

General Description

These N-channel enhanced VDMOSFETS Used advanced trench technology design, provided excellent $R_{DS(on)}$ and low gate charge. Which accords with the RoHS standard.

Product Summary			
V_{DS}	$R_{DS(on)}$ (m Ω) Typ	I_D (A)	Q_g (Typ)
100V	3.0 @ 10V	170	95nc

Features

- Fast switching
- Low on-resistance
- Low gate charge and input capacitance
- 100% avalanche tested

Mechanical Data

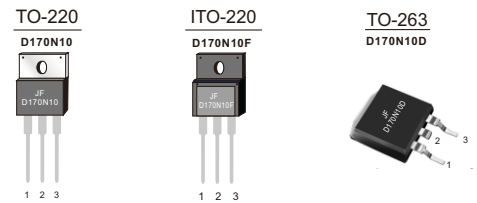
- Case: TO-220, ITO-220, TO-263 Package

Application

- Switching applications

Ordering Information

Part No.	Package Type	Package	Quality(box)
D170N10	TO-220	Tube	1000
D170N10F	ITO-220	Tube	1000
D170N10D	TO-263	Tape & Reel	800



Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

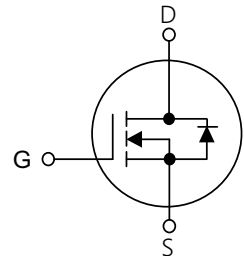


Table1 Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	D170N10/D170N10D	D170N10F	Unit
Drain-Source Voltage	V_{DS}	100		V
Gate-Source Voltage	V_{GS}	± 20		V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	170	A
		$T_C=100^\circ\text{C}$	100	
Pulsed Drain Current (Note 1)	I_{DM}	700		A
Single Pulse Avalanche Energy (Note2)	E_{AS}	1800		mJ
Single Pulse Avalanche Current (Note2)	I_{AS}	60		A
Power Dissipation $T_C=25^\circ\text{C}$	P_D	300	75	W
Operating Junction and Storage Temperature	T_J/T_{STG}	-50~+150		$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameter	Symbol	D170N10/D170N10D	D170N10F	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	64	64	$^{\circ}C/W$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.45	2	$^{\circ}C/W$

Table 3. Electrical Characteristics ($T_J=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate- Source Leakage Current	Forward	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
	Reverse	$V_{GS}=-20V, V_{DS}=0V$	-	-	-100	nA
On Characteristics(Note 4)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.8	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	3.0	3.6	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	-	-	$m\Omega$
Dynamic Characteristics(Note 5)						
Input Capacitance	C_{ISS}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$	-	5700	-	pF
Output Capacitance	C_{OSS}		-	3200	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	8	-	pF
Switching Characteristics (Note 5)						
Turn-On Delay Time	$t_d(on)$	$V_{DS}=50V, I_D=40A,$ $V_{GS}=10V, R_G=6\Omega$	-	23	-	ns
Turn-On Rise Time	t_r		-	18	-	ns
Turn-Off Delay Time	$t_d(off)$		-	62	-	ns
Turn-Off Fall Time	t_f		-	135	-	ns
Total Gate Charge	Q_G	$V_{DS}=80V, I_D=40A,$ $V_{GS}=10V$	-	95	-	nC
Gate-Source Charge	Q_{GS}		-	18	-	nC
Gate-Drain Charge	Q_{GD}		-	25	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Maximum Continuous Drain-Source Diode Forward Current	I_S		-	-	170	A
Pulsed Source Current	I_{SM}	$V_G V_D=0V, \text{Force Current}$	-	-	340	A

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
 2 $L=1mH, I_{AS}=50A, V_{DD}=25V, V_{GS}=10V, \text{Starting } T_J=25^{\circ}C$
 4 Pulse Test: Pulse width $\leq 300\mu S$, Duty cycle $\leq 2\%$
 5 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

