MORESEMI

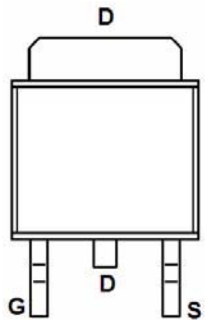
MSP0330D

-30V(D-S) P-Channel Enhancement Mode Power MOS FET

General Features

- V_{DS} =-30V,I_D =-30A
  $R_{DS(ON)}$ <18mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ <30mΩ @ V_{GS}=-4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Lead Free

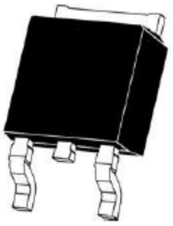


Marking and pin assignment

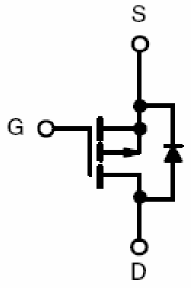
Application

- High side switch for full bridge converter
- DC/DC converter for LCD display

PIN Configuration



TO-252-2L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MSP0330D	MSP0330D	TO-252-2L	-	-	2500PCS

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-30	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-21.2	A
Pulsed Drain Current	I_{DM}	-70	A
Maximum Power Dissipation	P_D	60	W
Derating factor		0.4	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	169	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Case(Note 2)	$R_{\theta JC}$	2.5	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

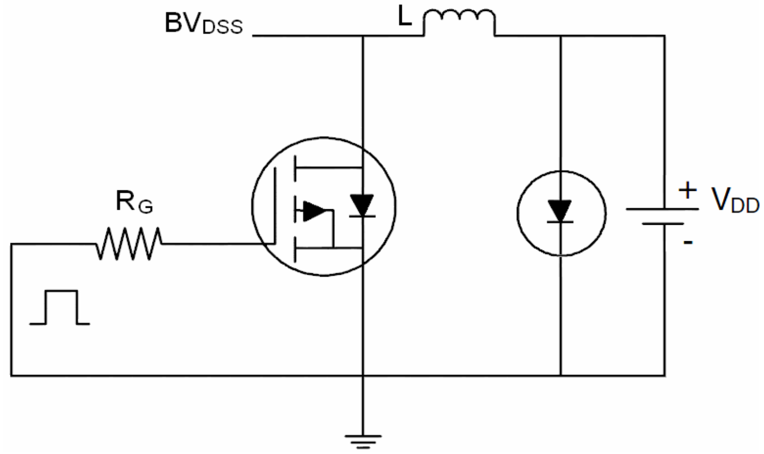
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.2	-1.6	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A	-	13	18	mΩ
		V_{GS}=-4.5V, I_D=-15A	-	22	30	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-20A	-	25	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	1363	-	PF
Output Capacitance	C_{oss}		-	250	-	PF
Reverse Transfer Capacitance	C_{rss}		-	210	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_L=3Ω, V_{GS}=-10V,R_G=2.5Ω	-	9	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	nS
Turn-Off Fall Time	t_f		-	20	-	nS
Total Gate Charge	Q_g	V_{DS}=-15,I_D=-15A, V_{GS}=-10V	-	31.2		nC
Gate-Source Charge	Q_{gs}		-	3.2		nC
Gate-Drain Charge	Q_{gd}		-	9.2		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-15A	-		-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-20	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF =- 15A di/dt = -100A/μs(Note3)	-	24		nS
Reverse Recovery Charge	Qrr		-	16		nC

Notes:

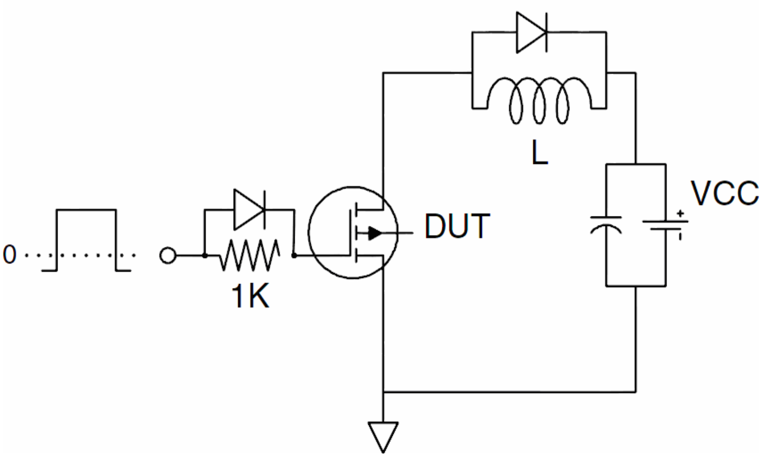
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: Tj=25℃,V_{DD}=-15V,V_G=-10V,L=0.5mH,Rg=25Ω,I_{AS}=-26A

