

N-Channel Super Trench Power MOSFET

Description

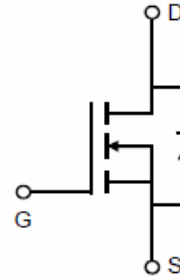
The HMS100N85D uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(on)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

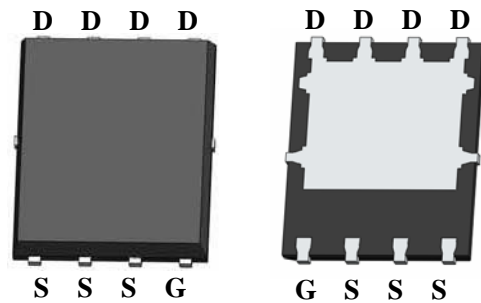
- $V_{DS} = 85V, I_D = 100A$
 $R_{DS(on)} < 5.3m\Omega @ V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

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



Schematic Diagram



Top View

Bottom View

100% UIS TESTED!
100% ΔVds TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HMS100N85D	HMS100N85D	DFN5X6-8L			

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	100	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	70.7	A
Pulsed Drain Current	I_{DM}	380	A
Maximum Power Dissipation	P_D	75	W
Derating factor		1.1	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	784	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.5	$^\circ C/W$
--	-----------------	-----	--------------

Electrical Characteristics (T_C=25°C unless otherwise noted)

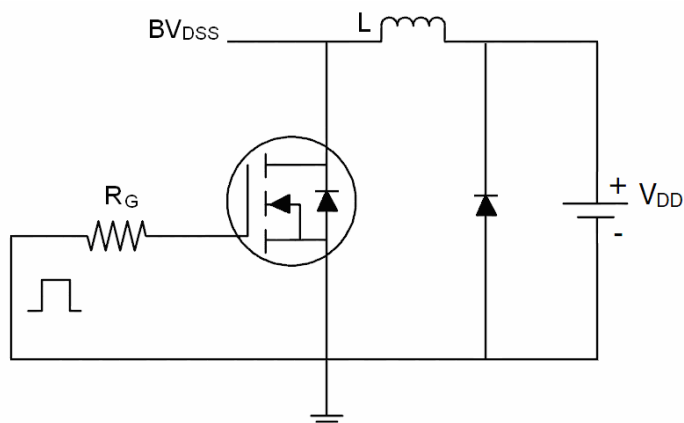
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	85		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.5	-	4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =50A	-	4.5	5.3	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =50A	40	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =40V, V _{GS} =0V, F=1.0MHz	-	4300	-	PF
Output Capacitance	C _{oss}		-	648	-	PF
Reverse Transfer Capacitance	C _{rss}		-	44	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =50A V _{GS} =10V, R _G =4.7Ω	-	13.5	-	nS
Turn-on Rise Time	t _r		-	12.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	38	-	nS
Turn-Off Fall Time	t _f		-	13.5	-	nS
Total Gate Charge	Q _g	V _{DS} =40V, I _D =50A, V _{GS} =10V	-	55		nC
Gate-Source Charge	Q _{gs}		-	21		nC
Gate-Drain Charge	Q _{gd}		-	11		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =100A	-		1.2	V
Diode Forward Current (Note 2)	I _S		-	-	100	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note3)	-	74		nS
Reverse Recovery Charge	Q _{rr}		-	156		nC

Notes:

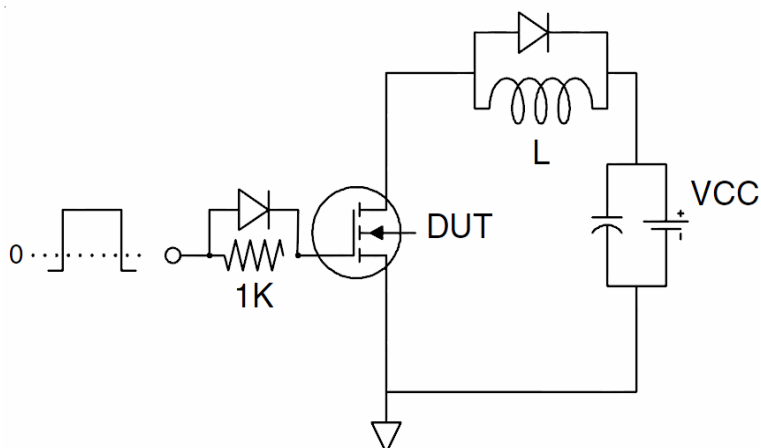
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=42.5V, V_G=10V, L=0.5mH, R_G=25Ω

