



XYD042N100

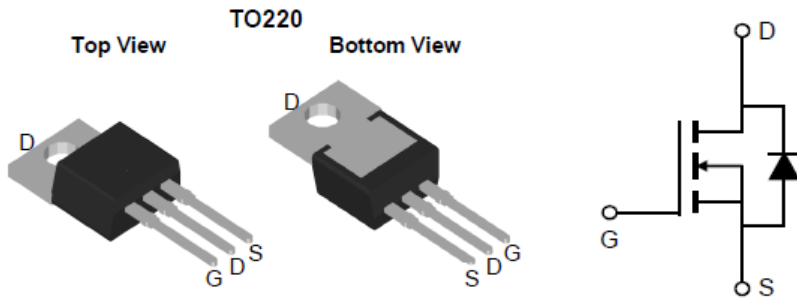
100V N-channel Shielding Gate MOSFET

Features

- N-channel, normal level
- Excellent Gate charge $\times R_{DS(on)}$ (FOM)
- Very low on-resistance $R_{DS(on)}$

This chip is used for:

- Industrial power supplies
- Boost converters
- Rectifier
- Telecom
- Industrial power supplies



Symbol	Parameter	Value	Units
V _{DS}	Drain-Source Voltage	100	V
I _D	Drain Current - Continuous (TC= 25°C)	170	A
	Drain Current - Continuous (TC= 100°C)	120	A
I _{DM}	Drain Current - Pulsed (Note 1)	380	A
V _{GS}	Gate-Source Voltage	± 20	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	660	mJ
P _D	Power Dissipation (TC = 25°C)	215	W
T _j , T _{stg}	Operating and Storage Temperature Range	-55 to +175	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	0.44	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	50	°C/W

Electrical Characteristics TC = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	110			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	3	4	V
$R_{DS(On)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 70\text{ A}$		3.4	3.8	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 70\text{ A}$ (Note 3)		122		S
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{GS}=0\text{V},$		5678		pF
C_{oss}	Output capacitance	$V_{DS}=50\text{V},$		673		pF
C_{riss}	Reverse transfer capacitance	$f=1\text{MHz}$		27		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DS} = 50\text{ V}, I_D = 70\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 4.7\ \Omega$ (Note 3, 4)		25		ns
t_r	Rising Time			33		ns
$t_{d(off)}$	Turn Off Delay Time			37		ns
t_f	Fall Time			18		ns
Q_g	Total Gate Charge	$V_{DS} = 50\text{ V}, I_D = 70\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3, 4)		48.5		nC
Q_{gs}	Gate-Source Charge			2		nC
Q_{gd}	Gate-Drain Charge			32		nC
R_g	Gate Resistance	$V_{DS} = 0\text{ V}, \text{Scan F mode}$		2		Ω
Drain-Source Diode Characteristics and Maximum Ratings						
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 140\text{ A}$			1.2	V
T_{rr}	Reverse recovery time	$I_S = 70\text{ A}, V_{GS} = 0\text{ V},$ $di_F/dt = 100\text{ A}/\mu\text{s}$		71		ns
Q_{rr}	Reverse recovery charge			144		nC
Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. $L = 0.5\text{ mH}, I_{AS} = 28\text{ A}, V_{DD} = 10\text{ V}, R_G = 25\ \Omega,$ Starting $T_j = 25^\circ\text{C}$ 3. $I_{SD} \leq 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS},$ Starting $T_j = 25^\circ\text{C}$ 4. Pulse Test : Pulse width $\leq 300\ \mu\text{s},$ Duty cycle $\leq 2\%$ 5. Essentially independent of operating temperature						