Test Circuit

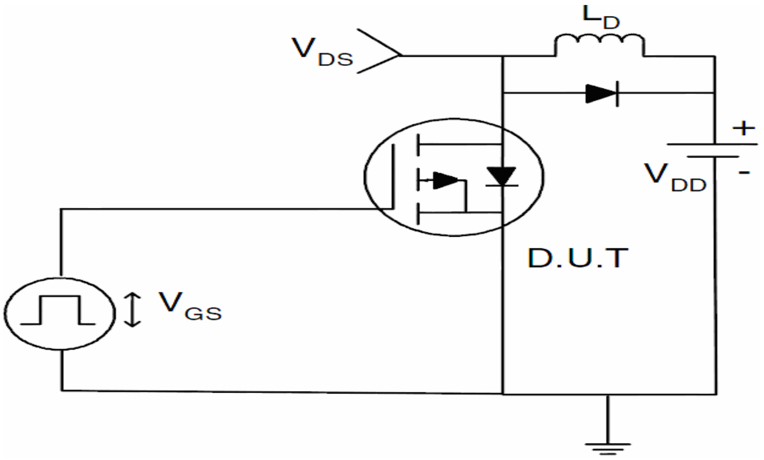
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

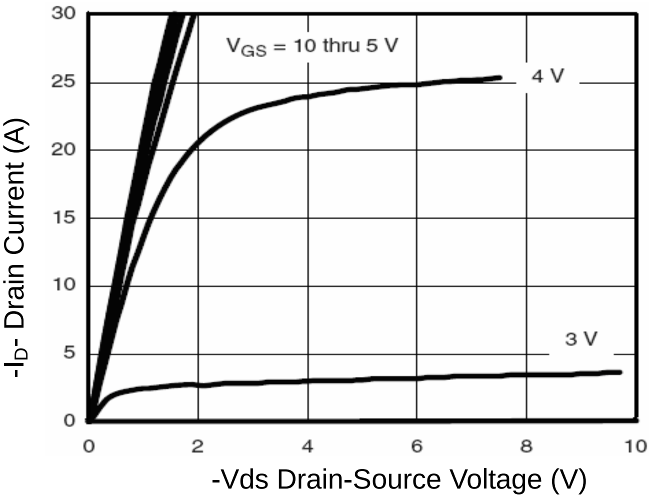


Figure 1 Output Characteristics

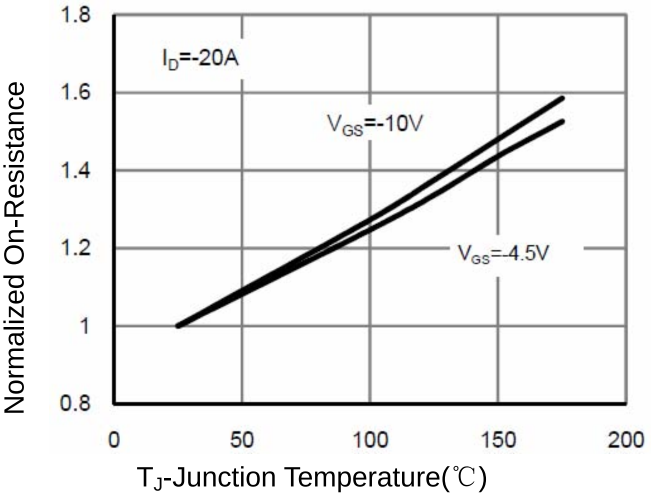


