

NCE N-Channel Super Trench Power MOSFET

Description

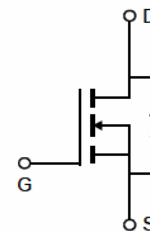
The NCEP85T14WD uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- $V_{DS} = 85V, I_D = 140A$
 $R_{DS(ON)} < 4.0m\Omega @ V_{GS} = 10V$
- 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

Application

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



Schematic diagram



TO-263T-2L top view

100% UIS TESTED!
100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP85T14WD	NCEP85T14WD	TO-220-3L	-	-	-

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	140	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	99	A
Pulsed Drain Current	I_{DM}	420	A
Maximum Power Dissipation	P_D	200	W
Derating factor		1.3	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	1000	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)	$R_{\theta JC}$	0.75	$^\circ C/W$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

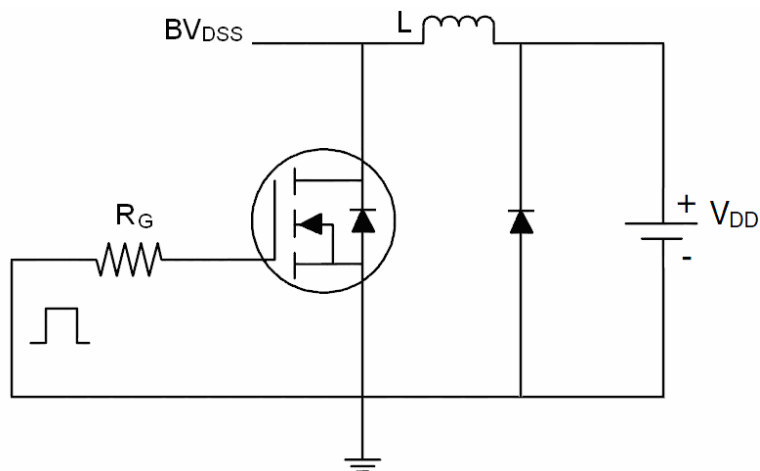
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	85		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.1	4.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =70A	-	3.3	4.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =70A	50	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =40V, V _{GS} =0V, F=1.0MHz	-	5600	-	PF
Output Capacitance	C _{oss}		-	850	-	PF
Reverse Transfer Capacitance	C _{rss}		-	60	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =70A V _{GS} =10V, R _G =4.7Ω	-	20	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS
Turn-Off Fall Time	t _f		-	35	-	nS
Total Gate Charge	Q _g	V _{DS} =40V, I _D =70A, V _{GS} =10V	-	84		nC
Gate-Source Charge	Q _{gs}		-	30.6		nC
Gate-Drain Charge	Q _{gd}		-	18.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =140A	-		1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	140	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs ^(Note3)	-	83		nS
Reverse Recovery Charge	Q _{rr}		-	194		nC

Notes:

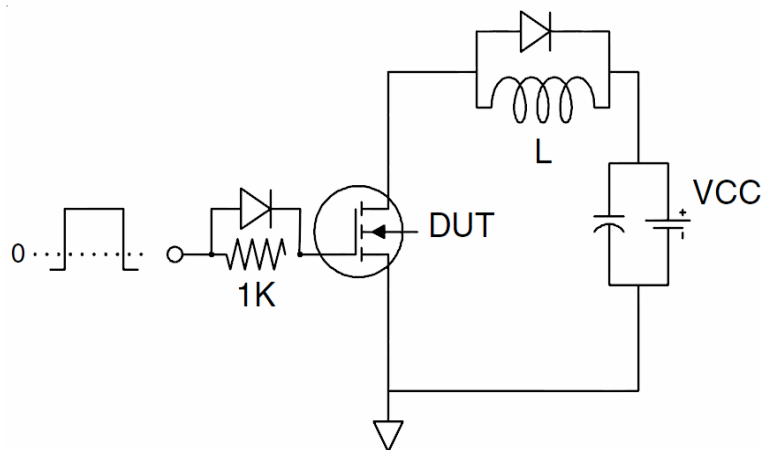
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=42.5V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test Circuit