Typical Electronic and Thermal Characteristics

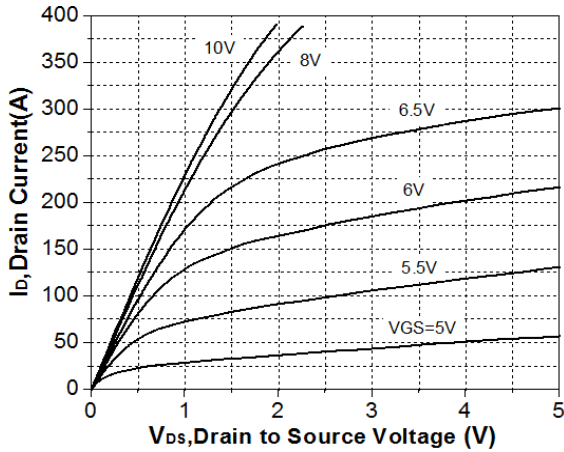


Figure 1. On-Region Characteristics

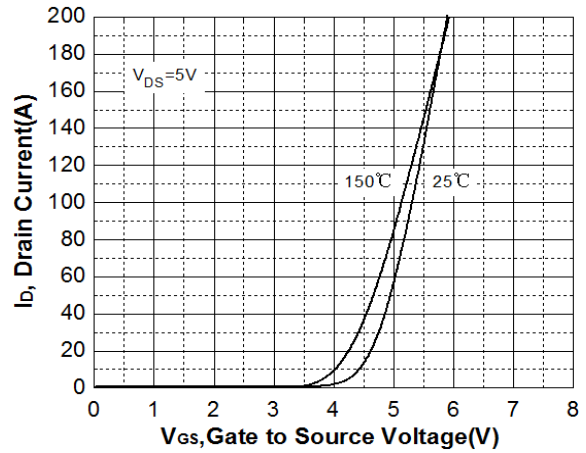


Figure 2. Transfer Characteristics

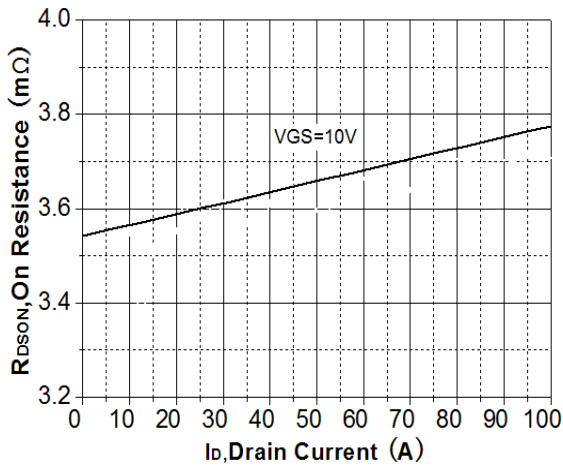


Figure 3. On-Resistance Variation vs Drain Current

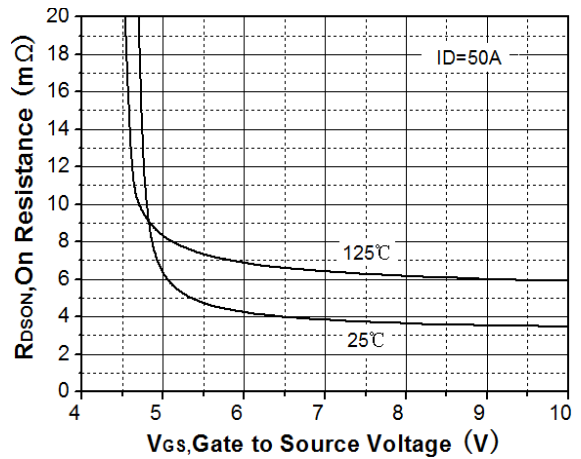


Figure 4. On-Resistance Vs Gate to Source Voltage

