

30V N And P-Channel Enhancement Mode MOSFET

Description

The Q003 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

◆ N-channel:

$V_{DS} = 30V$, $I_D = 7A$

$R_{DS(ON)} = 18m\Omega$ (typical) @ $V_{GS} = 4.5V$

$R_{DS(ON)} = 24m\Omega$ (typical) @ $V_{GS} = 2.5V$

P-Channel:

$V_{DS} = -30V$, $I_D = -7A$

$R_{DS(ON)} = 38.5m\Omega$ (typical) @ $V_{GS} = -4.5V$

$R_{DS(ON)} = 55m\Omega$ (typical) @ $V_{GS} = -2.5V$

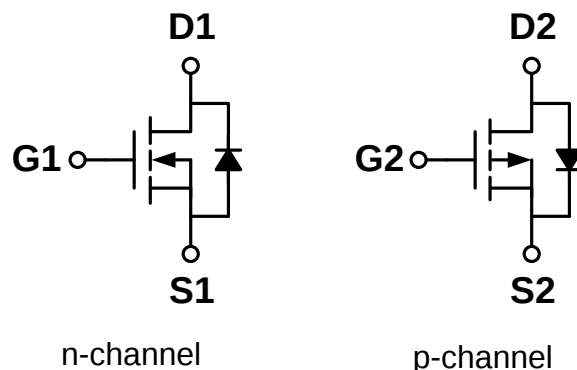
- ◆ Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(ON)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

Application

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



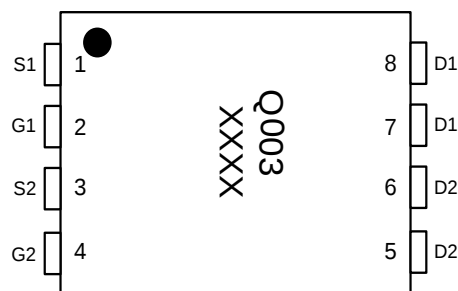
Schematic diagram



Marking and pin assignment

PDFN3×3-8L

(Top View)



Package

PDFN3×3-8L

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
Q003	-55°C to +150°C	PDFN3×3-8L	5000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	V_{DS}	30	-30	V
Gate-source voltage	V_{GS}	±12	±12	V
Maximum power dissipation	P_D	2.0	2.0	W

Operating junction Temperature range		T_j	-55—150	-55—150	°C
Drain Current-Continuous (Silicon Limited)	$T_A=25^{\circ}\text{C}$	I_D	7	-7	A
	$T_A=75^{\circ}\text{C}$		6	-6	
Pulsed Drain Current (Package Limited)		I_{DM}	30	-30	A
Avalanche Current ^C		I_{AS}, I_{AR}	10	23	A
Avalanche energy $L=0.1\text{mH}^C$		E_{AS}, E_{AR}	5	26	mJ
Power Dissipation ^B	$T_A=25^{\circ}\text{C}$	P_D	2	2	W
	$T_A=75^{\circ}\text{C}$		1.3	1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		°C

N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 10V$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.75	0.9	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=7A$	-	18	30	m Ω
		$V_{GS}=2.5V, I_D=7A$	-	24	45.5	
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=6A$	-	15	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V$ $f=1.0\text{MHz}$	-	359	-	pF
Output capacitance	C_{OSS}		-	60	-	
Reverse transfer capacitance	C_{RSS}		-	51	-	
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V,$ $f=1.0\text{MHz}$	-	3.2	5	Ω
Switching Characteristics						
Turn-on delay time	$t_{D(on)}$	$V_{DS}=15V$ $V_{GS}=10V$ $R_L=2.5\Omega$ $R_{GEN}=3\Omega$	-	4.5	-	ns
Rise time	t_r		-	2.5	-	
Turn-off delay time	$t_{D(off)}$		-	14.5	-	
Fall time	t_f		-	3.5	-	
Total gate charge	Q_g	$V_{DS}=15V, I_D=6A$ $V_{GS}=5V$	-	6.7	-	nC
Gate-source charge	Q_{gs}		-	0.7	-	
Gate-drain charge	Q_{gd}		-	2.1	-	

Thermal Characteristics

Thermal Resistance junction-to ambient	$R_{th JA}$	100	°C/W
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Typical Electrical And Thermal Characteristics