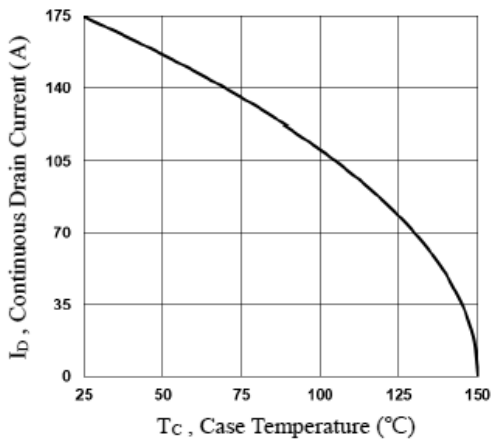


Fig.1 Continuous Drain Current vs. T_C

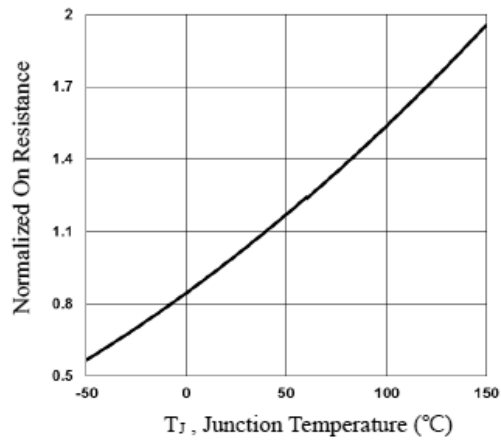


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

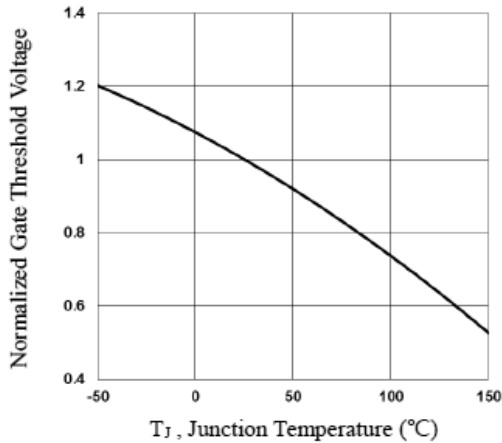


Fig.3 Normalized V_{th} vs. T_J

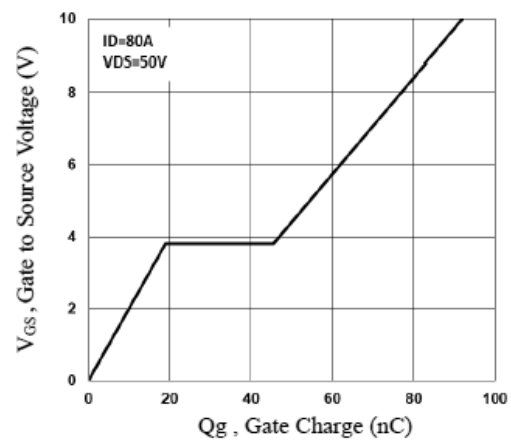


Fig.4 Gate Charge Characteristics