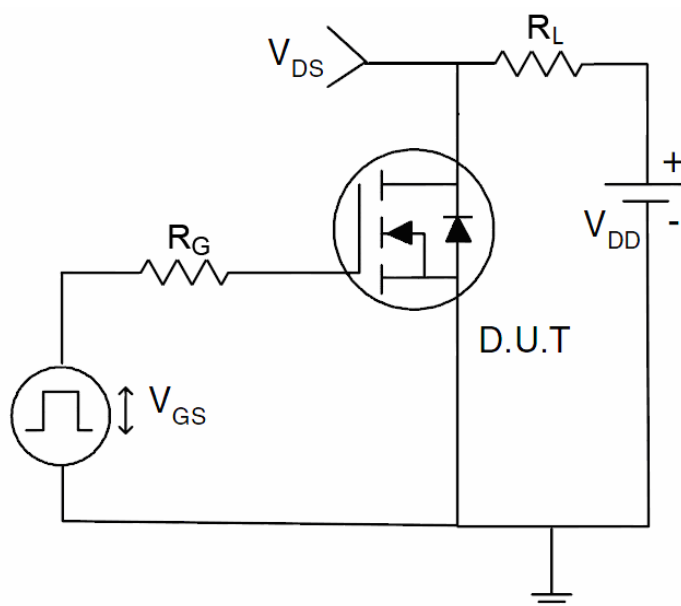
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