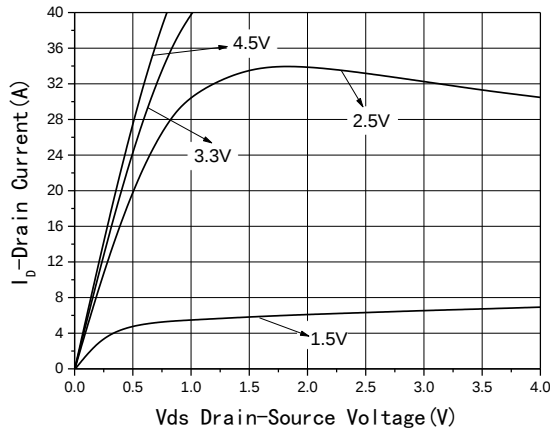


Fig1 Output Characteristics

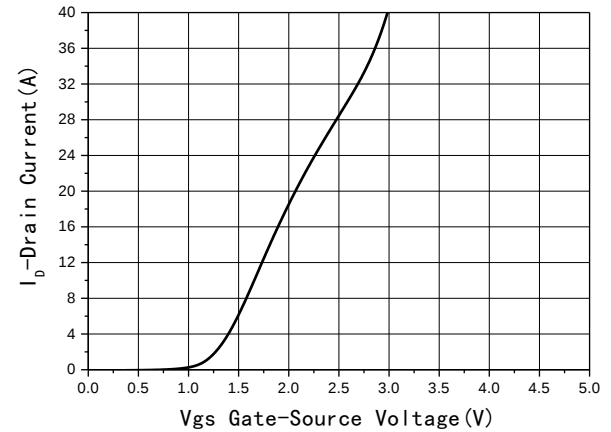


Fig2 Transfer Characteristics

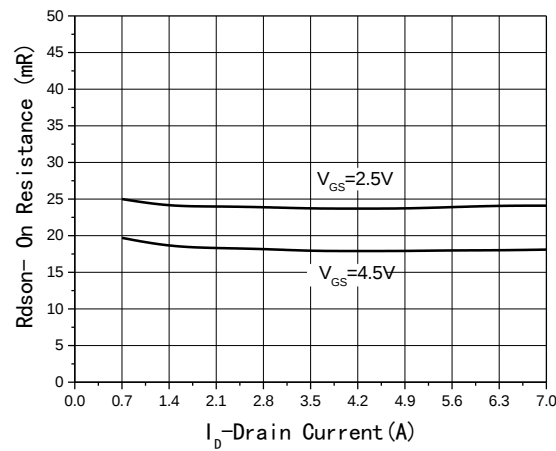


Fig3 $R_{DS(on)}$ -Drain current

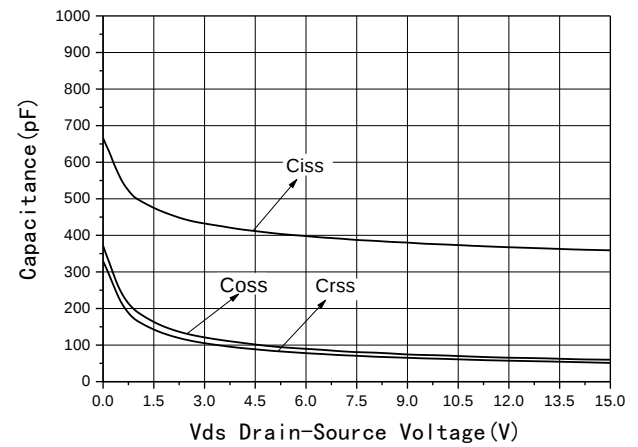


Fig4 Capacitance vs V_{DS}

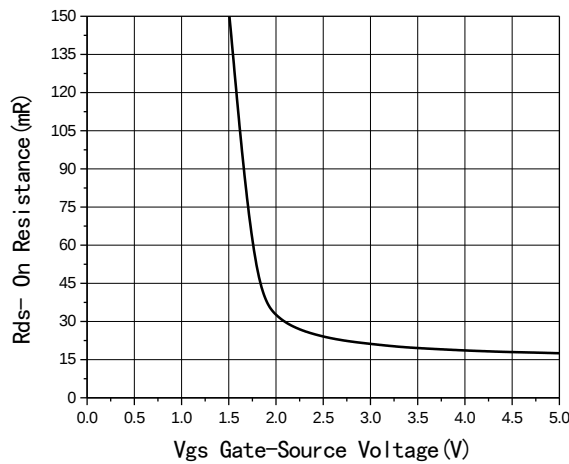


Fig5 $R_{DS(on)}$ -Gate Drain voltage

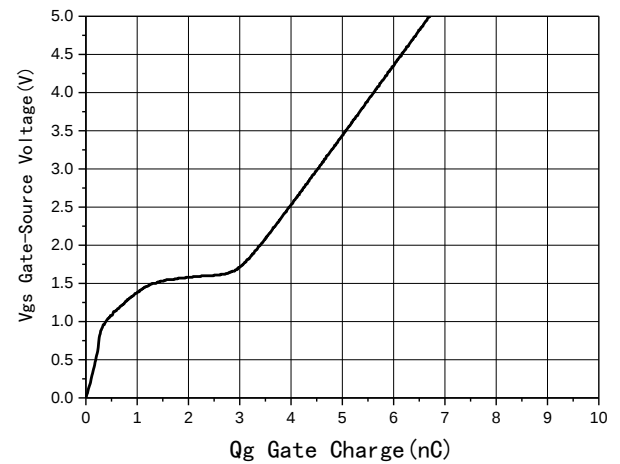


Fig6 Gate Charge

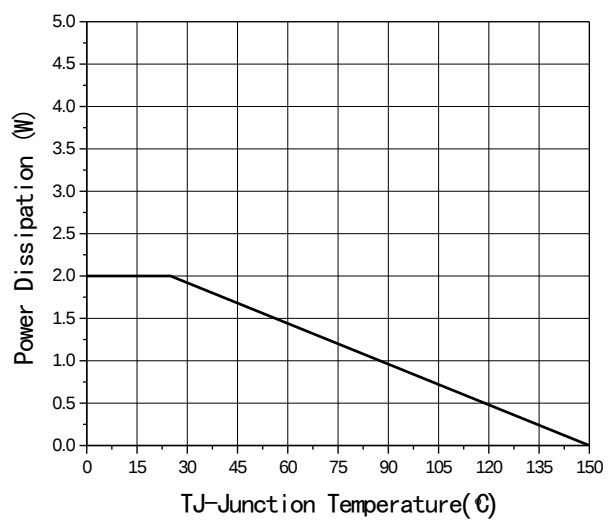


Fig7 Power De-rating

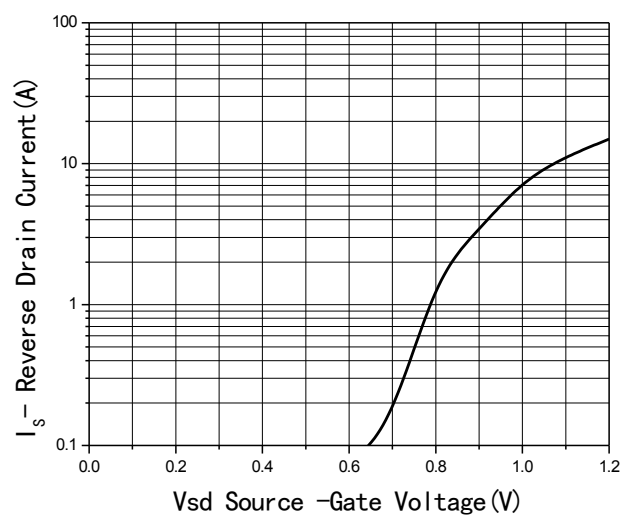


Fig8 Source-Drain Diode Forward

P-Channel Electrical Characteristics (T_J=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	-30	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V	-	-	-1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.6	-0.9	-1.4	V
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =-4.5V, I _D =-6A	-	38.5	58.2	mΩ
		V _{GS} =-2.5V, I _D =-5A	-	55	97	
Forward transconductance	gfs	V _{DS} =-5V, I _D =-6A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =-15V, V _{GS} =0V f=1.0MHz	-	867	-	pF
Output capacitance	C _{OSS}		-	75	-	
Reverse transfer capacitance	C _{RSS}		-	64	-	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	-	3.2	5	Ω
Switching Characteristics						
Turn-on delay time	t _{D(ON)}	V _{DS} =-15V V _{GS} =-10V R _L =2.3Ω R _{GEN} =3Ω	-	8	-	ns
Rise time	t _r		-	6	-	
Turn-off delay time	t _{D(OFF)}		-	17	-	
Fall time	t _f		-	5	-	
Total gate charge	Q _g	V _{DS} =-15V, I _D =-6A V _{GS} =-5V	-	10.6	-	nC
Gate-source charge	Q _{gs}		-	1.7	-	
Gate-drain charge	Q _{gd}		-	3	-	

