

NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE75H21TB uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

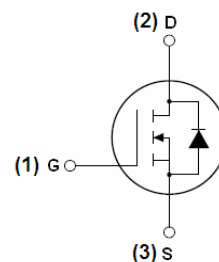
- $V_{DS} = 75V, I_D = 210A$
 $R_{DS(ON)} < 4.0m\Omega @ V_{GS}=10V$ (Typ3.3m Ω)
- Special process technology for high ESD capability
- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

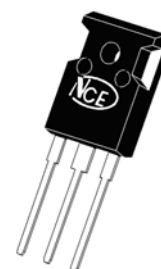
100% ΔV_{DS} TESTED!



Schematic diagram



Marking and pin assignment



TO-220-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE75H21TB	NCE75H21TB	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	75	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous($T_C=100^{\circ}C$)	$I_D(100^{\circ}C)$	148	A
Pulsed Drain Current	I_{DM}	850	A
Maximum Power Dissipation	P_D	330	W

Derating factor		2.2	W/°C
Single pulse avalanche energy ^(Note 5)	E_{AS}	2200	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.45	°C/W
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

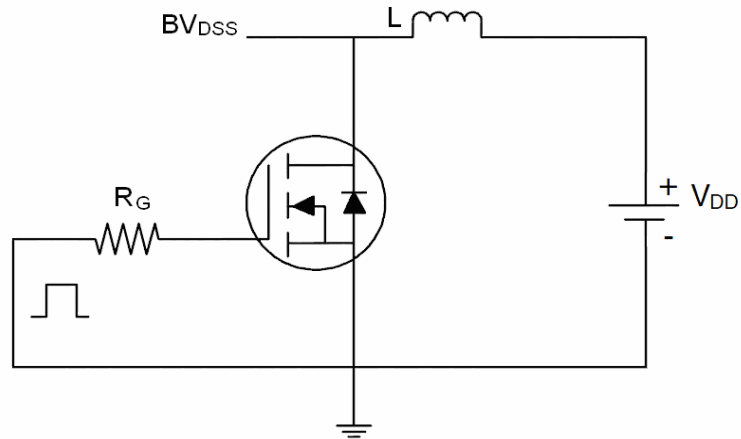
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$ $I_D=250\mu A$	75	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=75V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A$	-	3.3	4.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=40A$	60	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{ISS}	$V_{DS}=30V, V_{GS}=0V,$ $F=1.0MHz$	-	9400	-	PF
Output Capacitance	C_{OSS}		-	880	-	PF
Reverse Transfer Capacitance	C_{RSS}		-	520	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, R_L=1\Omega$ $V_{GS}=10V, R_{GEN}=2.5\Omega$	-	26.3	-	nS
Turn-on Rise Time	t_r		-	48.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	87.5	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	228	-	nC
Gate-Source Charge	Q_{gs}		-	66	-	nC
Gate-Drain Charge	Q_{gd}		-	36	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S	-	-	-	110	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = 40A$ $di/dt = 100A/\mu s^{(Note3)}$	-	53	-	nS
Reverse Recovery Charge	Q_{rr}		-	123	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

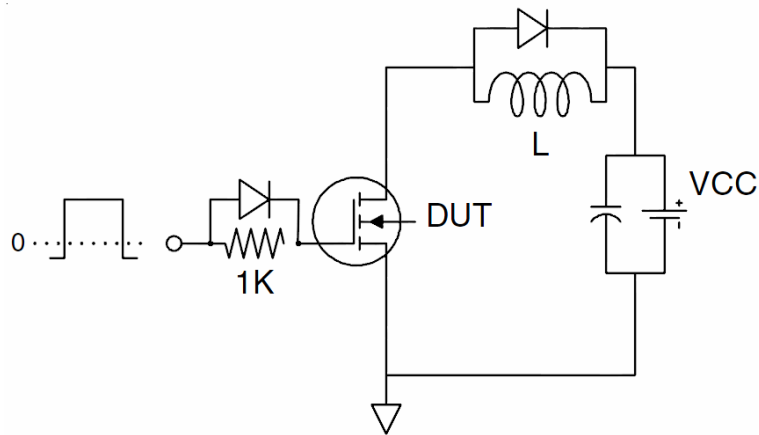
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=37.5V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test circuit

