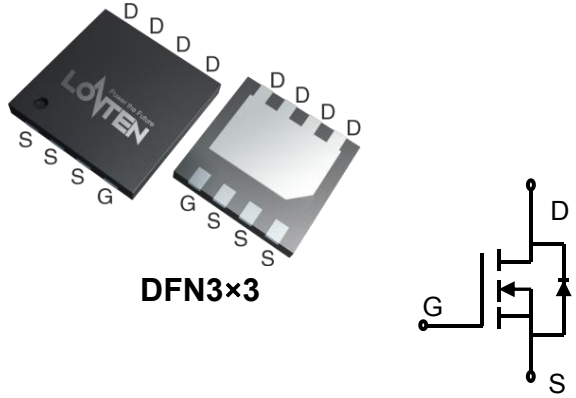


Lonten N-channel 40V, 20A, 12mΩ Power MOSFET

<p>Description</p> <p>These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.</p> <p>Features</p> <ul style="list-style-type: none"> ◆ 40V,20A,$R_{DS(ON),max}=12m\Omega@V_{GS}=10V$ ◆ Improved dv/dt capability ◆ Fast switching ◆ Green device available <p>Applications</p> <ul style="list-style-type: none"> ◆ Motor Drives ◆ UPS ◆ DC-DC Converter 	<p>Product Summary</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">V_{DSS}</td> <td style="padding: 2px;">40V</td> </tr> <tr> <td style="padding: 2px;">$R_{DS(on),max}@V_{GS}=10V$</td> <td style="padding: 2px;">12mΩ</td> </tr> <tr> <td style="padding: 2px;">I_D</td> <td style="padding: 2px;">20A</td> </tr> </table> <p>Pin Configuration</p> <div style="text-align: center;">  <p>DFN3×3</p> <p>N-Channel MOSFET</p> </div>	V_{DSS}	40V	$R_{DS(on),max}@V_{GS}=10V$	12mΩ	I_D	20A
V_{DSS}	40V						
$R_{DS(on),max}@V_{GS}=10V$	12mΩ						
I_D	20A						

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	40	V
Continuous drain current ($T_C = 25^\circ C$)	I_D	20	A
Continuous drain current ($T_C = 100^\circ C$)		12.5	A
Pulsed drain current ¹⁾	I_{DM}	80	A
Gate-Source voltage	V_{GSS}	± 20	V
Power Dissipation ($T_C = 25^\circ C$)	P_D	20	W
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6.25	$^\circ C/W$

Package Marking and Ordering Information

Device	Device Package	Marking
LNND04R120	DFN3×3	04R120

Electrical Characteristics
 $T_J = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=250\mu\text{A}$	40	---	---	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.0	---	2.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_J = 25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32\text{ V}, V_{GS}=0\text{ V}, T_J = 125^\circ\text{C}$	---	---	10	μA
Gate leakage current, Forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=12\text{ A}$	---	7.5	12	m Ω
		$V_{GS}=4.5\text{ V}, I_D=8\text{ A}$	---	9.5	16	m Ω
Forward transconductance	g_{fs}	$V_{DS}=5\text{ V}, I_D=20\text{ A}$	---	35	---	S
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{ MHz}$	---	1370	---	pF
Output capacitance	C_{oss}		---	149	---	
Reverse transfer capacitance	C_{rss}		---	115	---	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, V_{GS}=10\text{ V}, I_D = 10\text{ A}$	---	4.8	---	ns
Rise time	t_r		---	19.2	---	
Turn-off delay time	$t_{d(off)}$		---	73	---	
Fall time	t_f		---	21	---	
Gate resistance	R_g	$V_{GS}=0\text{ V}, V_{DS}=0\text{ V}, F=1\text{ MHz}$	---	3.5	---	Ω
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DS}=20\text{ V}, I_D=10\text{ A},$ $V_{GS}=10\text{ V}$	---	6	---	nC
Gate to drain charge	Q_{gd}		---	3.8	---	
Gate charge total	Q_g		---	25	---	
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I_S		---	---	20	A
Pulsed Source Current ⁽³⁾	I_{SM}		---	---	80	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{ V}, I_S=10\text{ A}, T_J=25^\circ\text{C}$	---	---	1.2	V
Reverse Recovery Time	t_{rr}	$I_S=10\text{ A}, di/dt=100\text{ A}/\mu\text{s}, T_J=25^\circ\text{C}$	---	34	---	ns
Reverse Recovery Charge	Q_{rr}		---	10.2	---	nC