Test Circuit

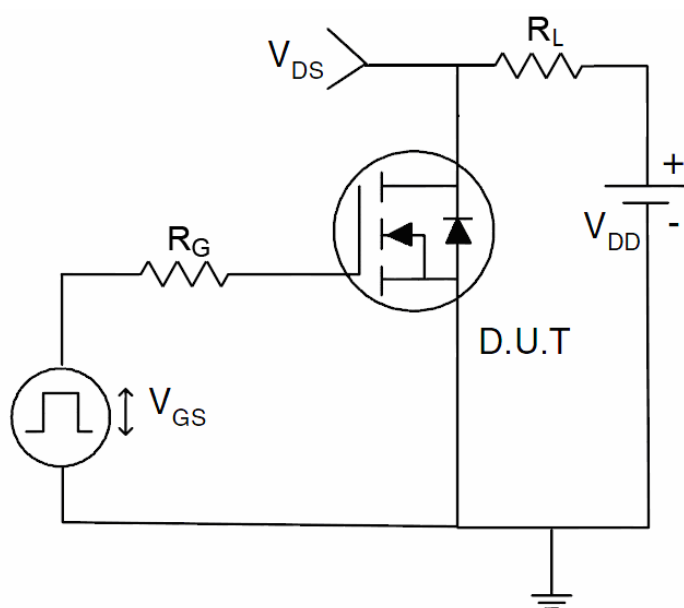
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