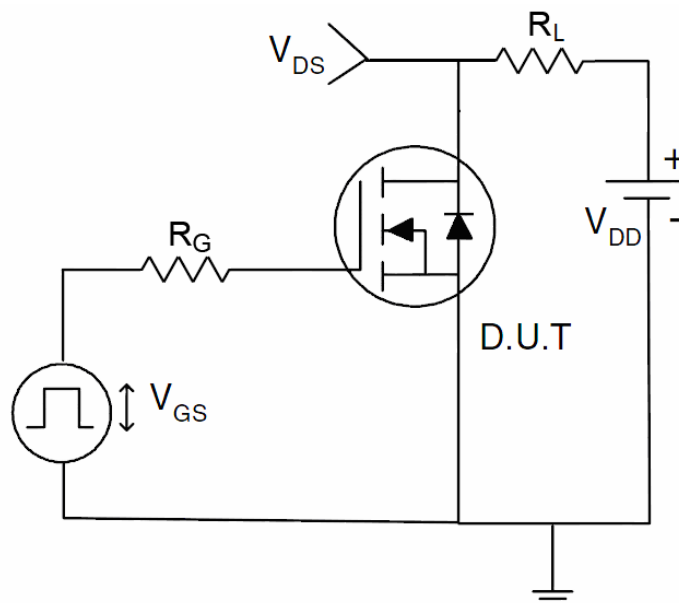
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