Typical Electrical And Thermal Characteristics

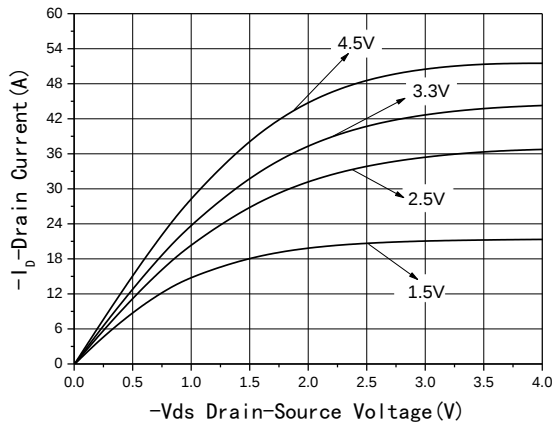


Fig1 Output Characteristics

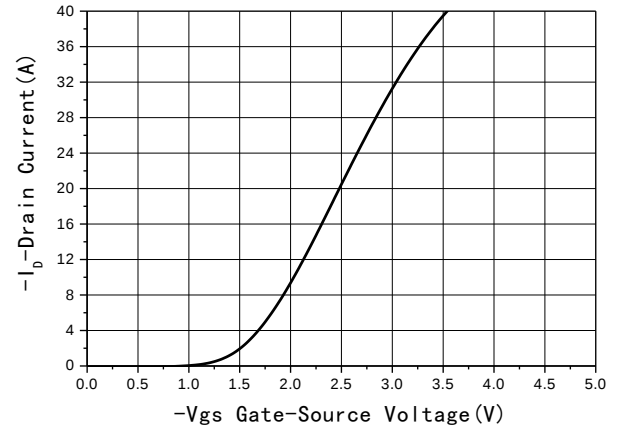


Fig2 Transfer Characteristics

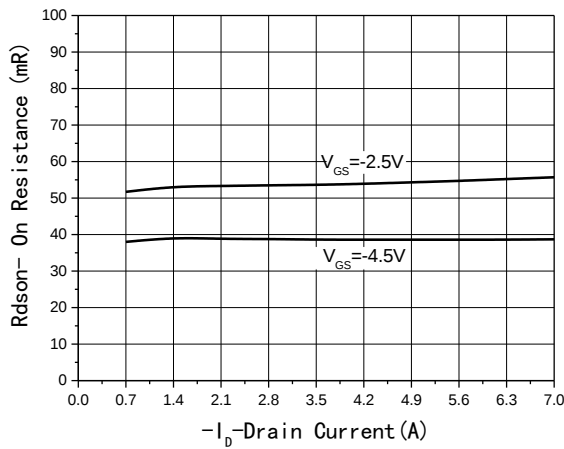


Fig3 Rdson-Drain current

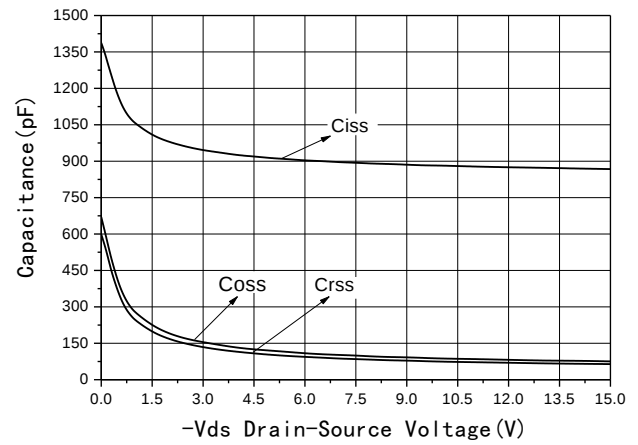


Fig4 Capacitance vs Vds

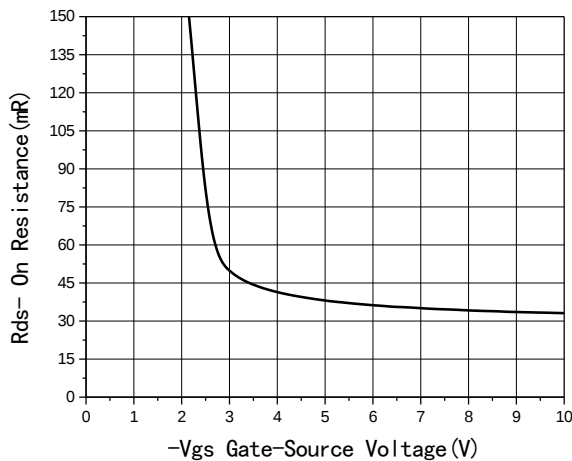


Fig5 Rdson-Gate Drain voltage

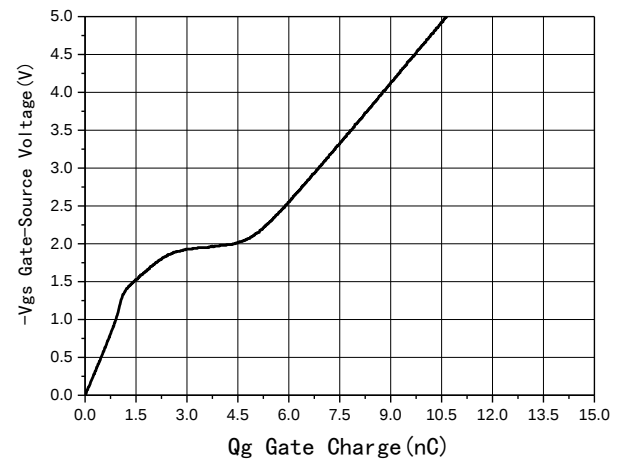


Fig6 Gate Charge