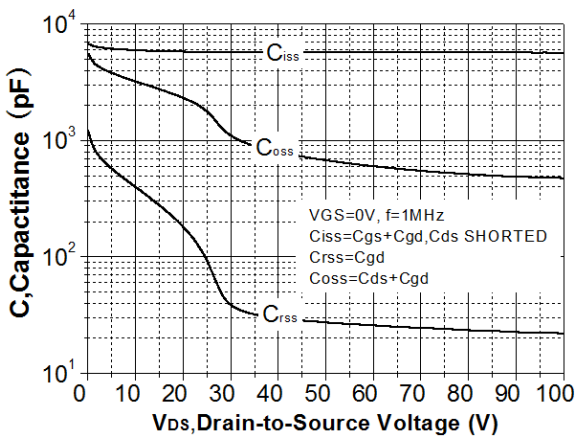


Figure 5. Capacitance Characteristics

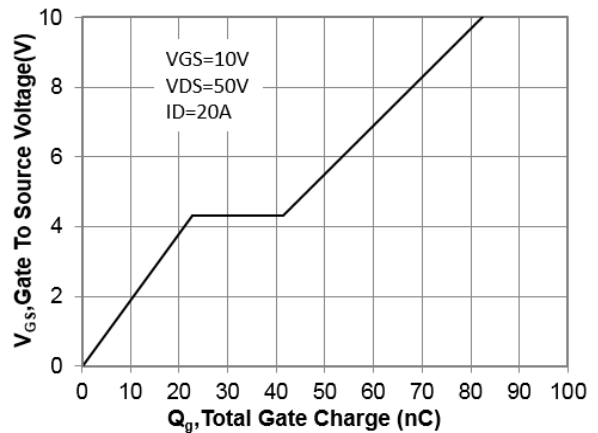


Figure 6. Gate Charge Characteristics

Typical Electronic and Thermal Characteristics

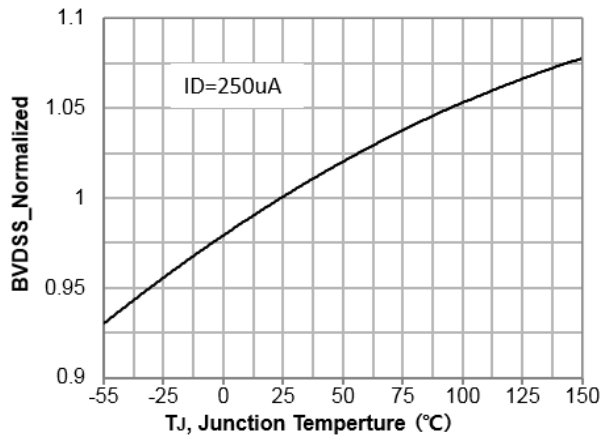


Figure 7. Breakdown Voltage Variation vs Temperature

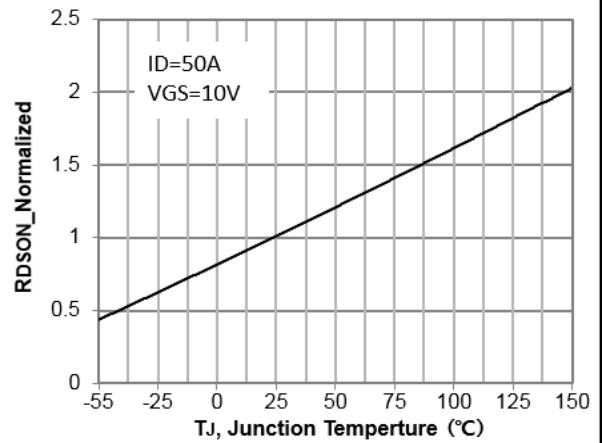


Figure 8. On-Resistance Variation vs Temperature