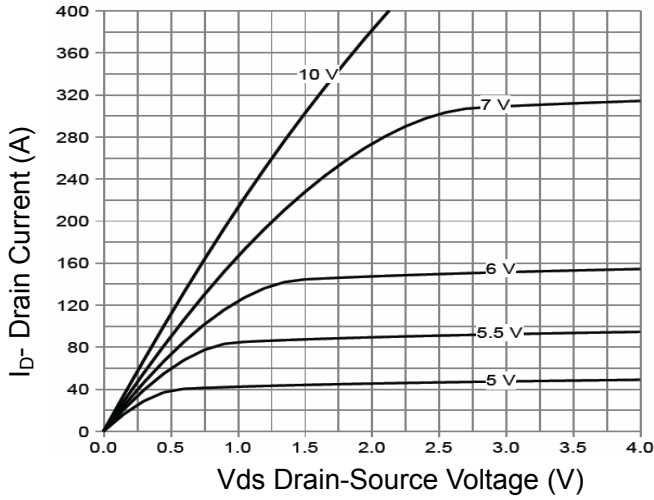


Figure 1 Output Characteristics

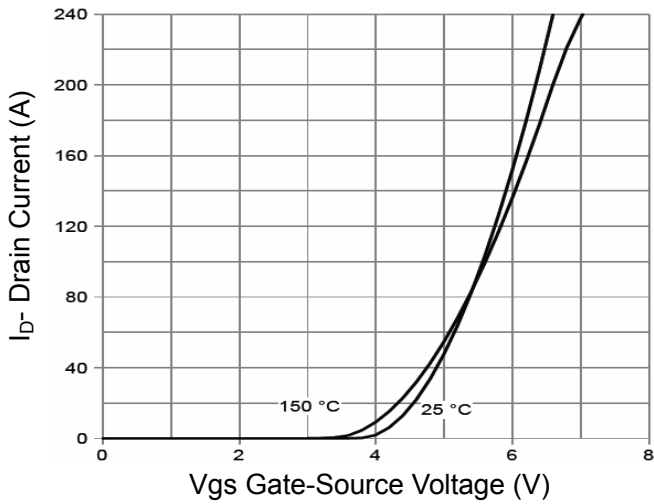


Figure 2 Transfer Characteristics

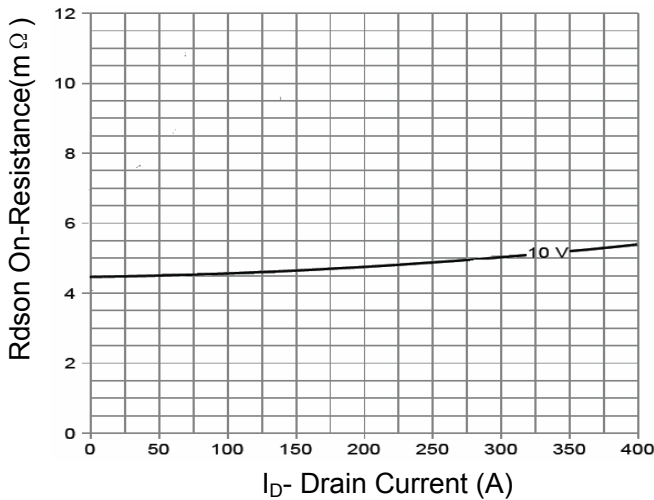


Figure 3 $R_{DS(on)}$ - Drain Current

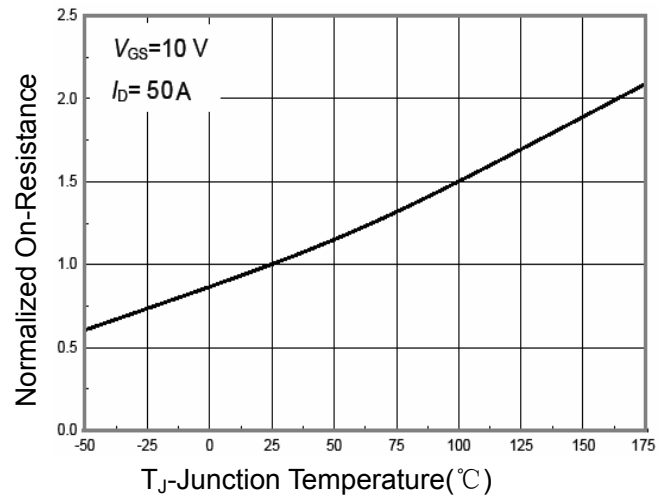


Figure 4 $R_{DS(on)}$ -Junction Temperature

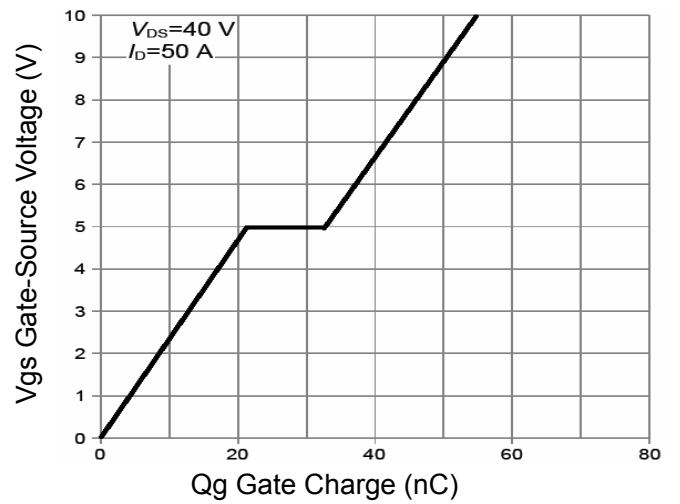


Figure 5 Gate Charge

