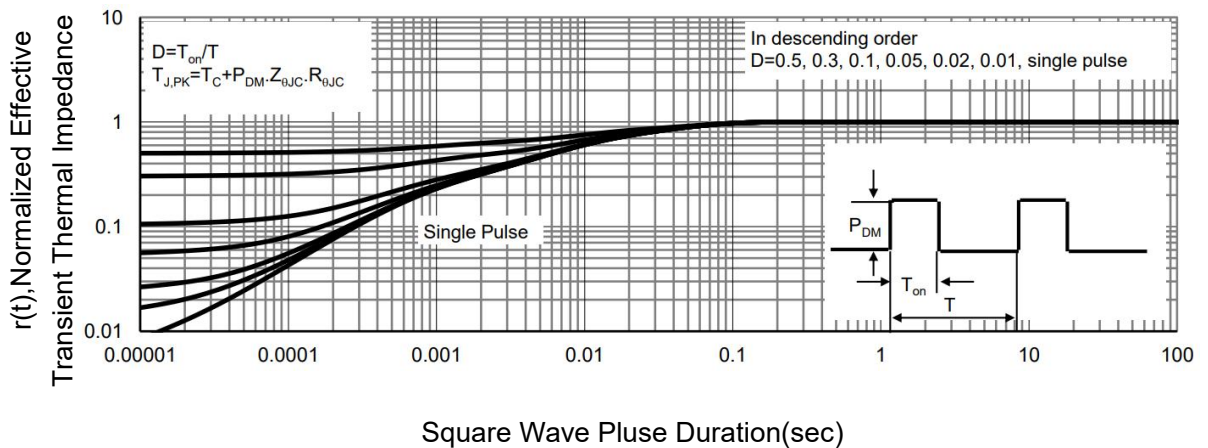
T_J-Junction Temperature(°C)
Figure 9 Power De-rating



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area (Note3)

