

NCE N-Channel Enhancement Mode Power MOSFET

Description

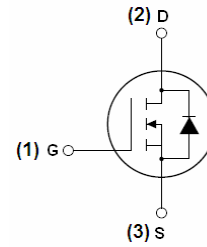
The NCE85H21TC uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

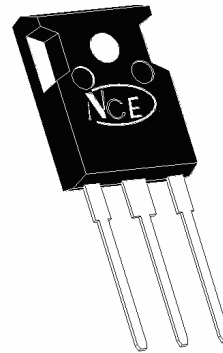
- $V_{DSS} = 85V, I_D = 210A$
 $R_{DS(ON)} < 4.9m\Omega @ V_{GS} = 10V$
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



TO-247 top view

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE85H21TC	NCE85H21TC	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	150	A
Pulsed Drain Current	I_{DM}	850	A
Maximum Power Dissipation	P_D	300	W
Derating factor		2.0	W/ $^\circ C$
Single pulse avalanche energy ^(Note 3)	E_{AS}	1800	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 1)	$R_{\theta JC}$	0.5	$^\circ C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

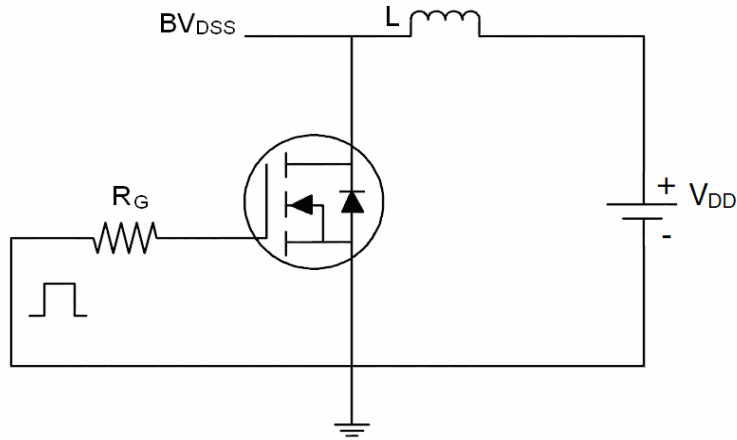
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	85	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±200	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3.2	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	4.0	4.9	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A	35	-	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	7600	-	PF
Output Capacitance	C _{oss}		-	720	-	PF
Reverse Transfer Capacitance	C _{rss}		-	346	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =2A, R _L =15Ω V _{GS} =10V, R _G =2.5Ω	-	23	-	nS
Turn-on Rise Time	t _r		-	124	-	nS
Turn-Off Delay Time	t _{d(off)}		-	84	-	nS
Turn-Off Fall Time	t _f		-	78	-	nS
Total Gate Charge	Q _g	I _D =40A, V _{DD} =40V, V _{GS} =10V	-	140	-	nC
Gate-Source Charge	Q _{gs}		-	40	-	nC
Gate-Drain Charge	Q _{gd}		-	57	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 40A di/dt = 100A/μs ^(Note2)	-	110	-	nS
Reverse Recovery Charge	Q _{rr}		-	300	-	nC

Notes:

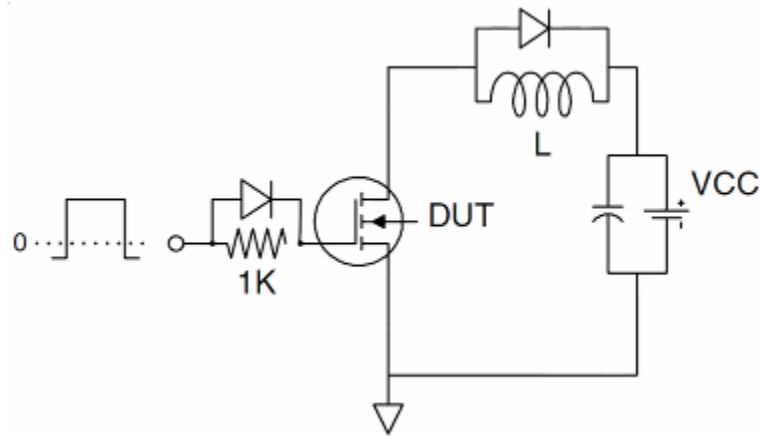
1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.
3. EAS condition: T_J=25°C, V_{DD}=42.5V, V_G=10V, L=2mH, R_G=25Ω, I_{AS}=37A
4. I_{SD}≤125A, di/dt≤260A/μs, V_{DD}≤V_{(BR)DSS}, T_J ≤175°C