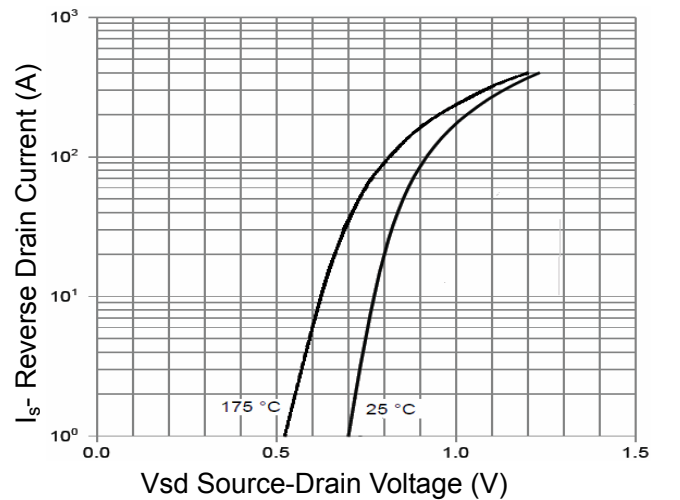


Figure 6 Source- Drain Diode Forward

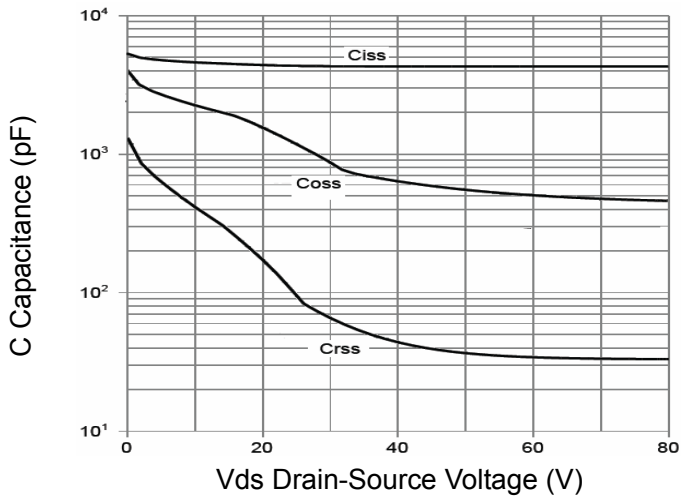


Figure 7 Capacitance vs Vds

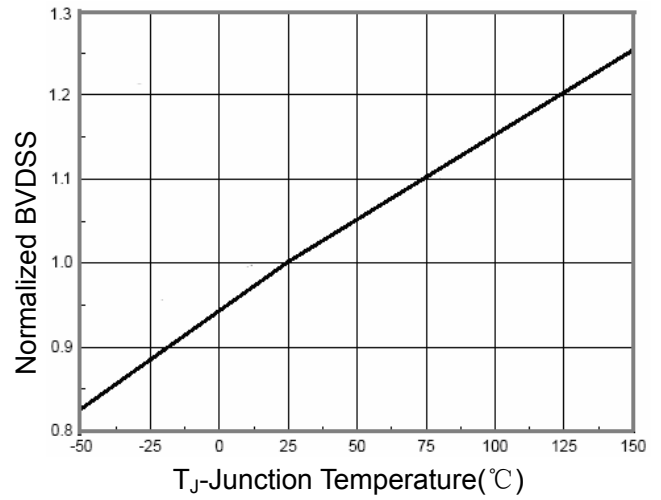


Figure 9 BV_{DSS} vs Junction Temperature

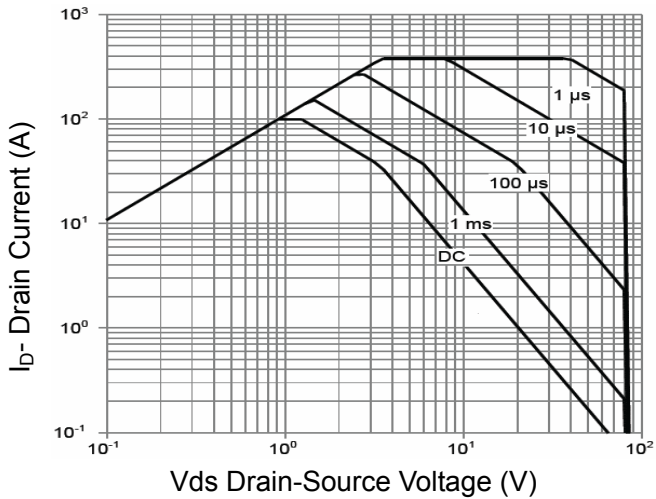


Figure 8 Safe Operation Area

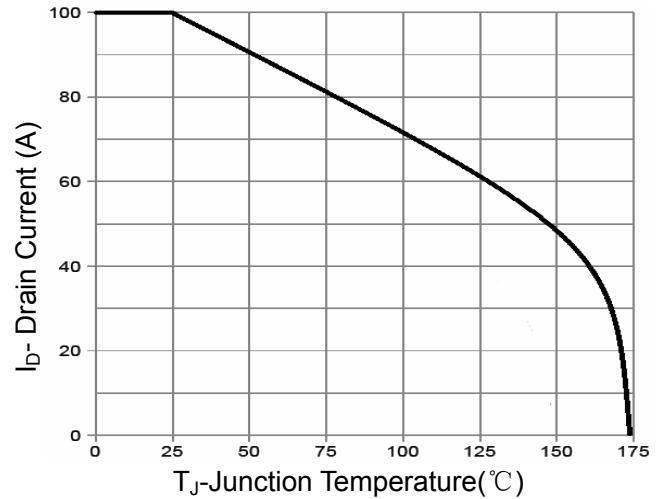


Figure 10 Current De-rating