Notes:

1: Repetitive Rating: Pulse width limited by maximum junction temperature.

 2: Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

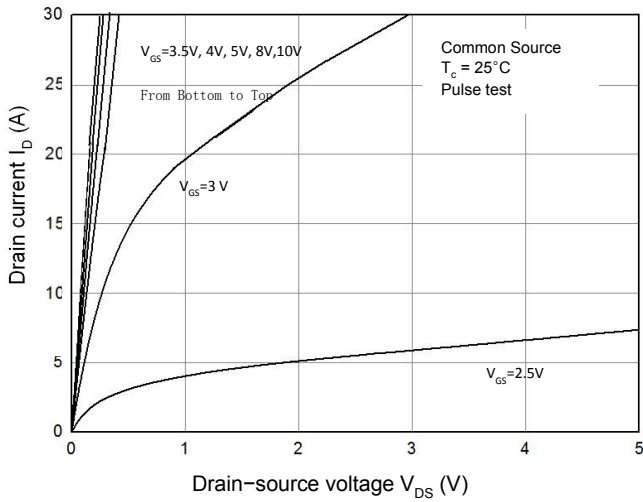


Figure 2. Transfer Characteristics

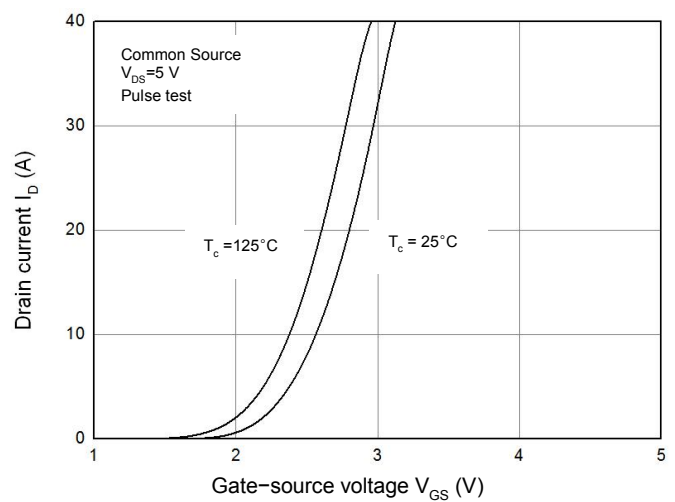


Figure 3. Capacitance Characteristics