Test Circuit

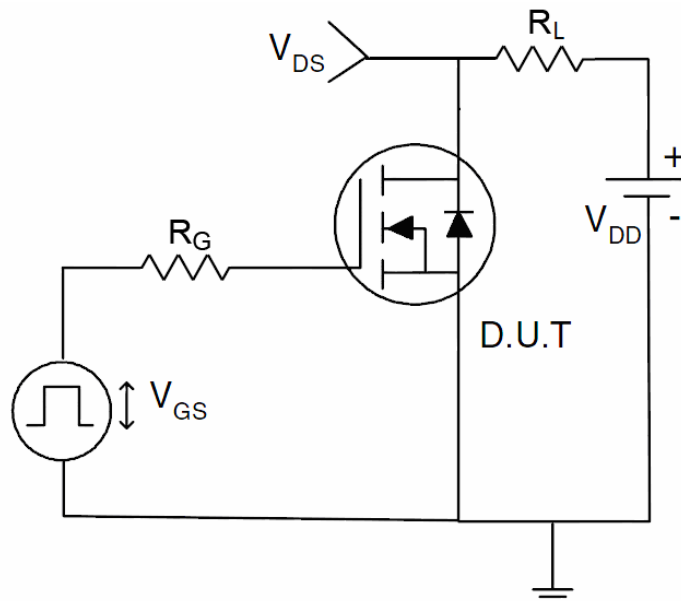
1) E_{AS} test Circuit



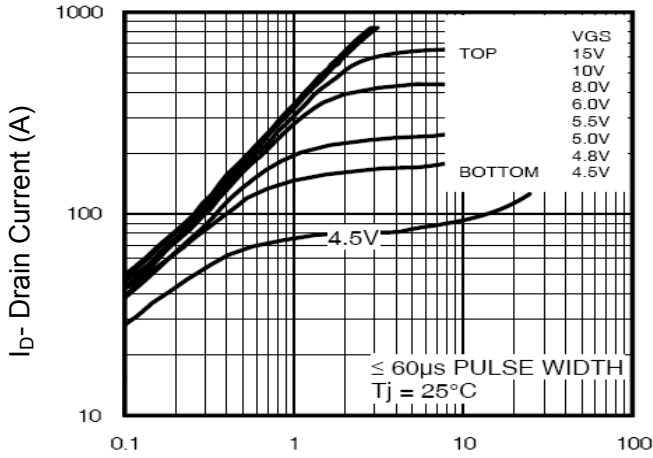
2) Gate charge test Circuit



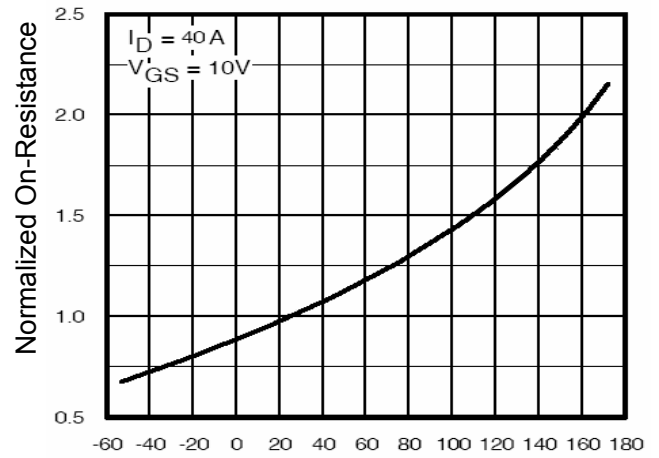
3) Switch Time Test Circuit



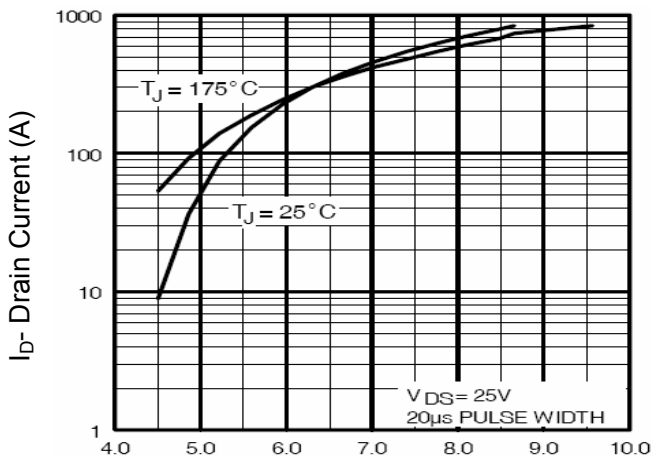
Typical Electrical and Thermal Characteristics