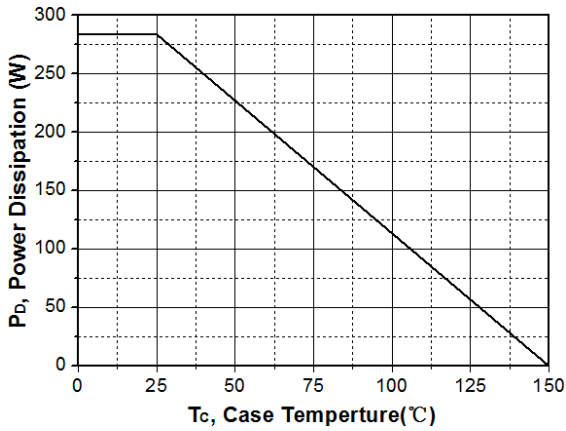


Figure 9. Power Dissipation

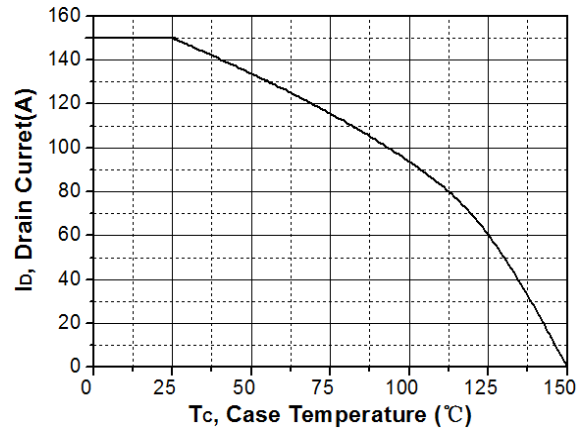


Figure 10. Drain Current Derating

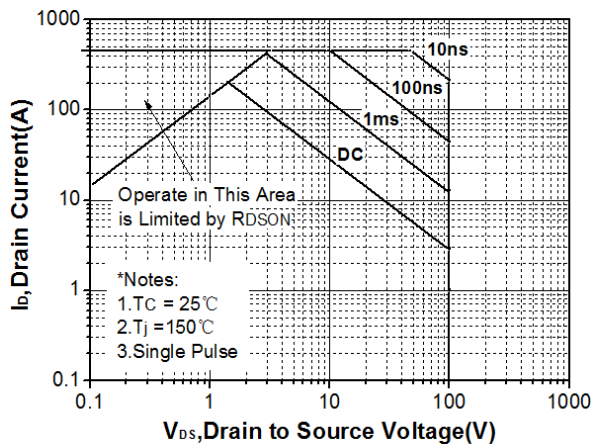


Figure 11. Maximum Safe Operating Area

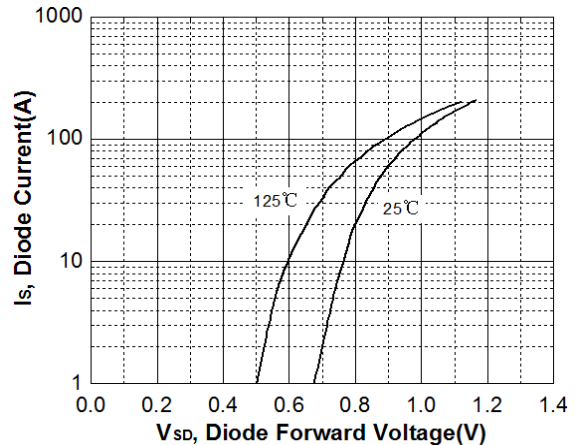


Figure 12. Body-diode Forward Characteristics

Typical Electronic and Thermal Characteristics