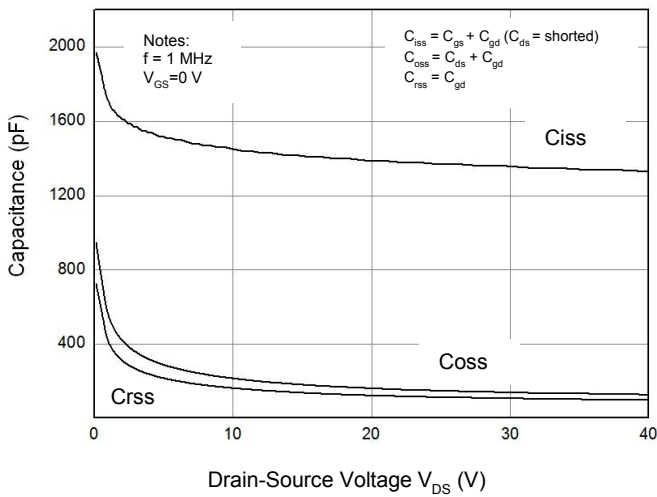


Figure 4. Gate Charge Waveform

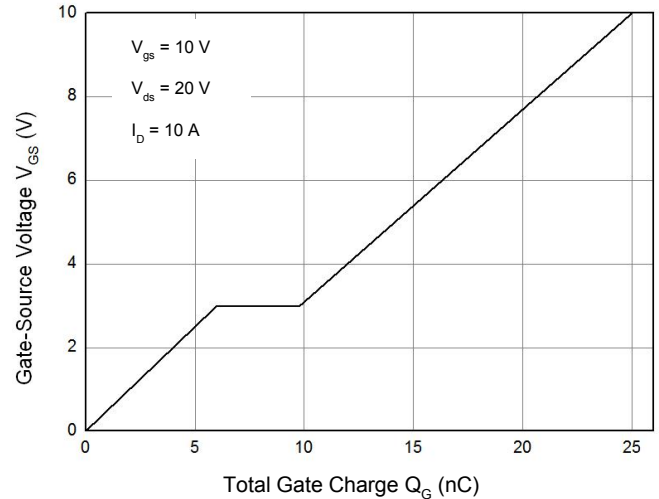


Figure 5. Body-Diode Characteristics

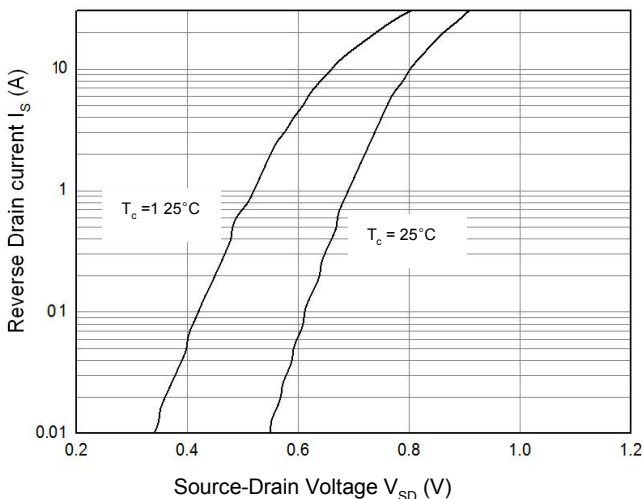


Figure 6. Rds(on)-Drain Current

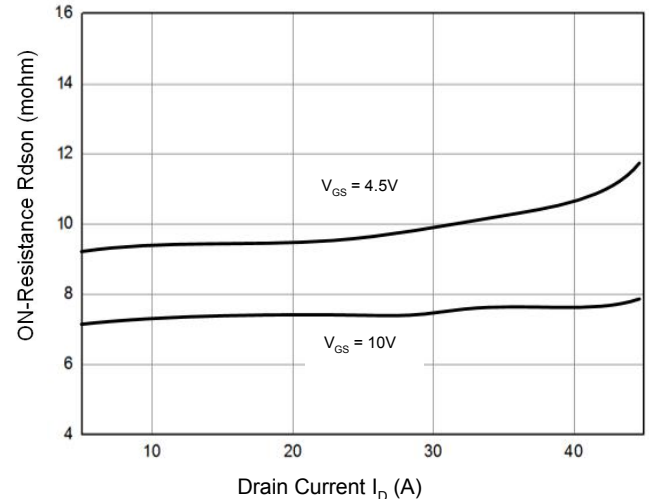


Figure 7. Rdson-Junction Temperature(°C)