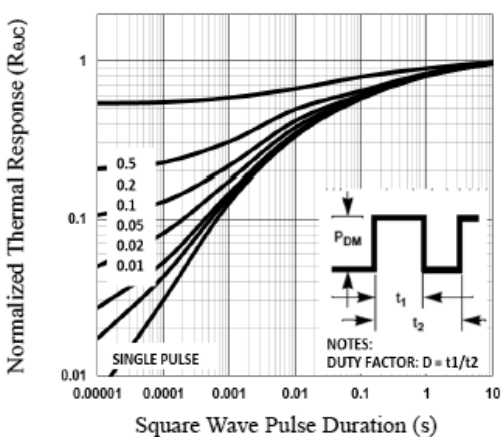


Fig.5 Normalized Transient Impedance

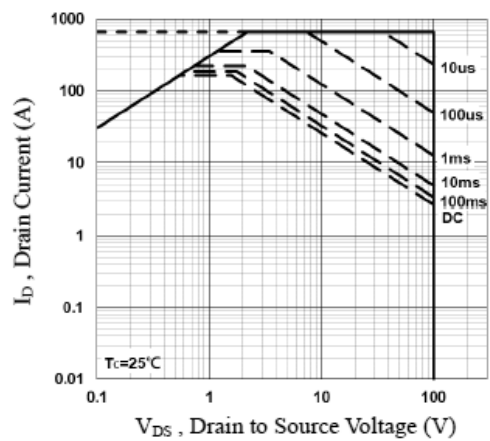


Fig.6 Maximum Safe Operation Area

Typical Characteristics Diagrams

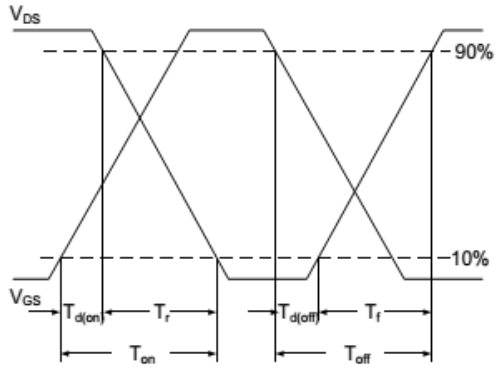


Fig.7 Switching Time Waveform

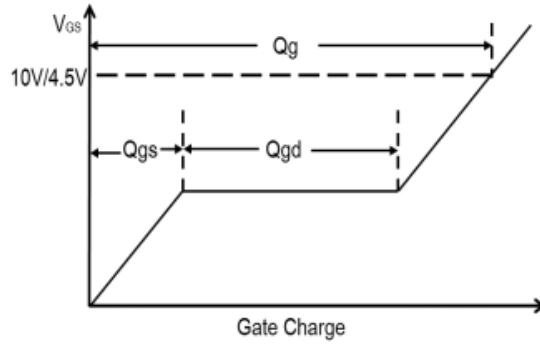
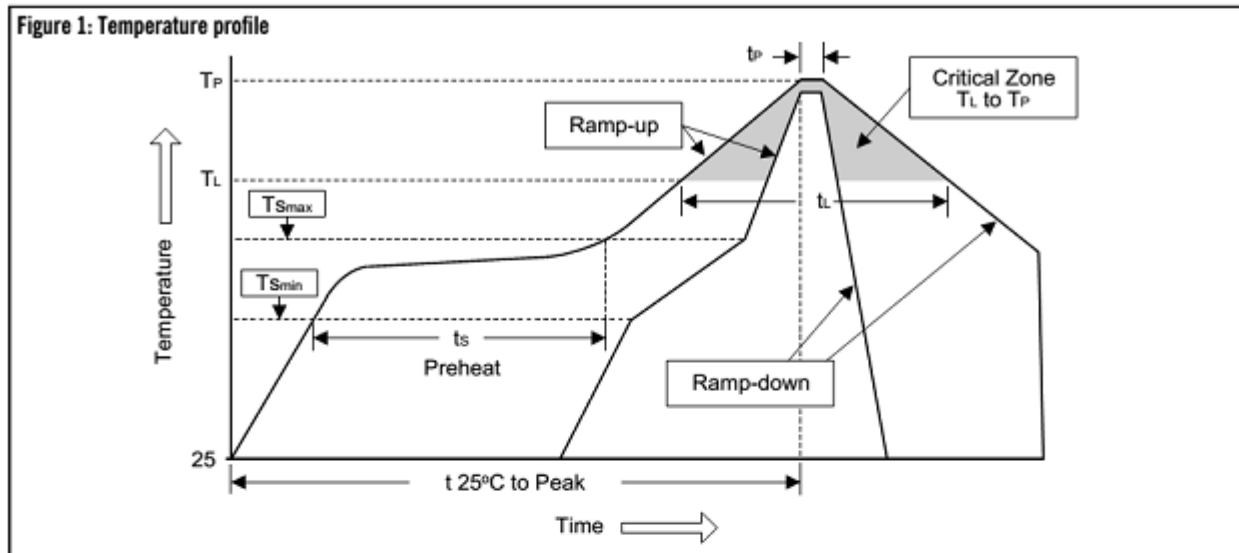