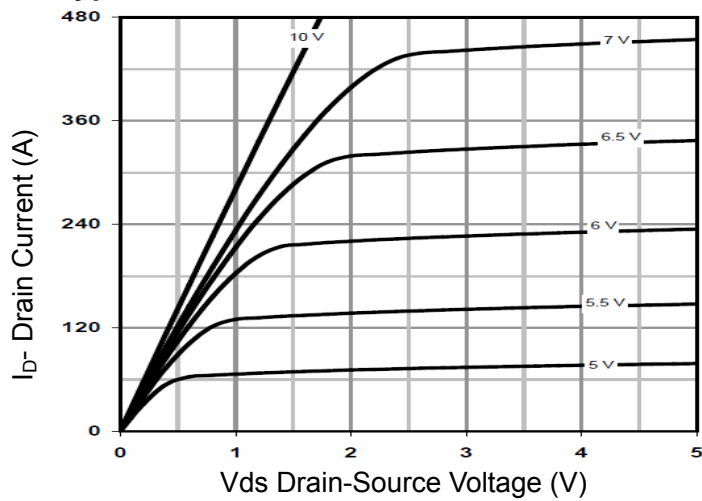


Figure 1 Output Characteristics

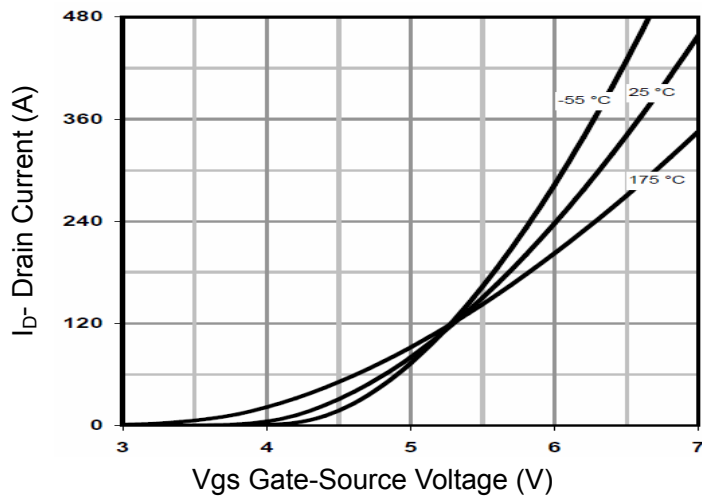


Figure 2 Transfer Characteristics

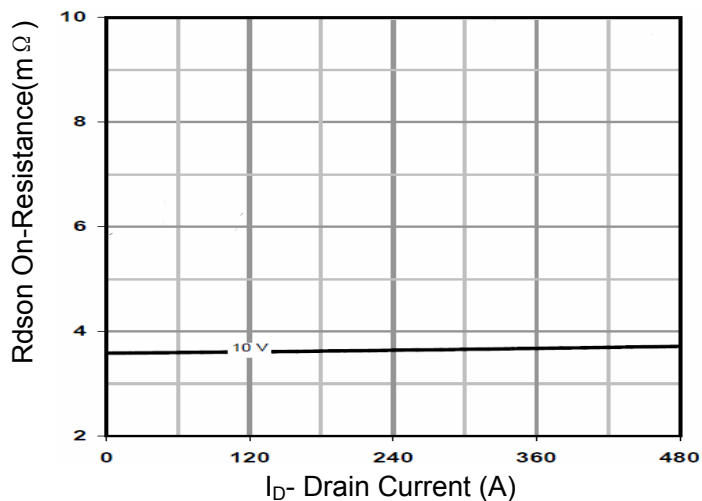


Figure 3 Rdson- Drain Current

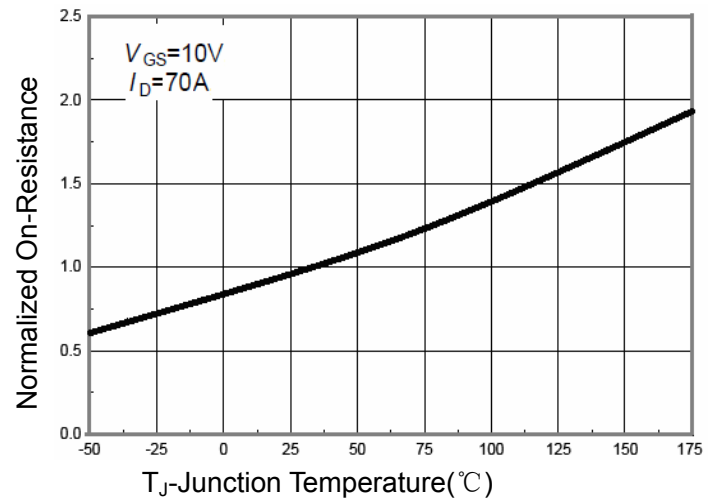


Figure 4 Rdson-Junction Temperature