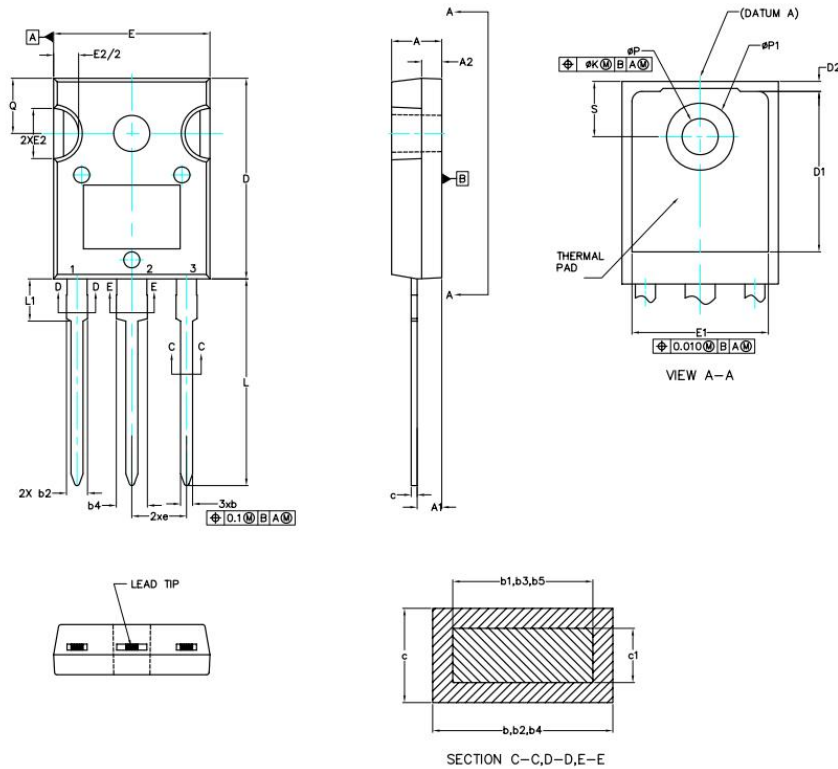


T_J-Junction Temperature (°C)
Figure 10 Current De-rating



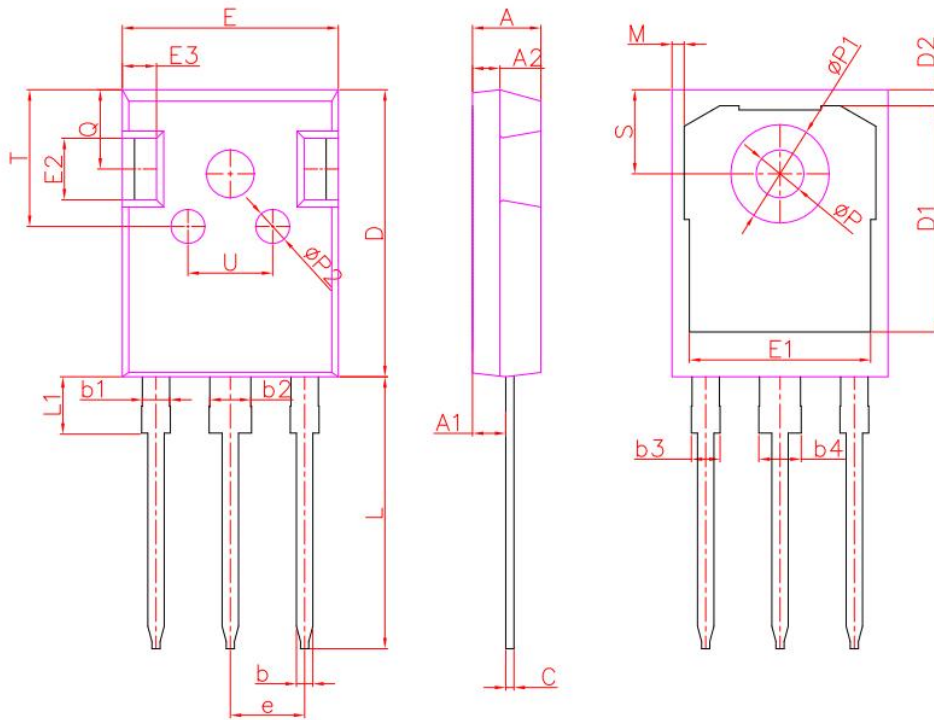
Square Wave Pluse Duration(sec)
Figure 11 Maximum Transient Thermal Impedance

TO-247-3L (J) Package Information



SYMBOL	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.83	5.13	0.190	0.20
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.65	2.39	0.065	0.094
b3	1.65	2.34	0.065	0.092
b4	2.59	3.43	0.102	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.89	0.015	0.035
c1	0.38	0.84	0.015	0.033
D	19.71	20.70	0.776	0.815
D1	13.08	—	0.515	—
D2	0.51	1.35	0.020	0.053
E	15.29	15.87	0.602	0.625
E1	13.46	—	0.530	—
E2	4.52	5.49	0.178	0.216
e	5.46BSC		0.215BSC	
L	19.57	21.00	0.780	0.827
L1	3.71	4.29	0.146	0.169
ϕP	3.56	3.66	0.140	0.144
$\phi P1$	—	7.39	—	0.291
Q	5.31	5.69	0.209	0.224
S	5.51BSC		0.217BSC	

TO-247-3L (E) Package Information



TO247			
DIM.	MIN.	NOM.	MAX.
A	4.90	5.00	5.10
A1	2.31	2.432	2.51
A2	1.90	2.00	2.10
b	1.16	1.20	1.26
b1	1.96	2.00	2.06
b2	2.96	3.00	3.06
b3	-	-	2.25
b4	-	-	3.25
c	0.59	0.60	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.70	15.80	15.90
E1	13.10	13.26	13.50
E2	4.40	4.50	4.60
E3	2.40	2.50	2.60
e	5.436BSC		
L	19.80	19.90	20.10
L1	-	-	4.30
M	0.35	0.89	0.95
P	3.40	3.50	3.60
P1	7.00	7.20	7.40
P2	2.40	2.50	2.60
Q	5.60	5.80	6.00
S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
All dimensions in millimeters			

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