Fig.8 Gate Charge Waveform

Typical Test Circuit

Soldering Methods for Product

1. Storage environment: Temperature=10°C to35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

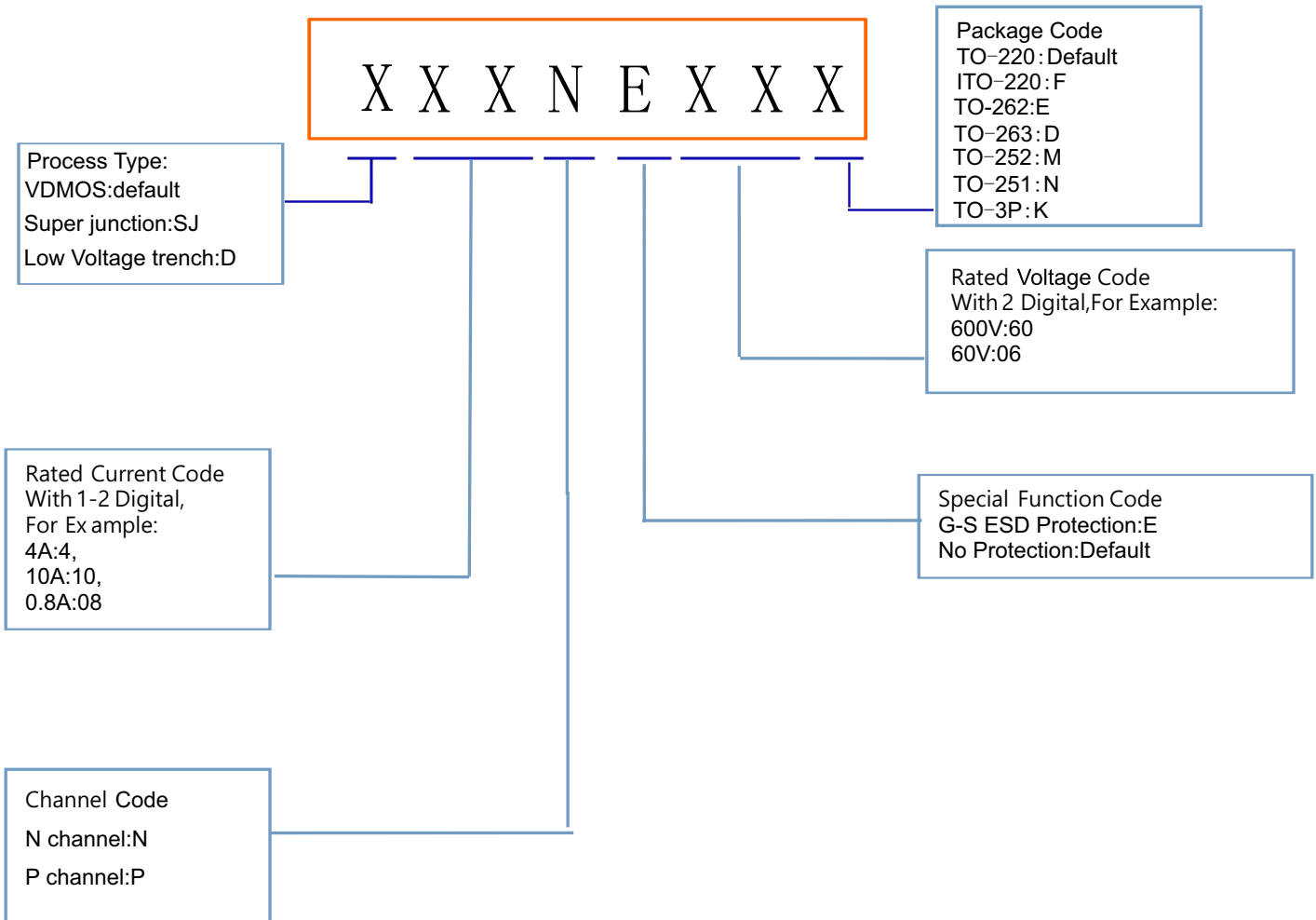


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T_{Smin})	100°C	150°C
- Temperature Max (T_{Smax})	150°C	200°C
- Time (min to max) (t_s)	60 to 120 sec	60 to 180 sec
T_{Smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60 to 150 sec	60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_p)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

