

N-Channel Enhancement Mode Power MOSFET

Description

The HM15N10D uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

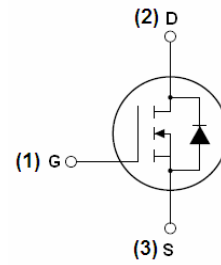
- $V_{DS} = 100V, I_D = 15A$
 $R_{DS(ON)} < 31m\Omega @ V_{GS}=10V$ (Typ:27m Ω)
- Special process technology for high ESD capability
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

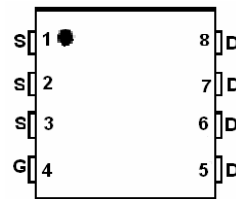
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Schematic diagram



Marking and pin assignment



DFN5X6-8L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM15N10D	HM15N10D	DFN5X6-8L	-	-	-

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

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current-Continuous	15	A
$I_D(100^{\circ}C)$	Drain Current-Continuous($T_C=100^{\circ}C$)	10.5	A
I_{DM}	Pulsed Drain Current	45	A
P_D	Maximum Power Dissipation	85	W
	Derating factor	0.57	W/ $^{\circ}C$
E_{AS}	Single pulse avalanche energy ^(Note 5)	256	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^{\circ}C$

Thermal Characteristic

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case ^(Note 2)	1.8	$^{\circ}\text{C}/\text{W}$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	115	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.3	1.9	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=10A$	-	27	31	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=10A$	-	15	-	S
Dynamic Characteristics ^(Note 4)						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	2000	-	PF
C_{oss}	Output Capacitance		-	300	-	PF
C_{rss}	Reverse Transfer Capacitance		-	250	-	PF
Switching Characteristics ^(Note 4)						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=50V, R_L=5\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	7	-	nS
t_r	Turn-on Rise Time		-	7	-	nS
$t_{d(off)}$	Turn-Off Delay Time		-	29	-	nS
t_f	Turn-Off Fall Time		-	7	-	nS
Q_g	Total Gate Charge	$V_{DS}=50V, I_D=10A,$ $V_{GS}=10V$	-	39	-	nC
Q_{gs}	Gate-Source Charge		-	8	-	nC
Q_{gd}	Gate-Drain Charge		-	12	-	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage ^(Note 3)	$V_{GS}=0V, I_S=10A$	-	-	1.2	V
I_S	Diode Forward Current ^(Note 2)	-	-	-	15	A
t_{rr}	Reverse Recovery Time	$T_J = 25^{\circ}\text{C}, I_F = 10A$ $di/dt = 100A/\mu s$ ^(Note 3)	-	32	-	nS
Q_{rr}	Reverse Recovery Charge		-	53	-	nC
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

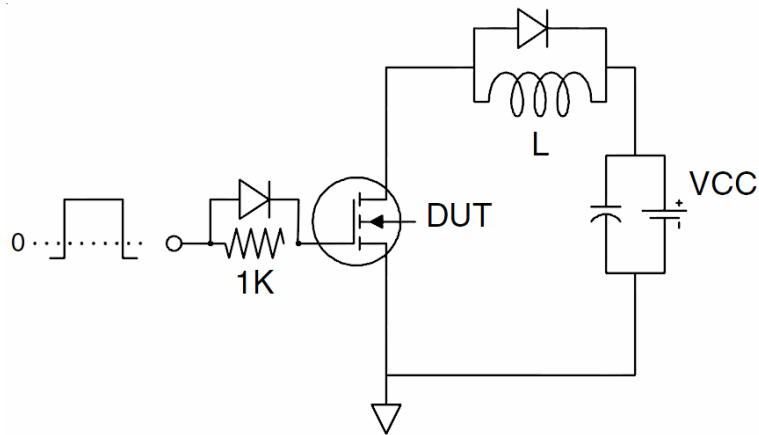
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS Condition : $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega, I_{AS}=32A$