Figure 4 Rdson-Junction Temperature

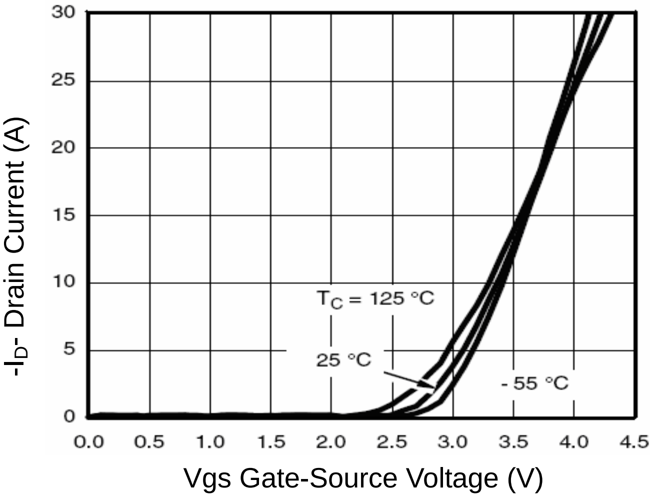


Figure 2 Transfer Characteristics

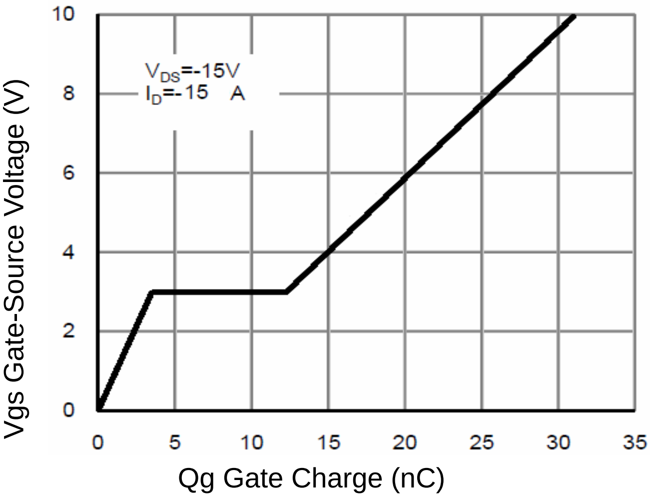


Figure 5 Gate Charge

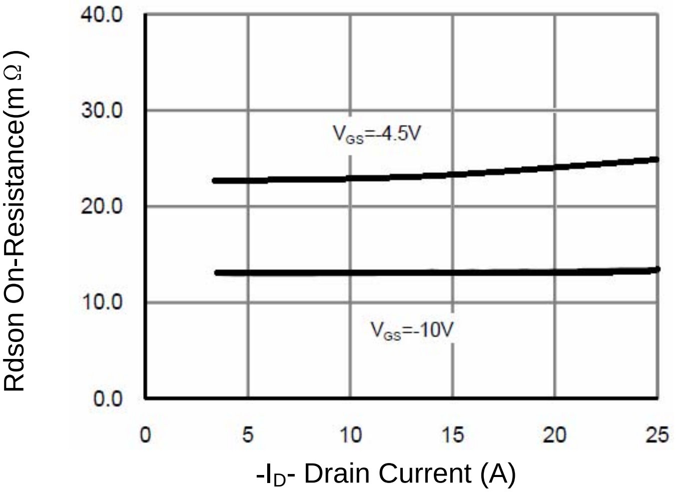


Figure 3 Rdson- Drain Current