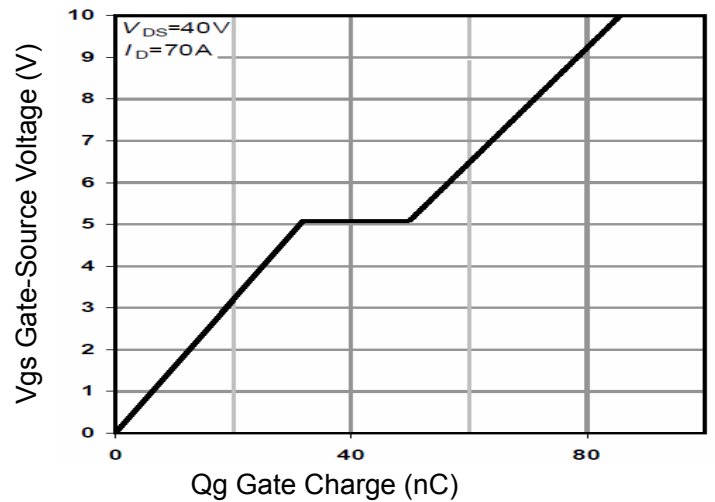


Figure 5 Gate Charge

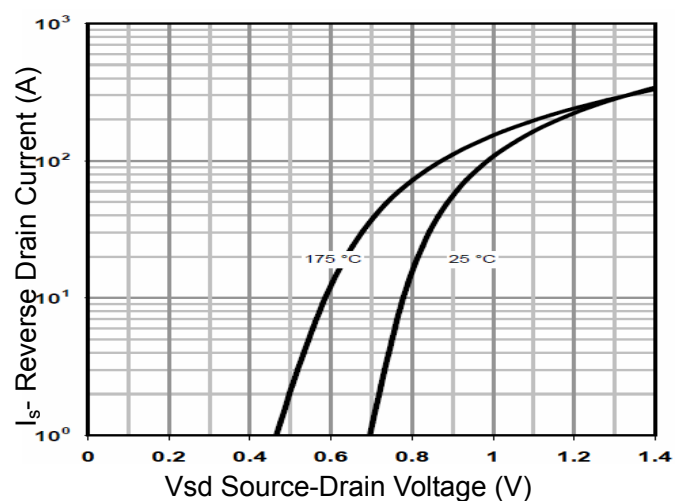


Figure 6 Source- Drain Diode Forward

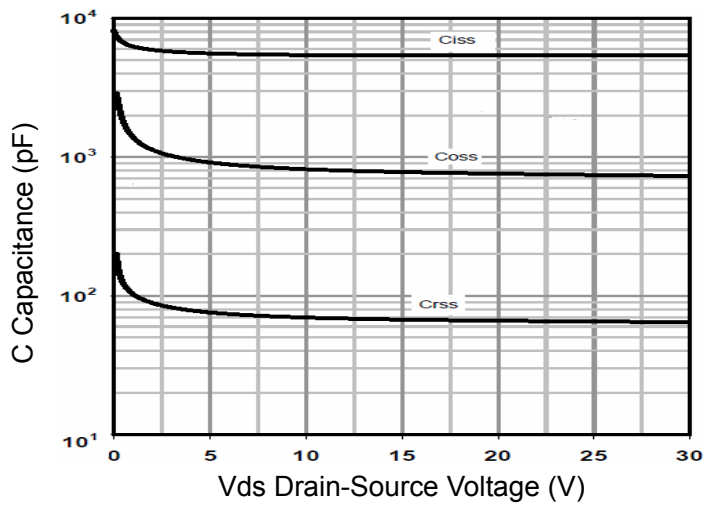


Figure 7 Capacitance vs Vds

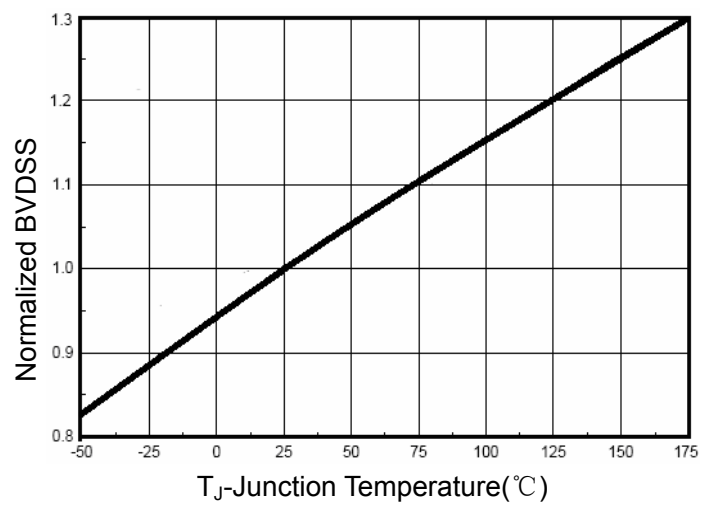
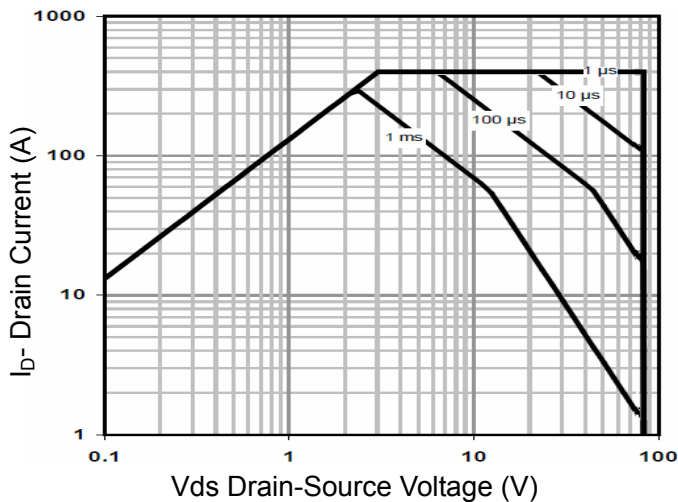