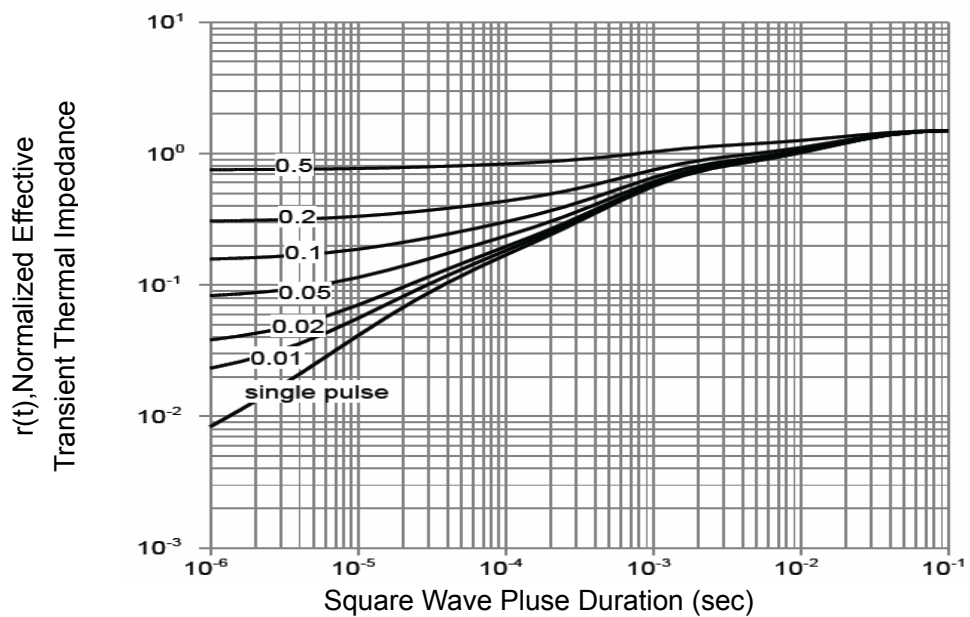
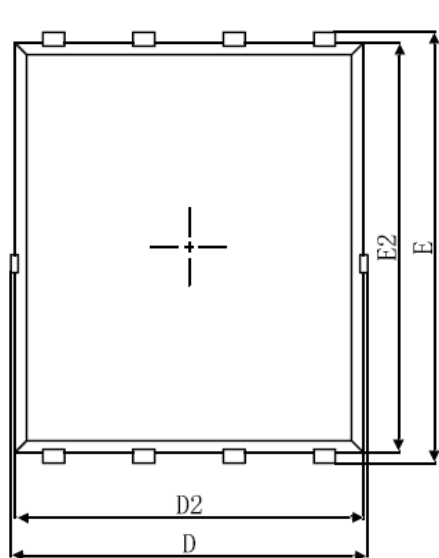
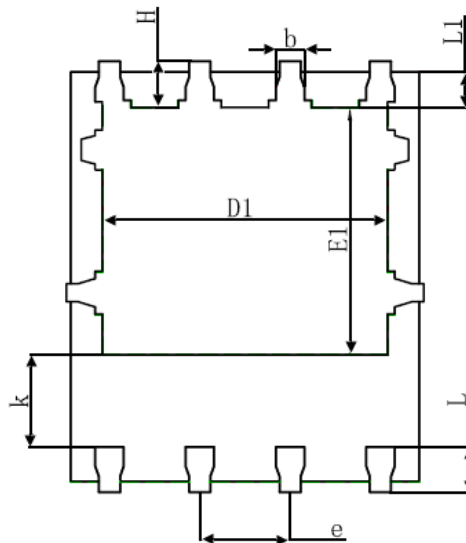


Figure 11 Normalized Maximum Transient Thermal Impedance

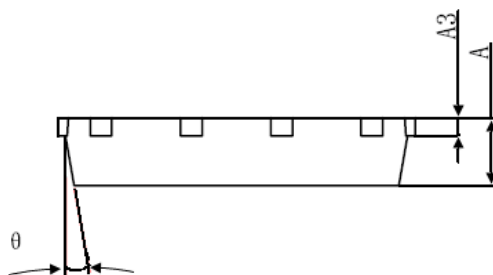
DFN5X6-8L Package Information



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	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°