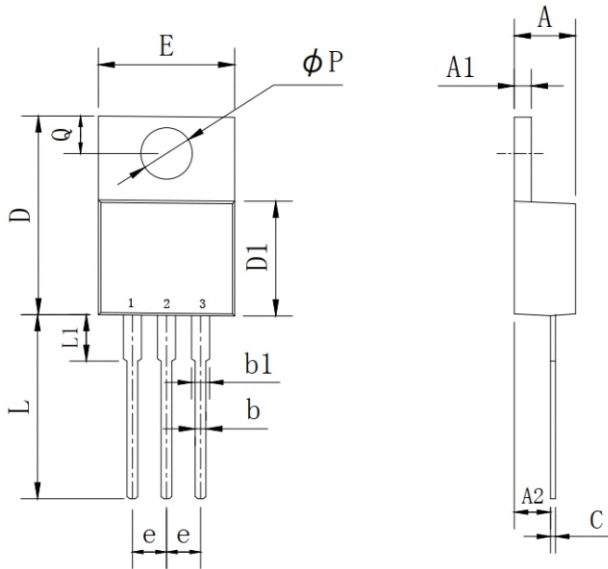
Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

Product Names Rules



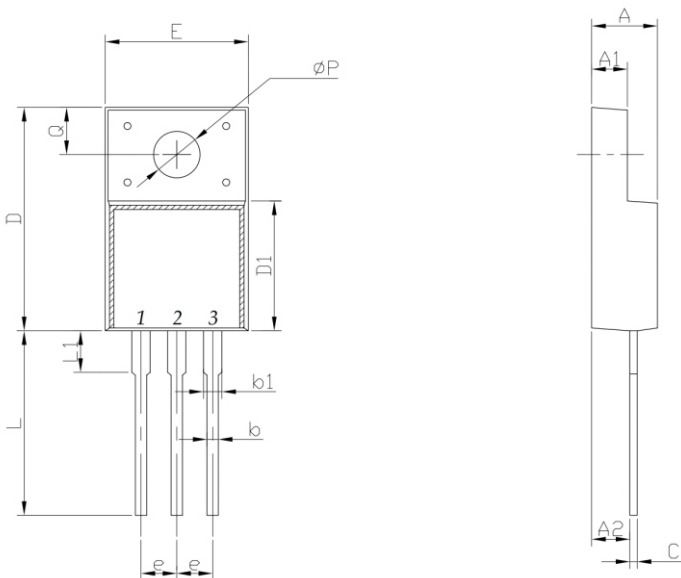
Dimensions

TO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	2.03	2.92	0.080	0.115
b	0.51	1.11	0.020	0.044
b1	0.97	1.6	0.038	0.063
C	0.3	0.7	0.012	0.028
D	14.6	15.9	0.575	0.626
D1	8.04	9.3	0.317	0.366
E	9.57	10.57	0.377	0.416
e	2.34	2.74	0.092	0.108
L	12.58	14.3	0.495	0.563
L1	2.8	4.2	0.110	0.165
P	3.4	4.14	0.134	0.163
Q	2.45	3	0.096	0.118

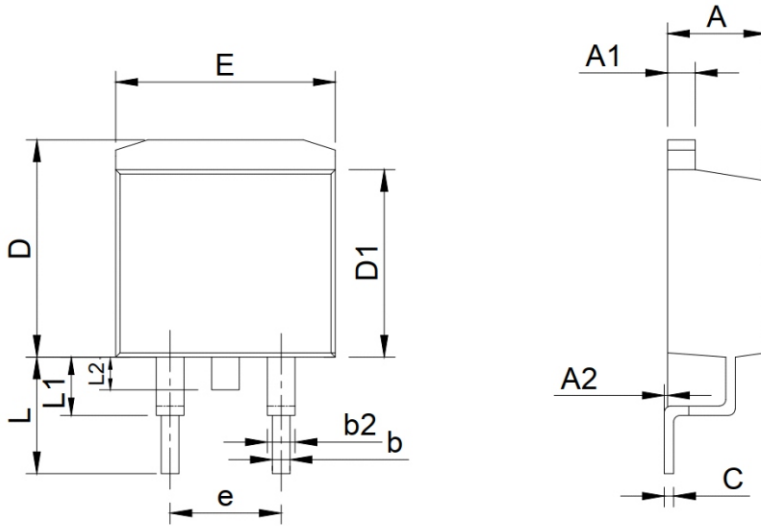
ITO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140

Dimensions

TO-263 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	0.208
L	4.46	5.85	0.176	0.230
L1	1.33	2.33	0.052	0.092
L2	0	2.2	0.000	0.087

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