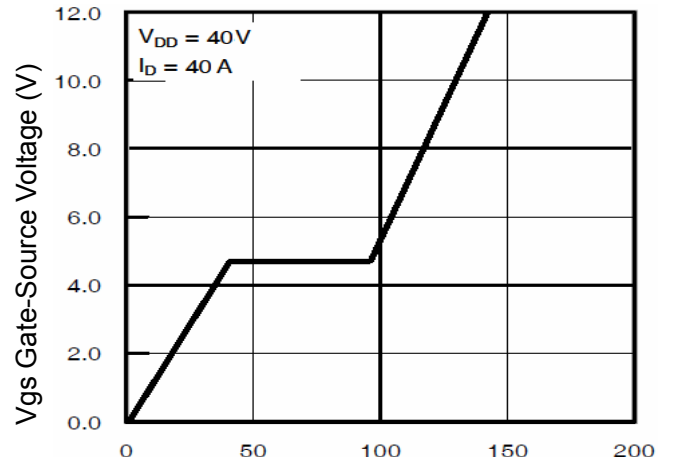
Vds Drain-Source Voltage (V)
Figure 1 Output Characteristics



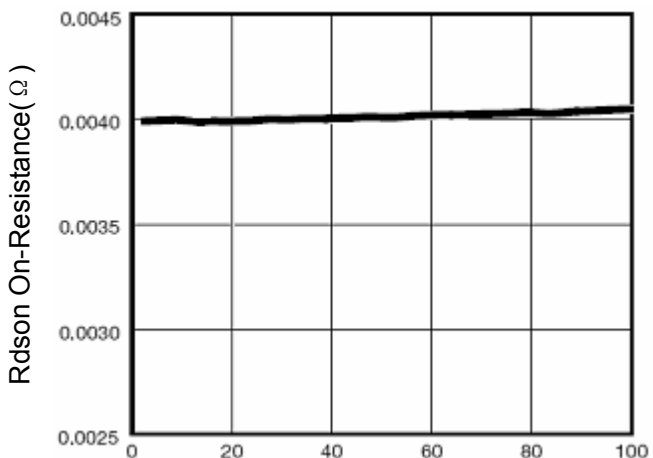
T_J -Junction Temperature($^\circ C$)
Figure 4 Rdson-Junction Temperature



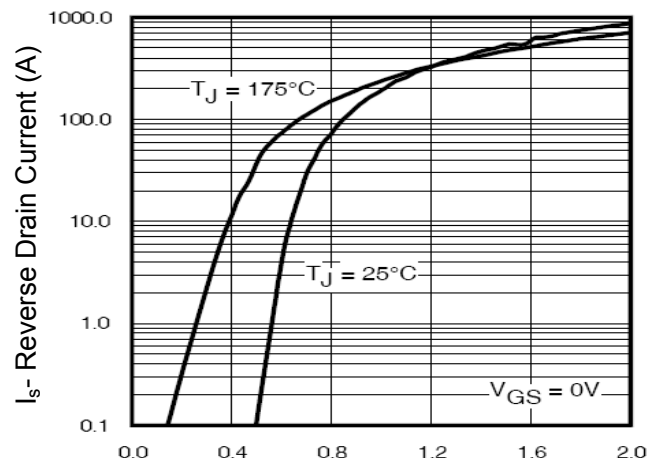
Vgs Gate-Source Voltage (V)
Figure 2 Transfer Characteristics