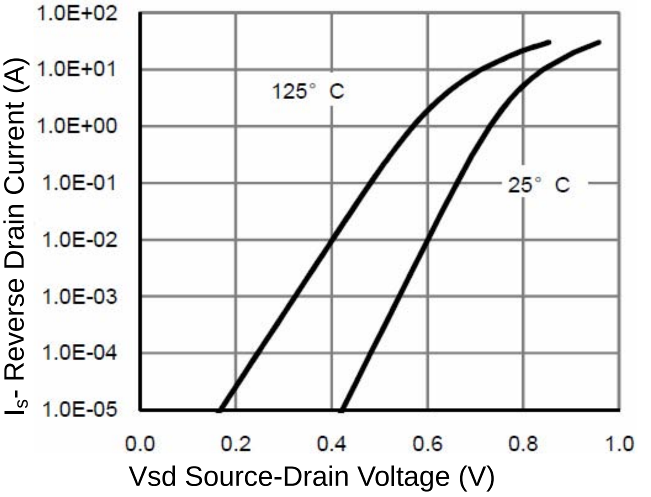


Figure 6 Source- Drain Diode Forward

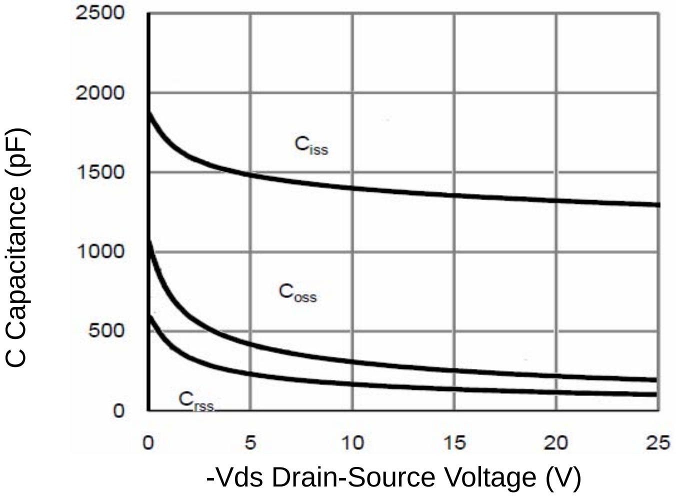


Figure 7 Capacitance vs Vds

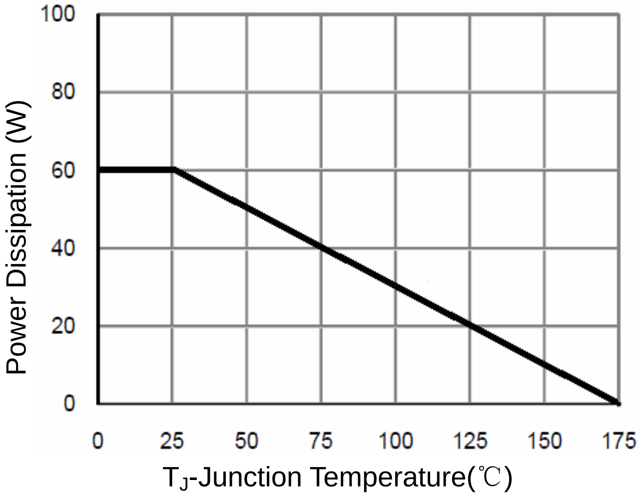


Figure 9 Power De-rating

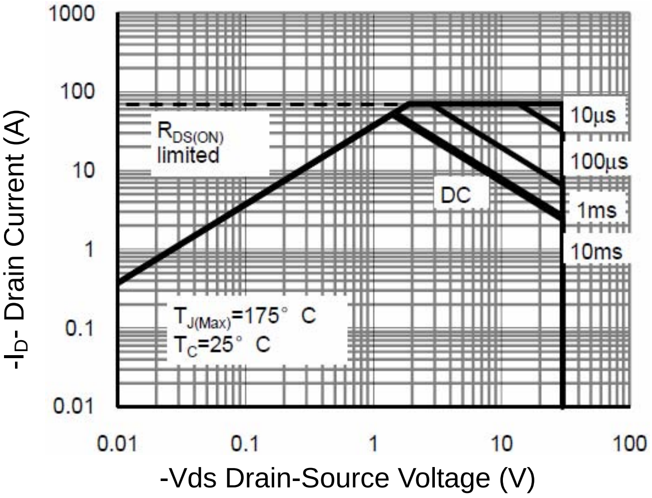