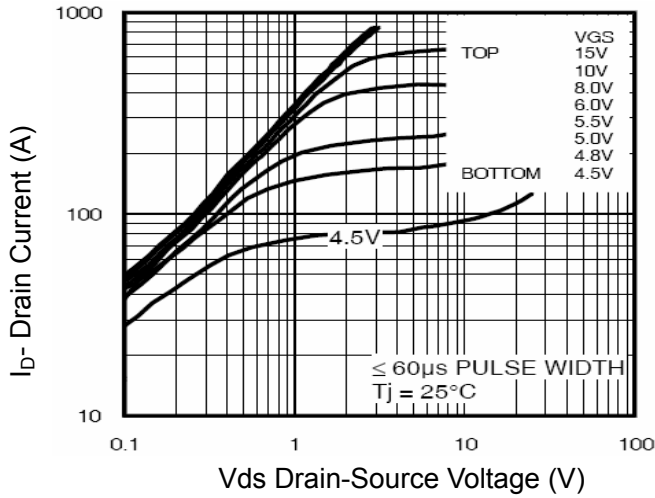


Figure 1 Output Characteristics

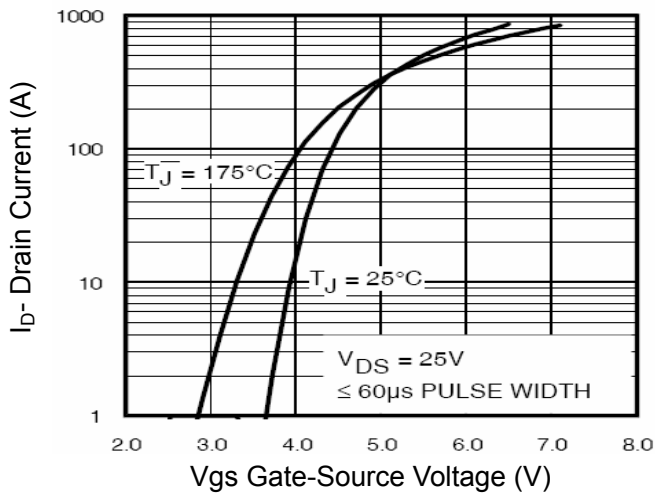


Figure 2 Transfer Characteristics

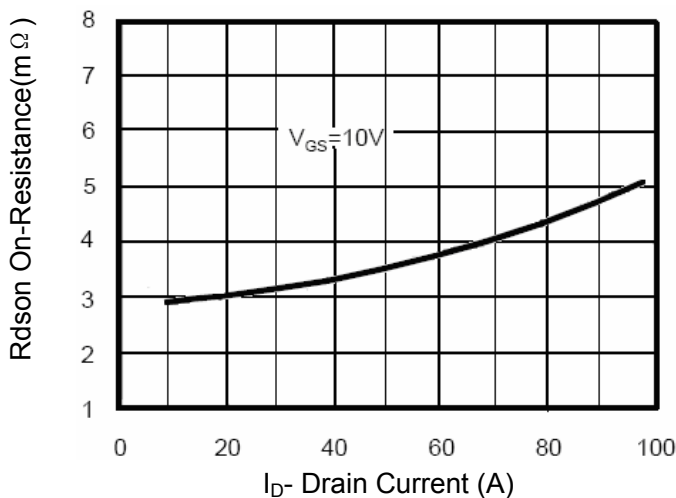


Figure 3 $R_{DS(on)}$ - Drain Current

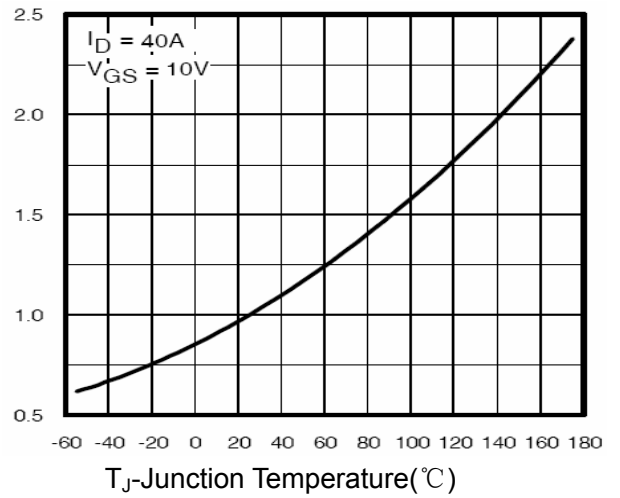


Figure 4 $R_{DS(on)}$ -Junction Temperature