Test Circuit

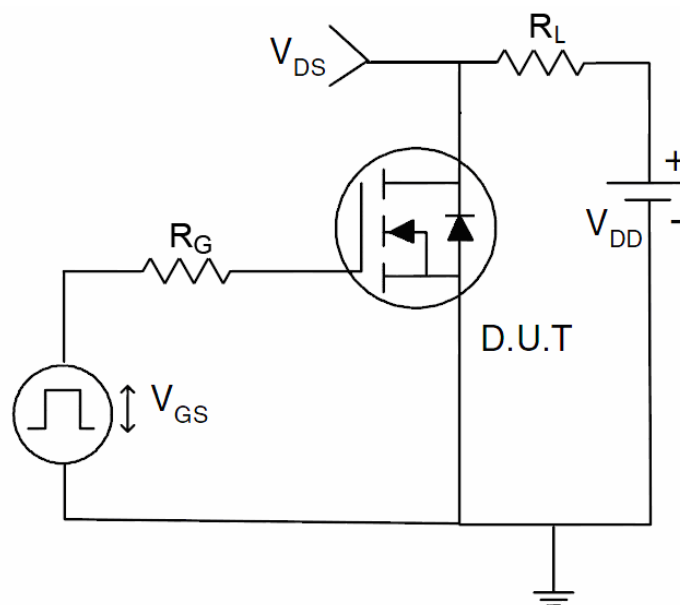
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