Figure 9 BV_{DSS} vs Junction Temperature


Figure 8 Safe Operation Area

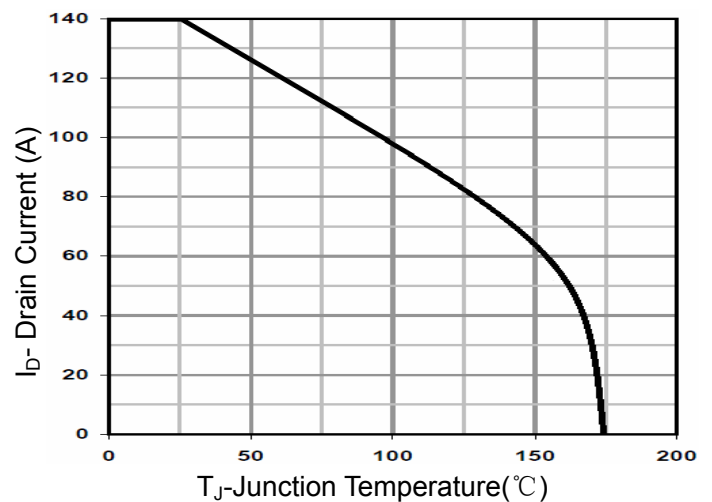


Figure 10 Current De-rating

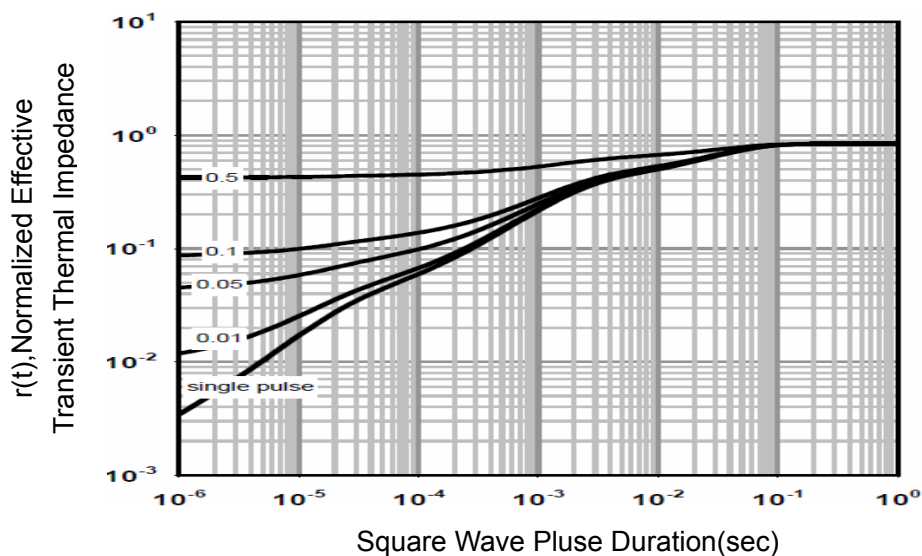
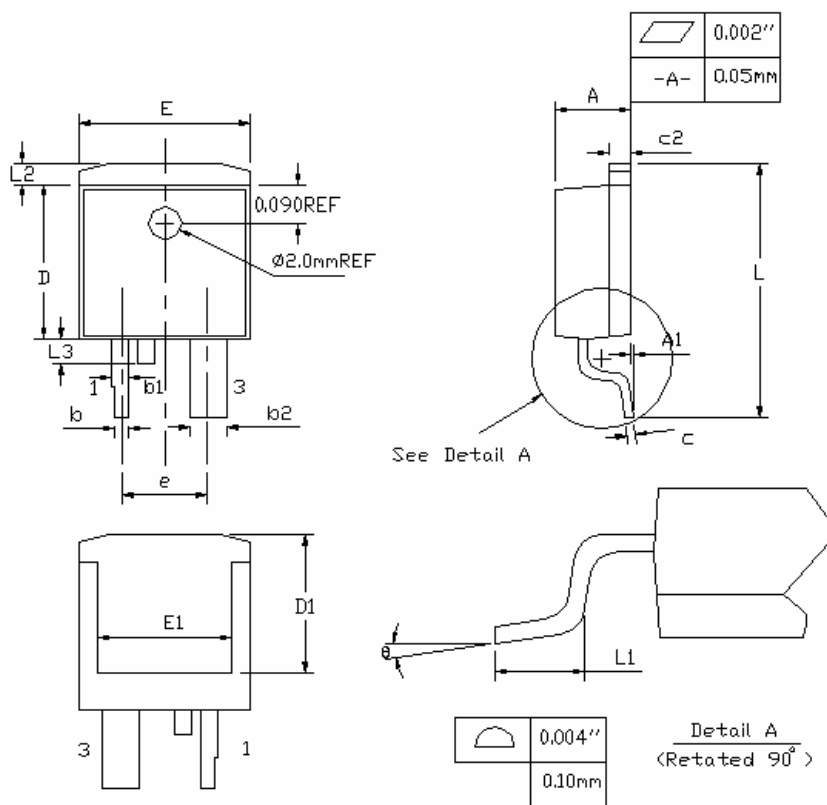


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263T-2L Package Information



Symbol	Dimensions In Inches		Dimensions In Millimeters	
	Min.	Max.	Min.	Max.
A	0.170	0.180	4.32	4.57
A1	-	0.010	-	0.25
b	0.028	0.037	0.71	0.94
b 1	0.035	0.047	0.9	1.2
b2	0.081	0.095	2.05	2.4
c	0.018	0.024	0.46	0.61
c2	0.048	0.055	1.22	1.40
D	0.350	0.370	8.89	9.40
D1	0.315	0.324	8.01	8.23
E	0.395	0.405	10.04	10.28
E1	0.310	0.318	7.88	8.08
e	0.200 BSC.		5.08 BSC.	
L	0.580	0.620	14.73	15.75
L1	0.090	0.110	2.29	2.79
L2	0.045	0.055	1.15	1.39
L3	0.050	0.070	1.27	1.77
θ	0°	8°	0°	8°

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