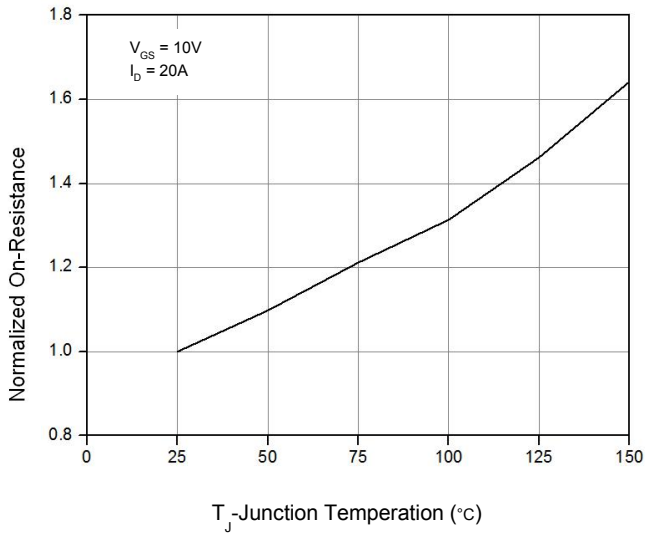


Figure 8. Maximum Safe Operating Area

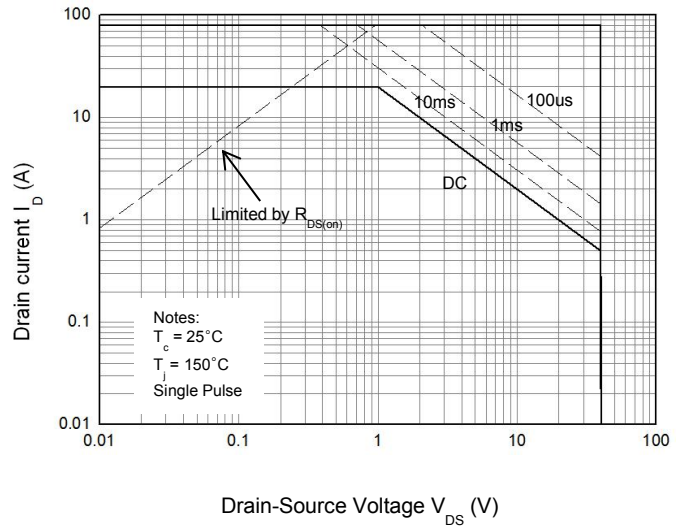
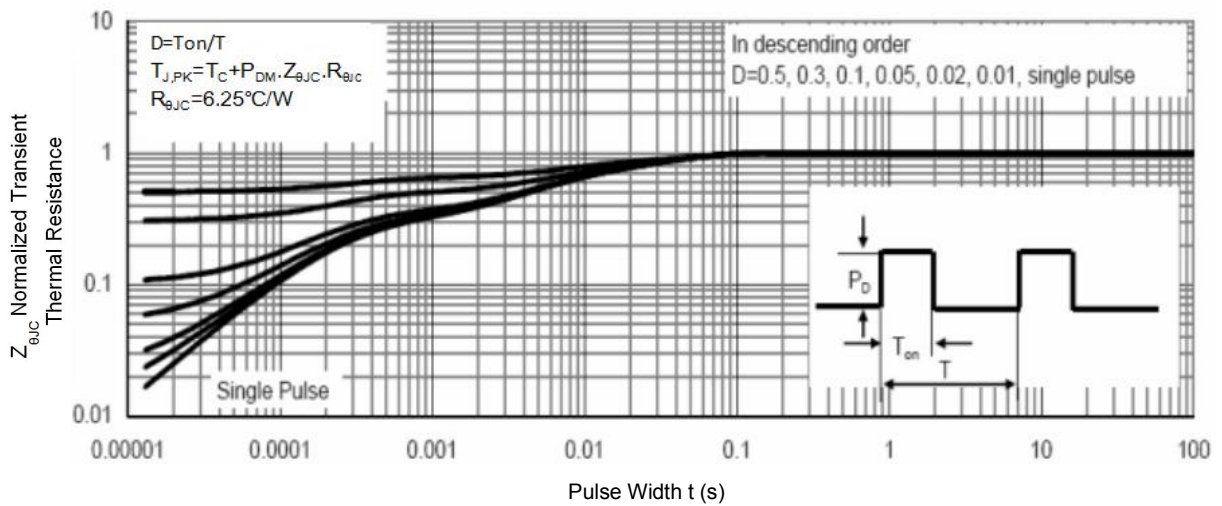