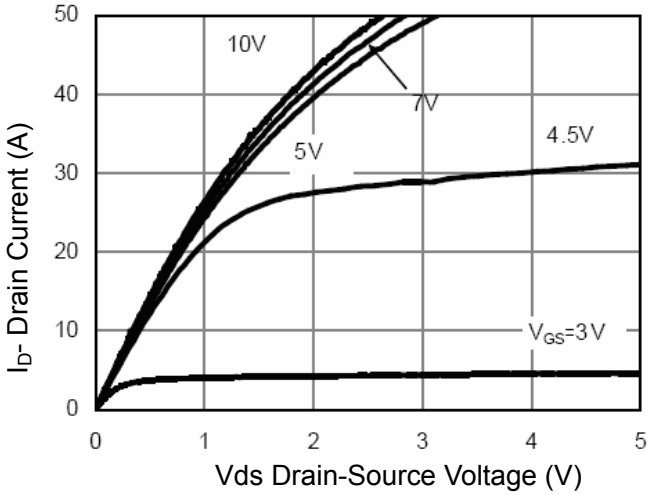


Figure 1 Output Characteristics

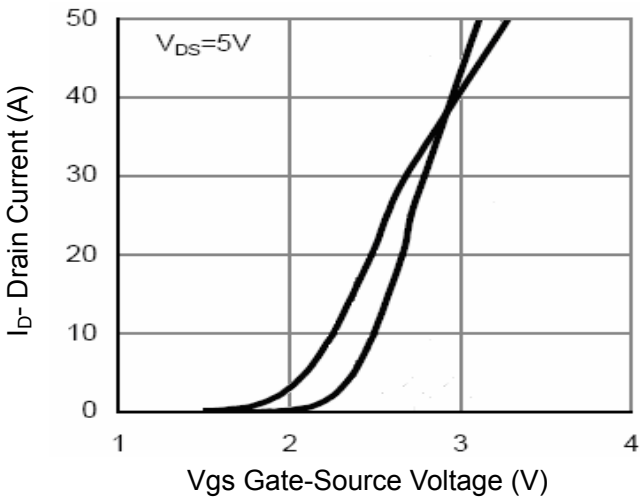


Figure 2 Transfer Characteristics

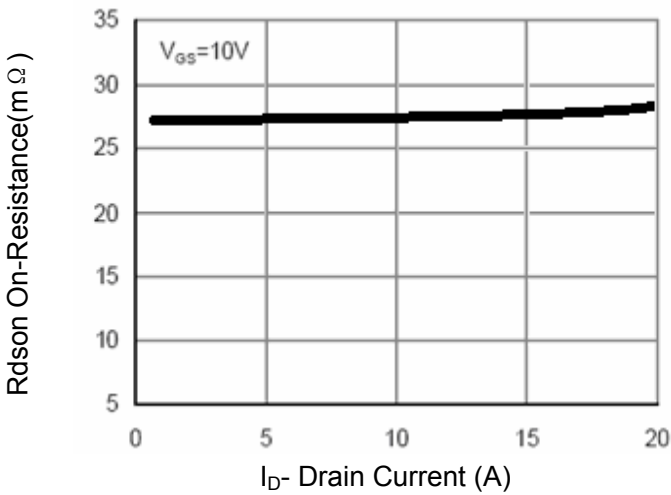


Figure 3 Rdson- Drain Current

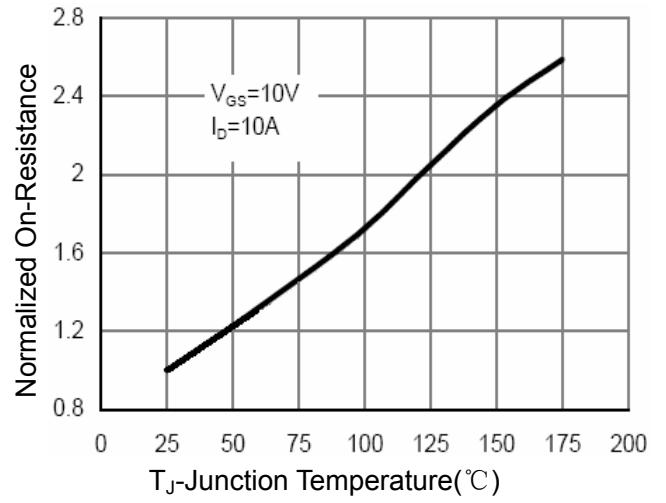


Figure 4 Rdson-Junction Temperature

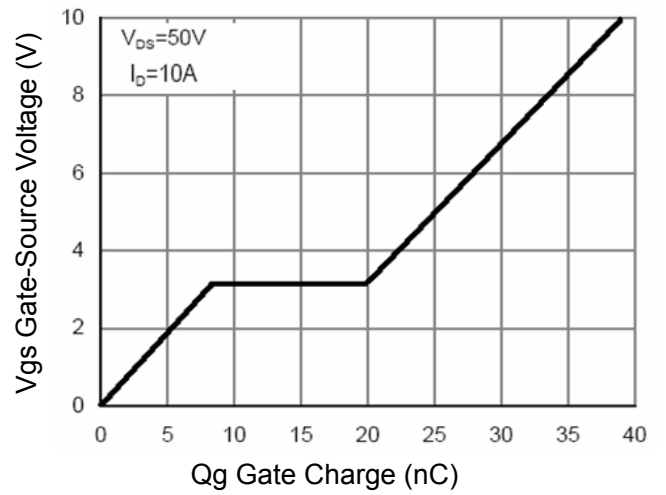