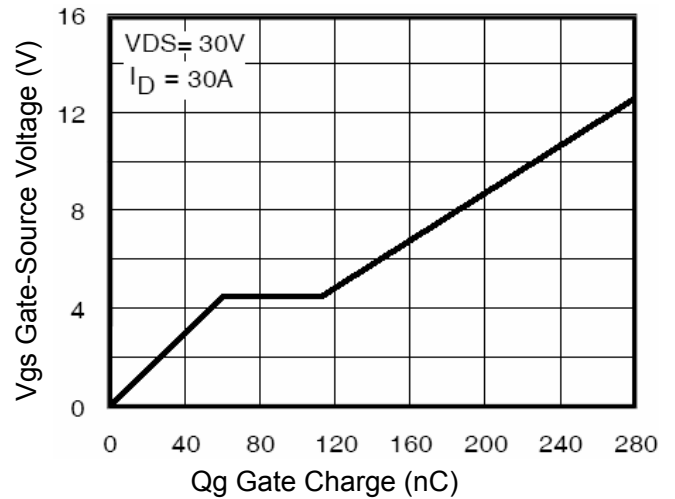


Figure 5 Gate Charge

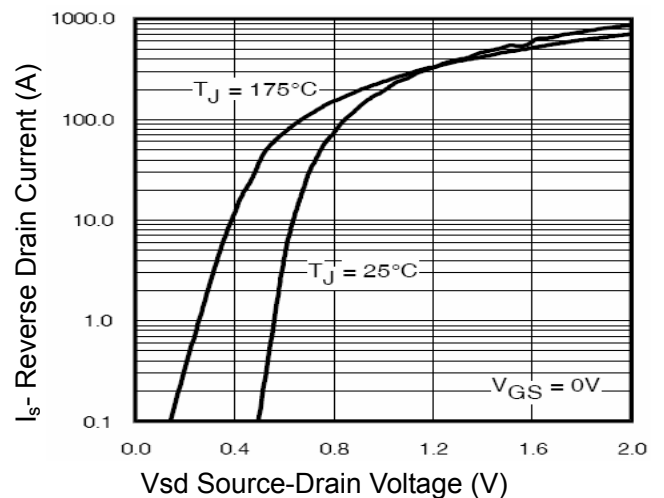


Figure 6 Source- Drain Diode Forward

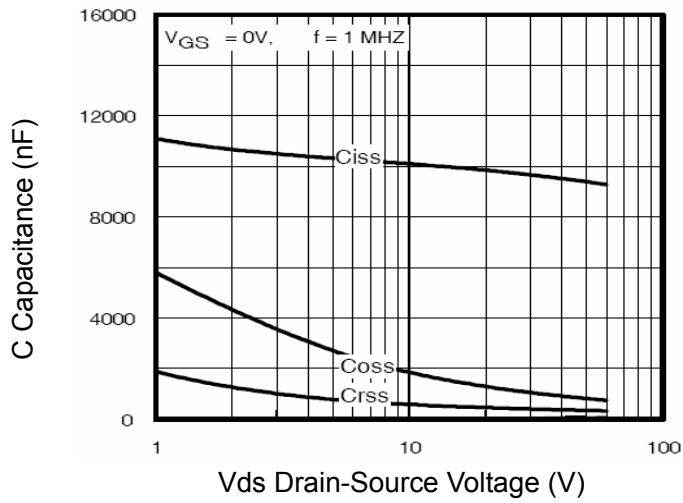


Figure 7 Capacitance vs Vds

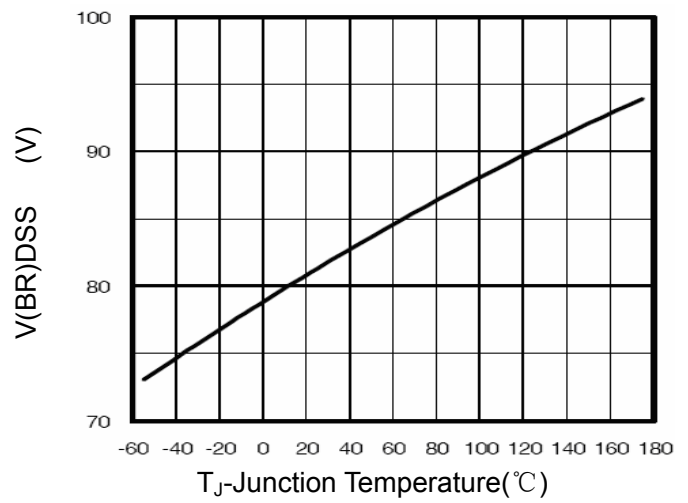
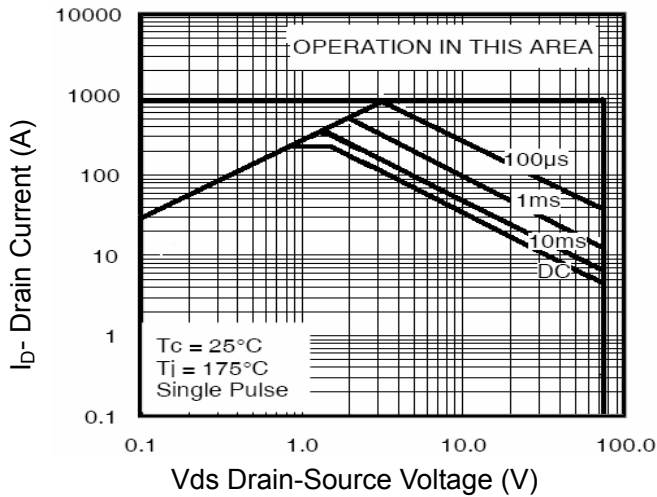