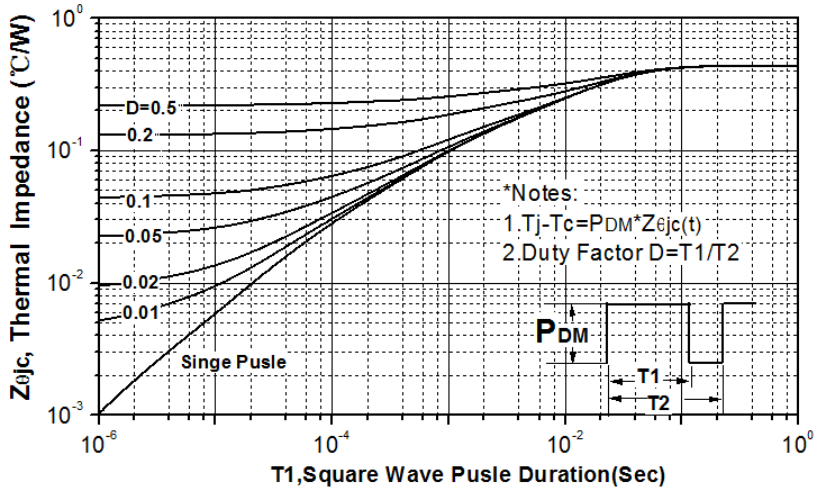
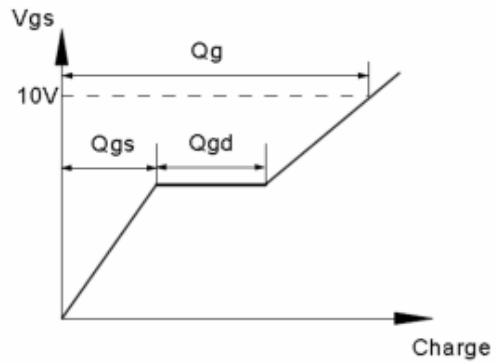
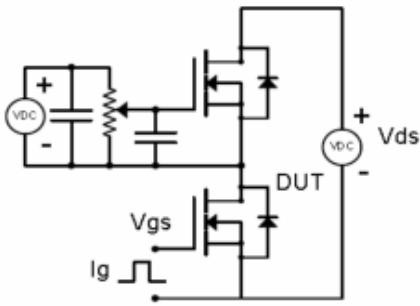


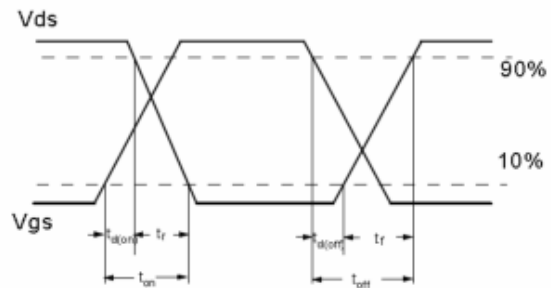
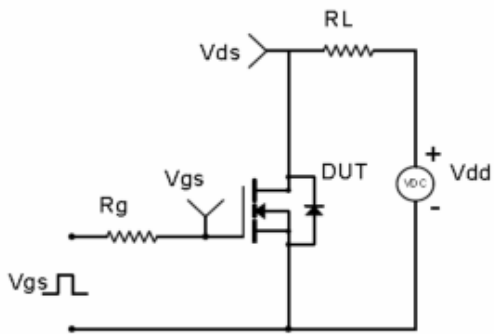
Figure 13. Transient Thermal Response Curve

Test Circuit & Waveform

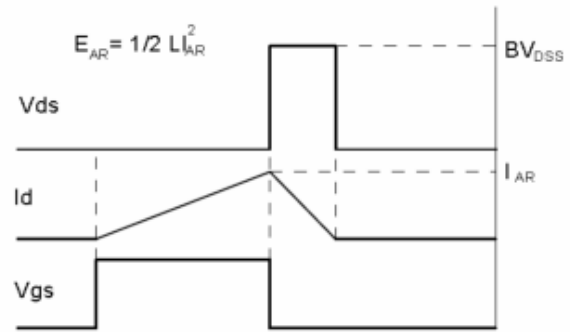
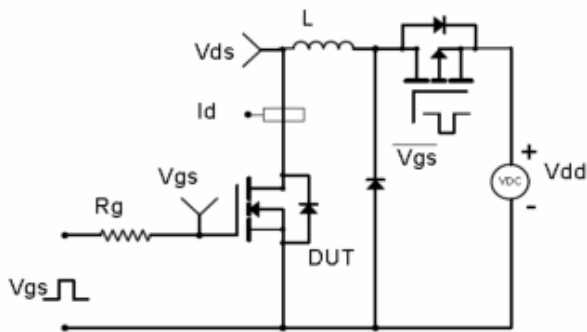
Gate Charge Test Circuit & Waveform