Figure 5 Gate Charge

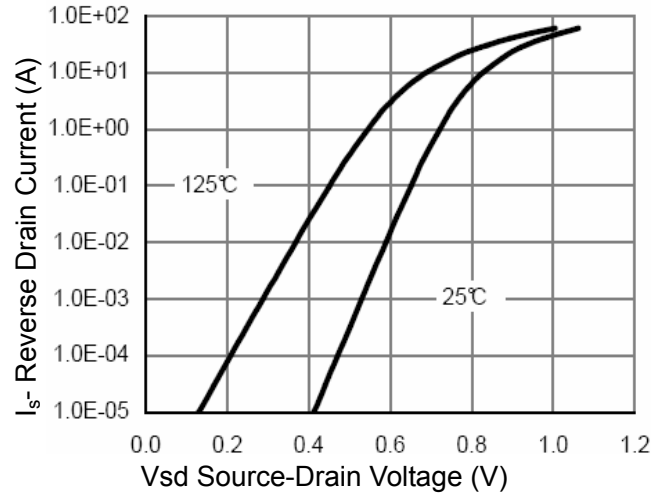


Figure 6 Source- Drain Diode Forward

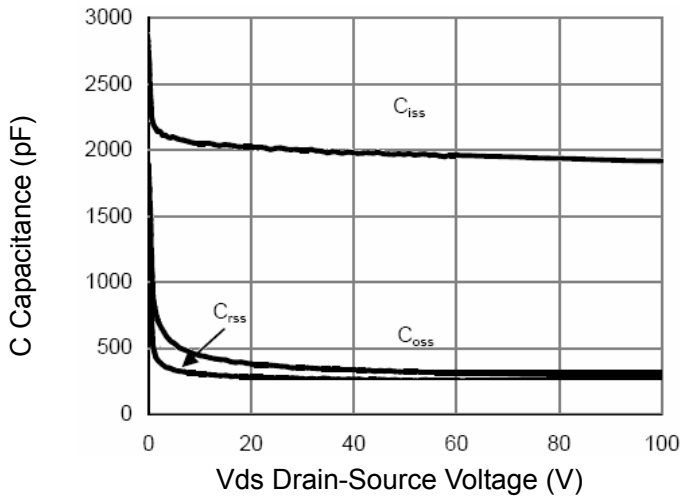


Figure 7 Capacitance vs Vds

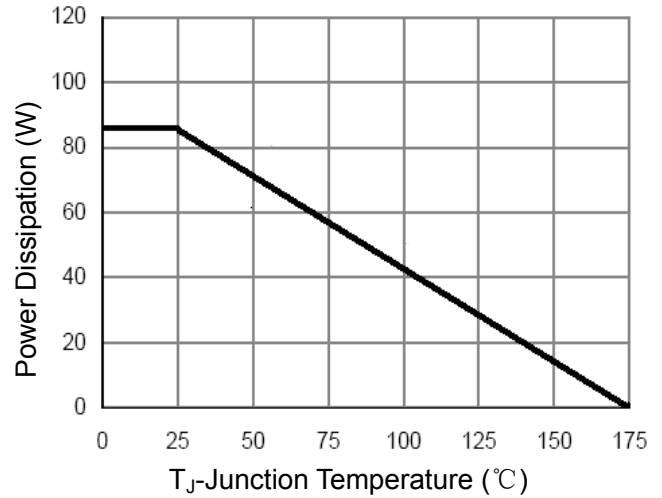


Figure 9 Power De-rating

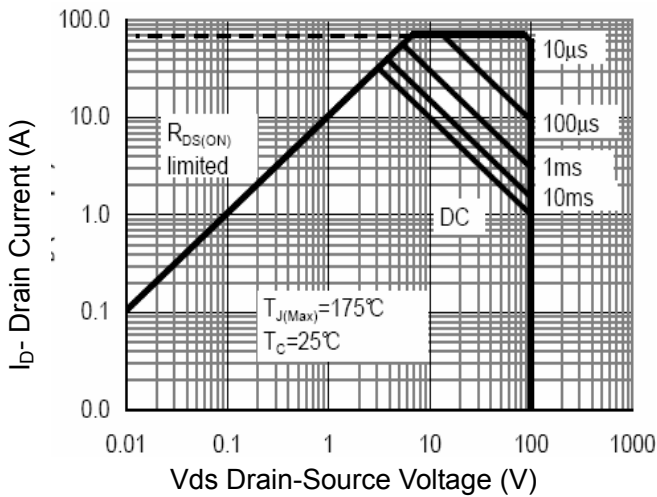


Figure 8 Safe Operation Area

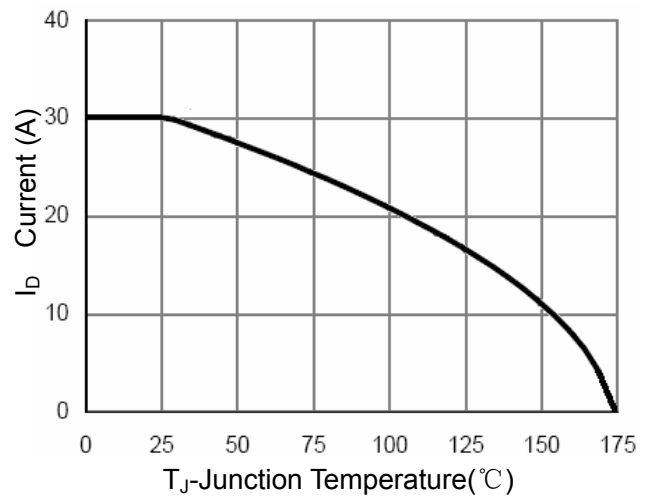