Qg Gate Charge (nC)
Figure 5 Gate Charge



I_D - Drain Current (A)
Figure 3 Rdson- Drain Current



Vsd Source-Drain Voltage (V)
Figure 6 Source- Drain Diode Forward

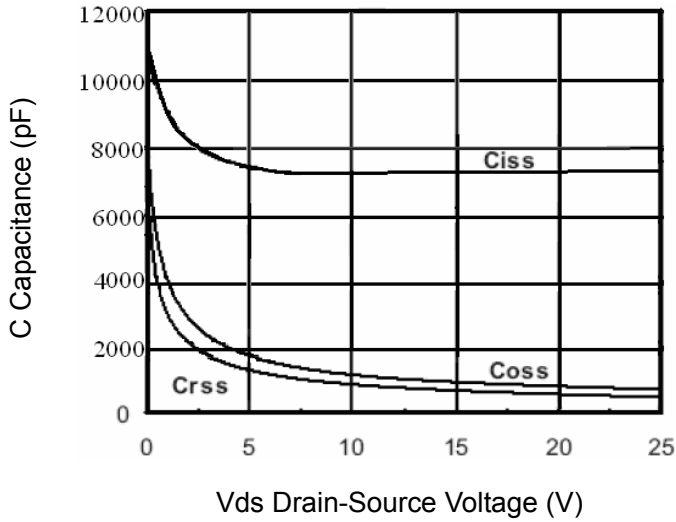


Figure 7 Capacitance vs Vds

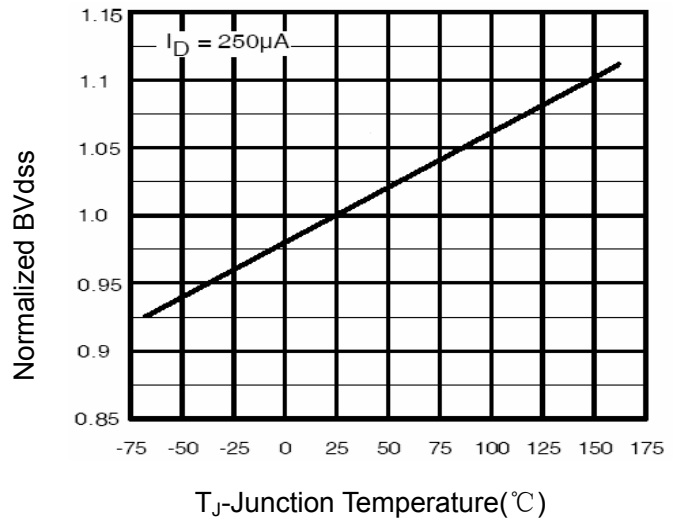


Figure 9 BV_{DSS} vs Junction Temperature

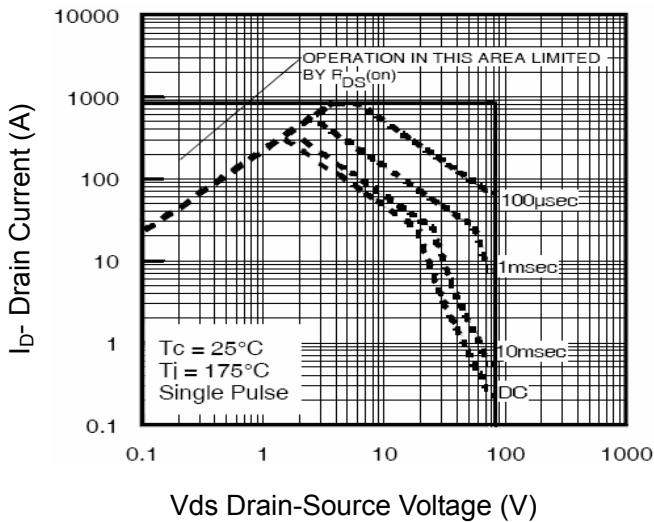