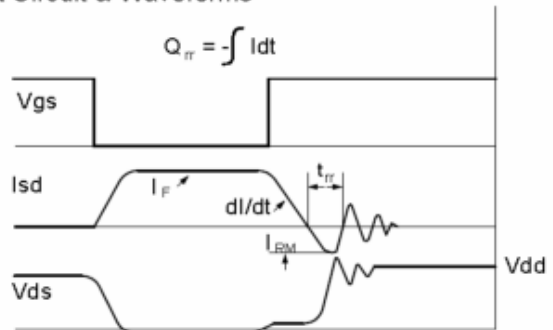
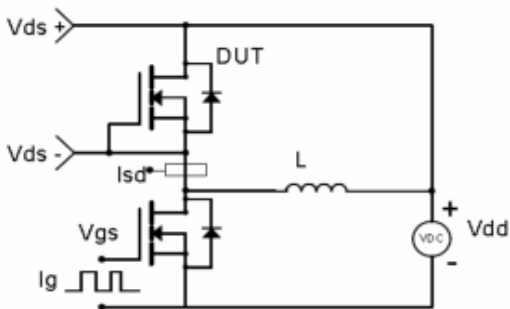
Resistive Switching Test Circuit & Waveforms



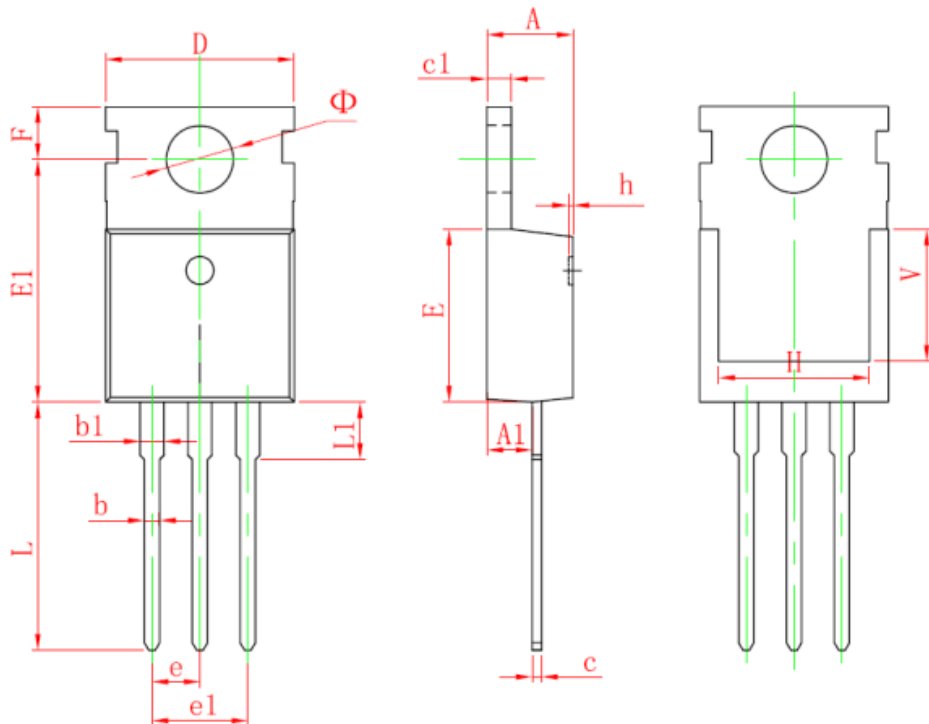
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Dimensions : TO-220-3L(T0.5mm) PACKAGE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150