Figure 9. Normalized Maximum Transient Thermal Impedance (RthJC)



Test Circuit & Waveform

Figure 8. Gate Charge Test Circuit & Waveform

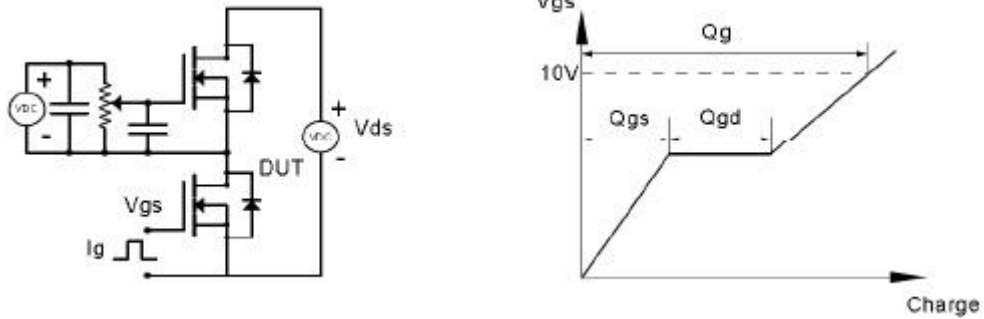


Figure 9. Resistive Switching Test Circuit & Waveforms

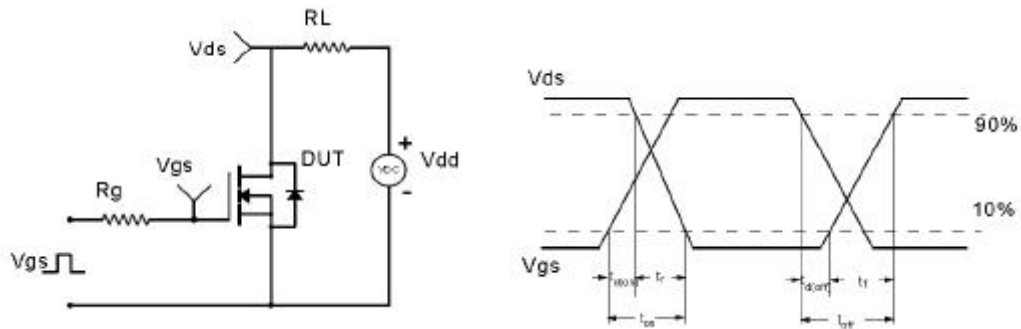


Figure 10. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

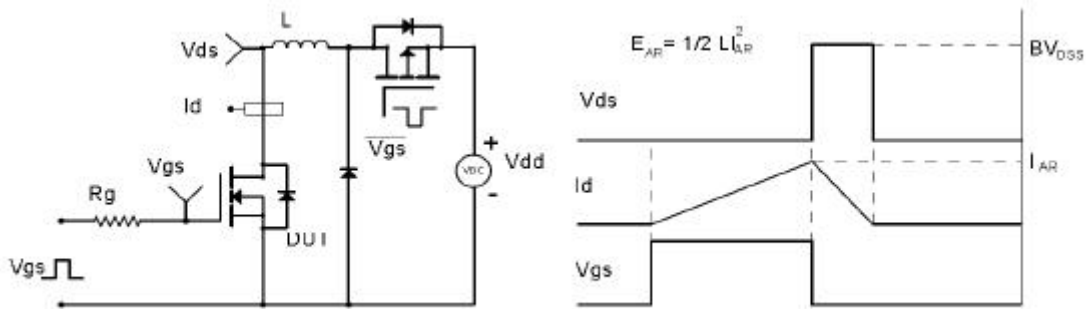
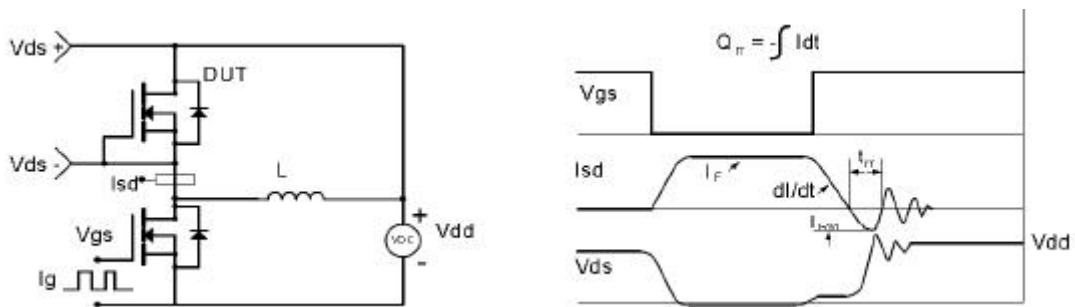