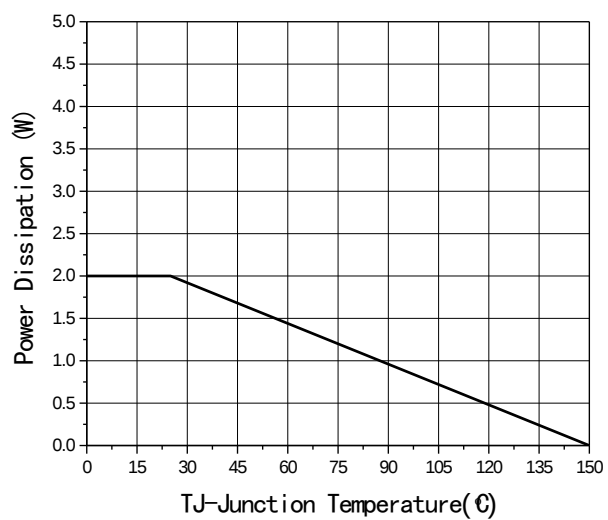


Fig7 Power De-rating

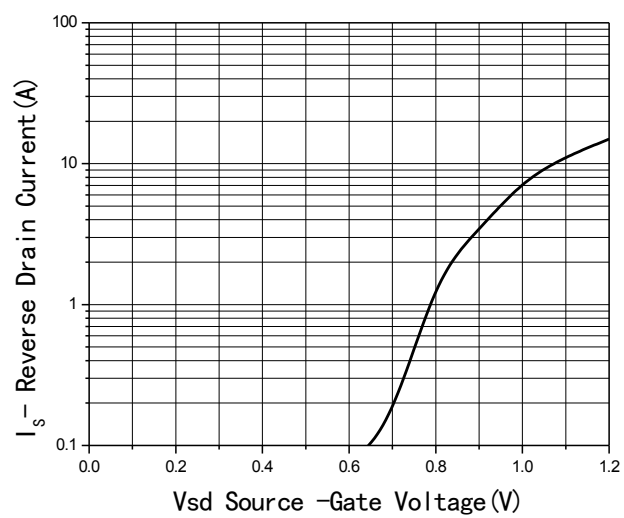
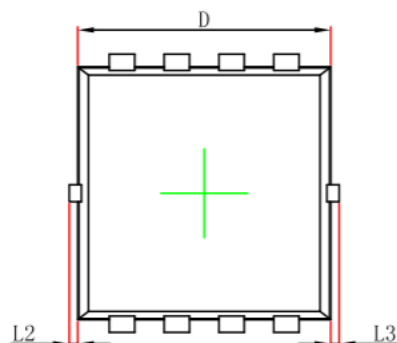


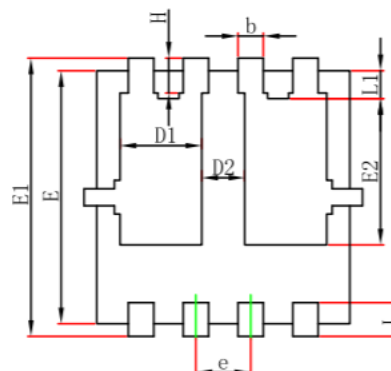
Fig8 Source-Drain Diode Forward

Package Information

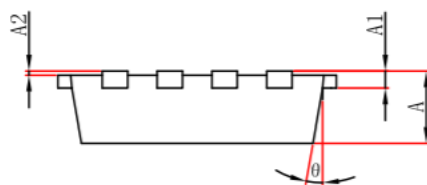
● PDFN3*3-8L



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	0.935	1.135	0.037	0.045
D2	0.280	0.480	0.011	0.019
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°