Figure 9 BV_{DSS} vs Junction Temperature


Figure 8 Safe Operation Area

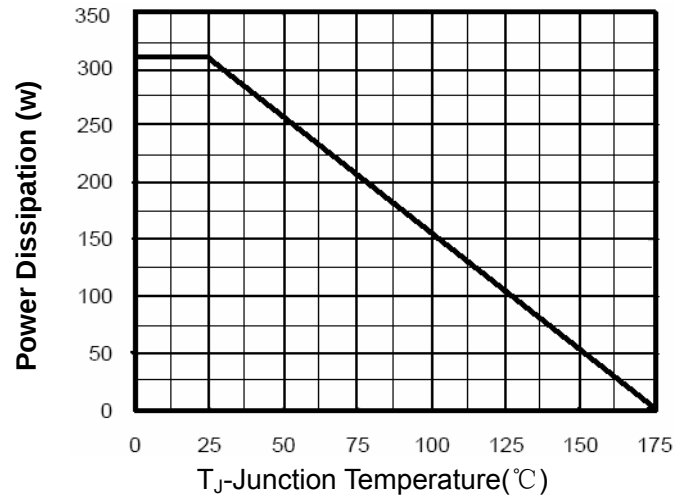


Figure 10 Power De-rating

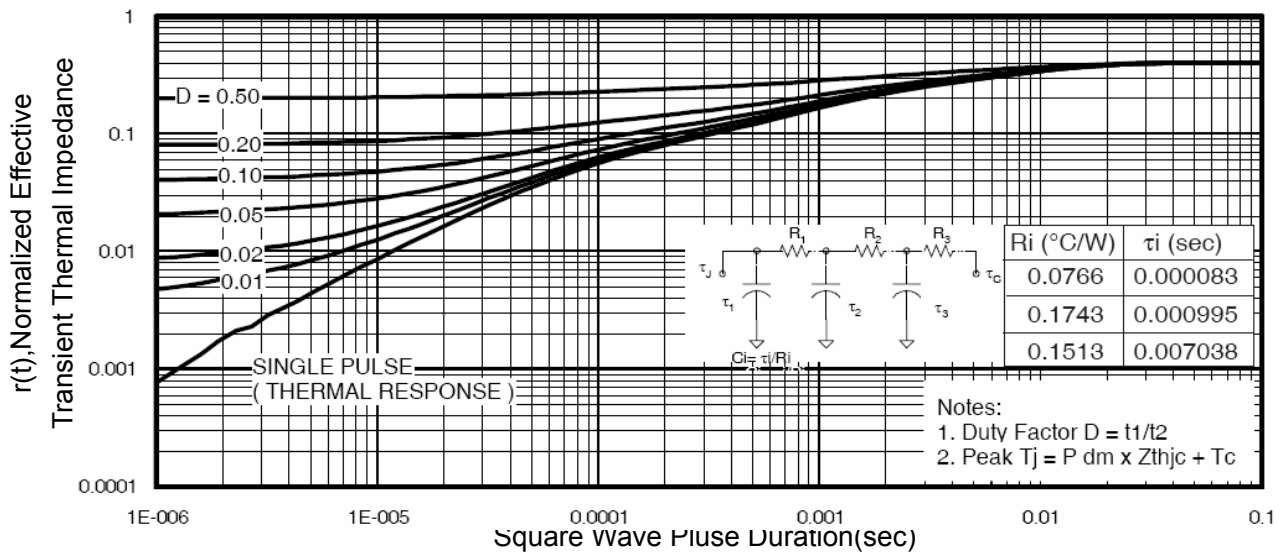
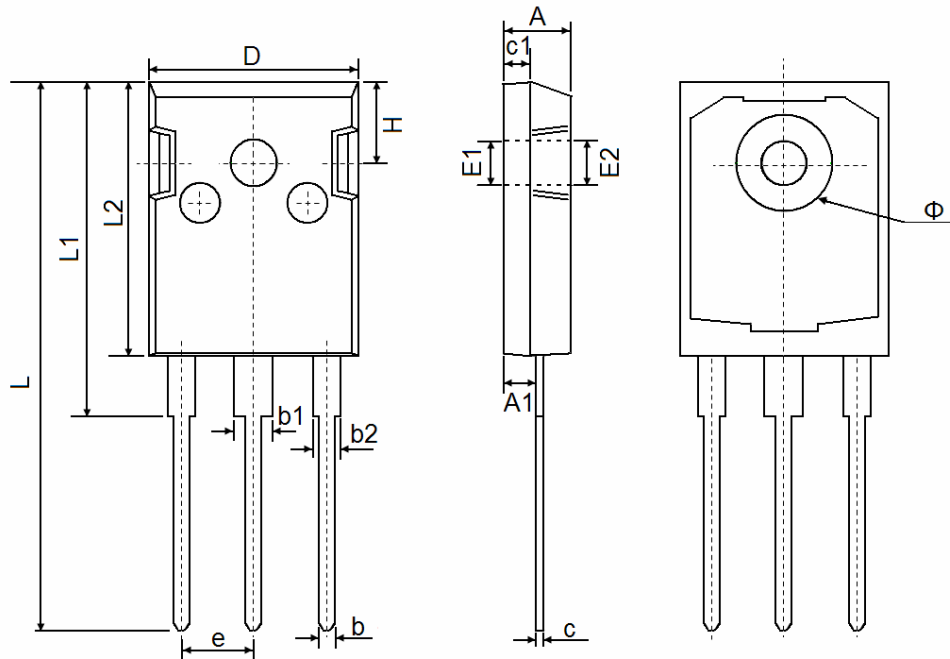


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

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