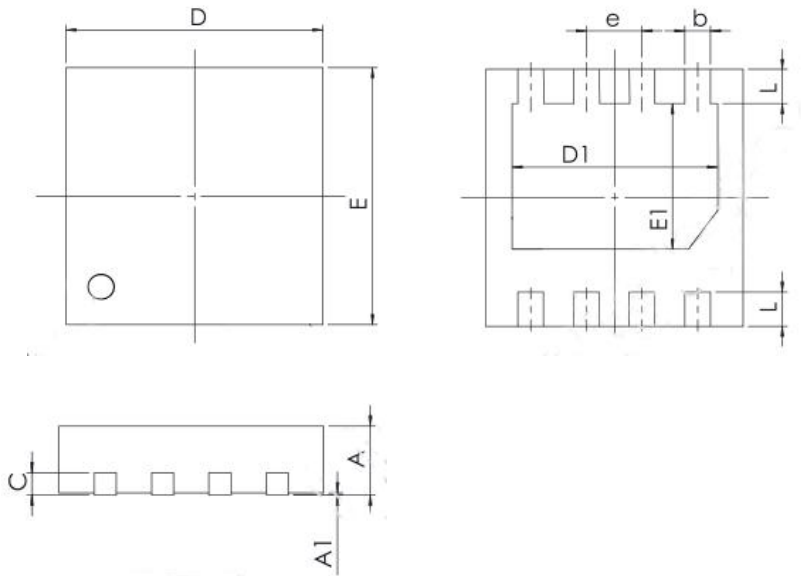


Figure 11. Diode Recovery Circuit & Waveform

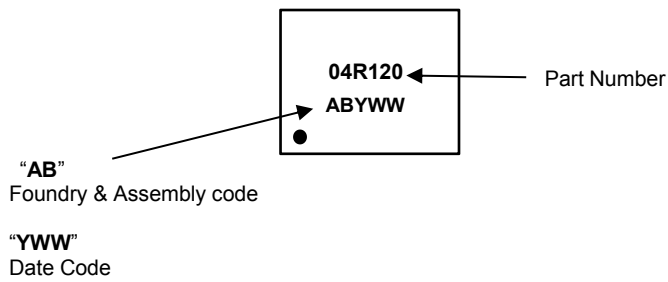


Mechanical Dimensions for DFN3×3



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	NA	0.02	0.05
b	0.25	0.30	0.35
c	0.18	0.20	0.30
D	2.95	3.00	3.07
E	2.95	3.00	3.07
D1	2.30	2.40	2.50
E1	1.60	1.70	1.80
L	0.30	0.40	0.50
e	0.65BSC		

DFN3×3 Part Marking Information



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