Figure 10 ID Current- Junction Temperature

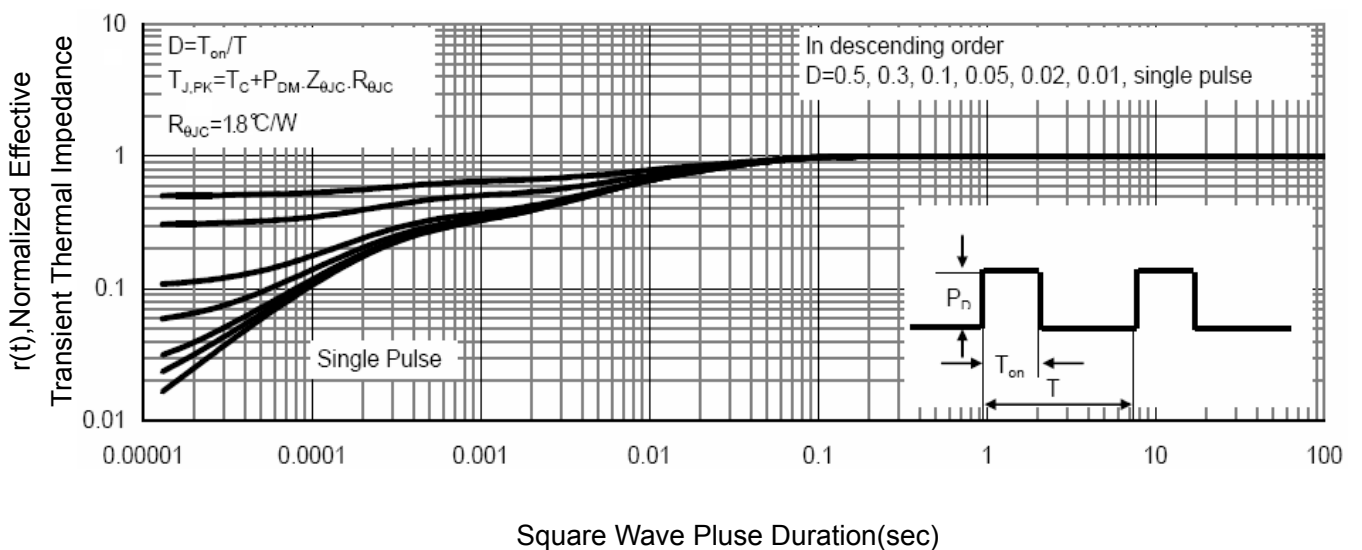
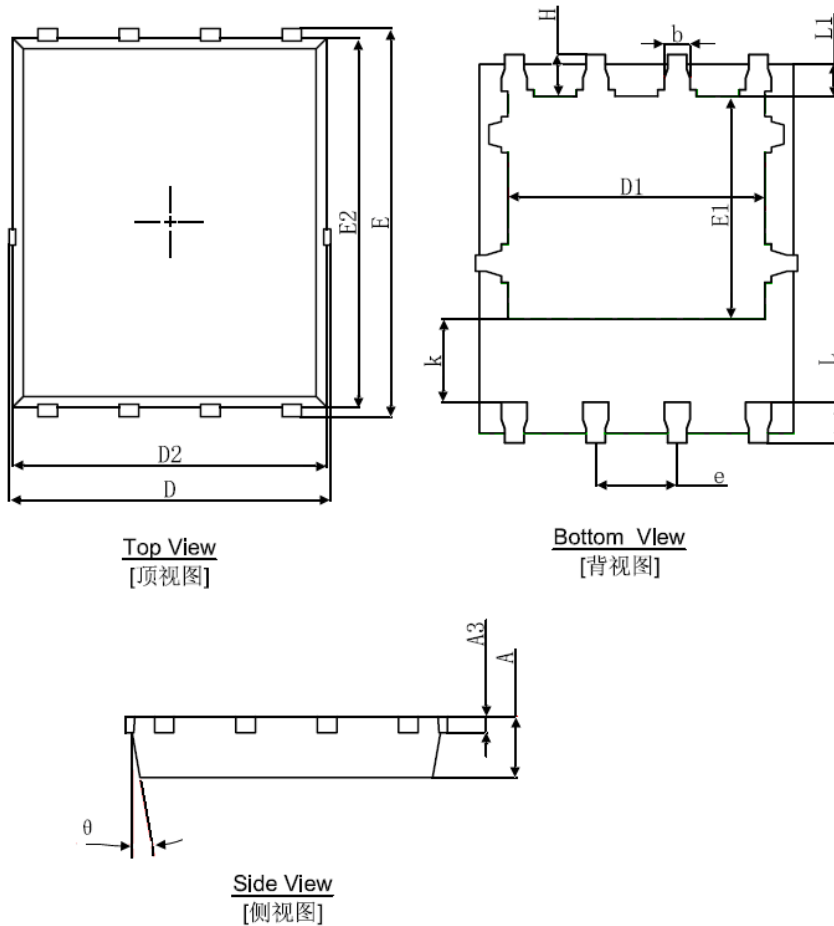


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



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	0.035	0.450	0.014	0.018
e	1.270(TYP.)		0.050(TYP.)	
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°