Figure 8 Safe Operation Area

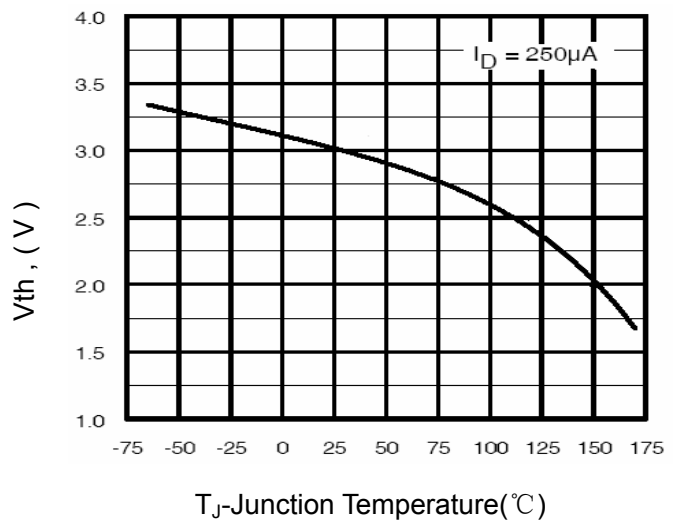


Figure 10 $V_{GS(th)}$ vs Junction Temperature

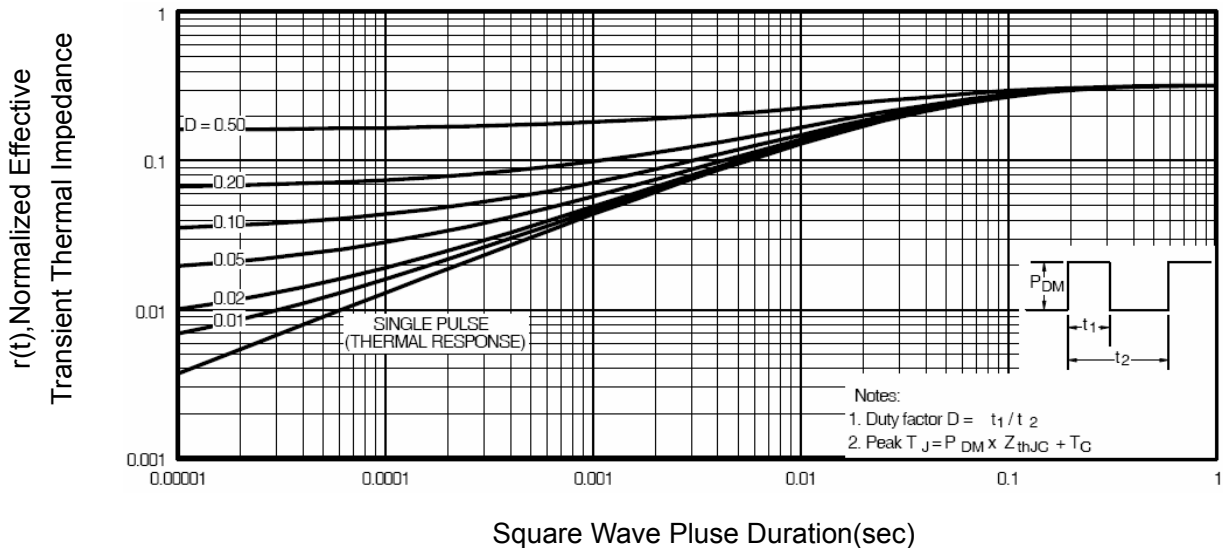
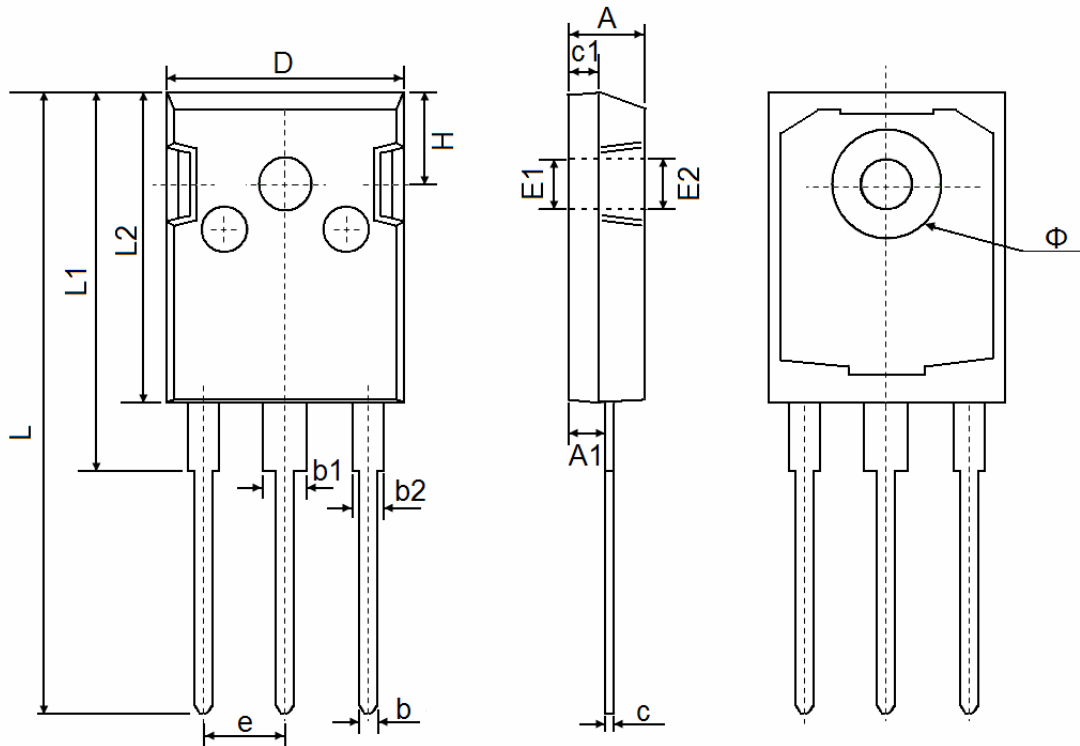


Figure 11 Normalized Maximum Transient Thermal Impedance

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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