Figure 8 Safe Operation Area

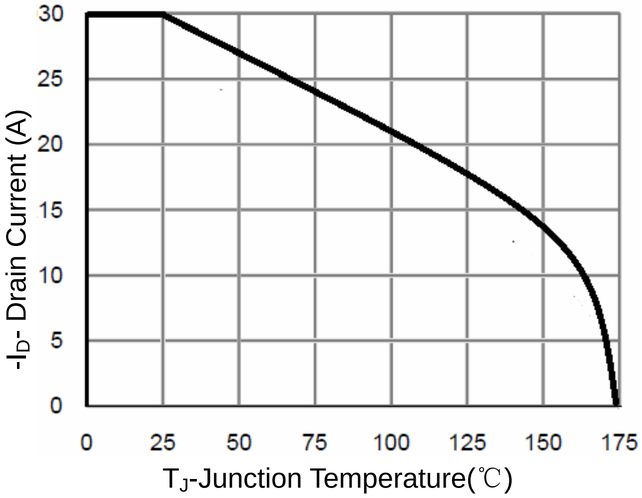


Figure 10 ID Current Derating

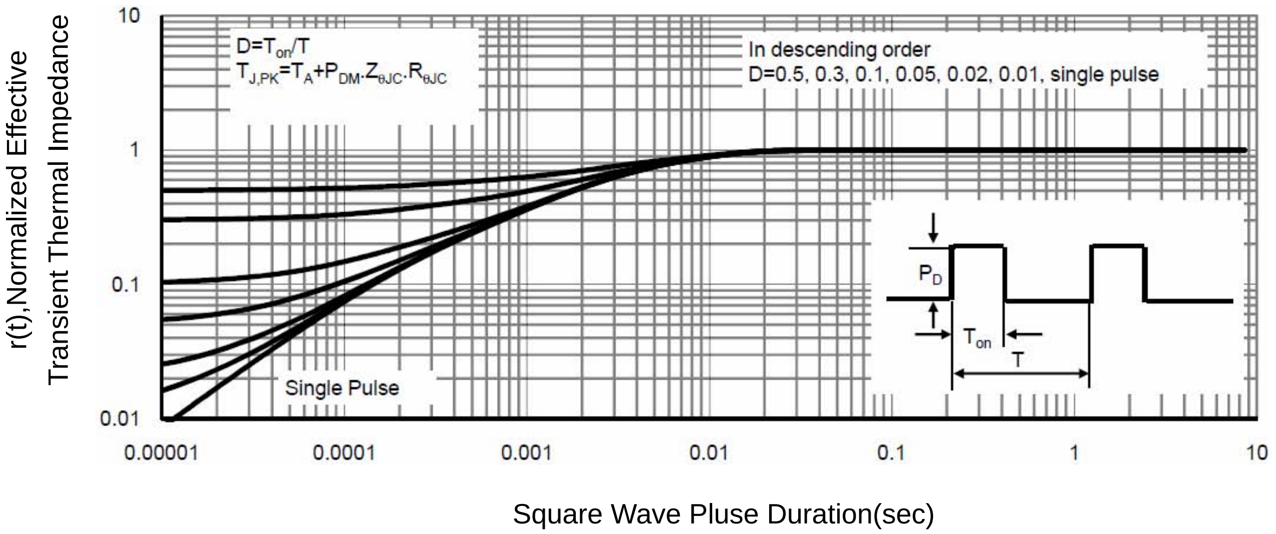
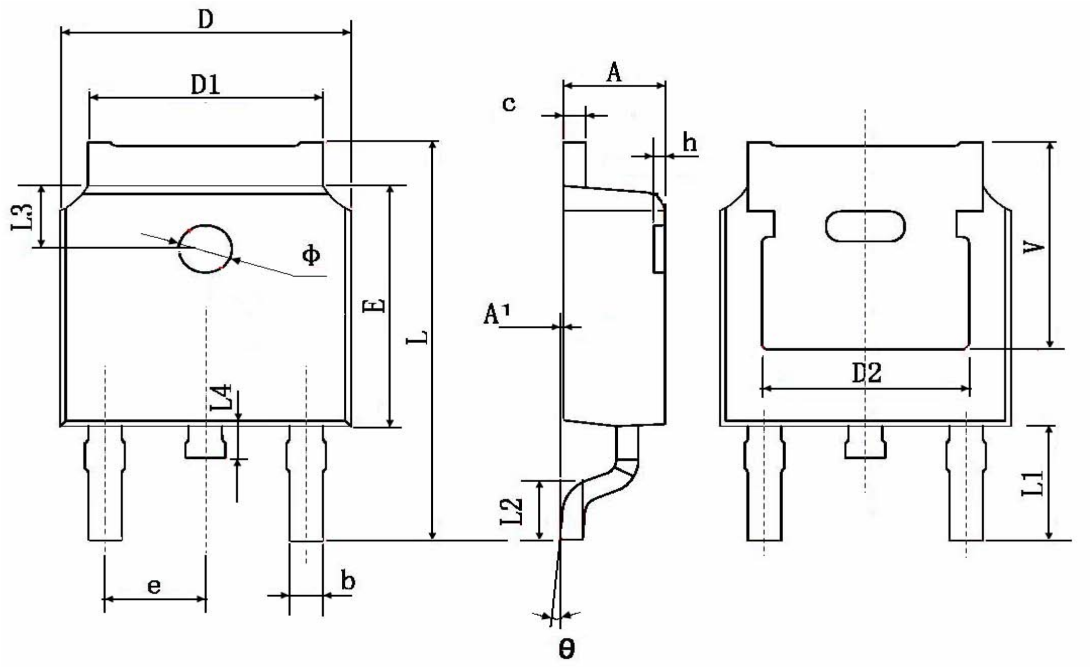


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	