

FH3402

N-Channel Enhancement Mode MOSFET

Description

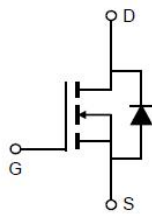
The FH3402 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and high density cell Design for ultra low on resistance. This device is suitable for use as a load switch or in PWM applications.

Application

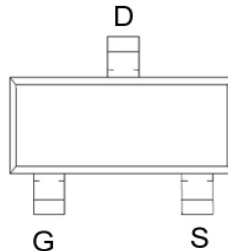
- ◆ PWM applications
- ◆ Load switch

General Features

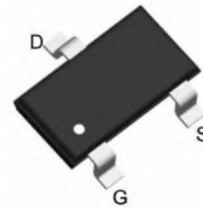
- ◆ $V_{DS} = 30V$, $I_D = 3.9A$
 $R_{DS(ON)}(Typ.) = 37m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 40m\Omega$ @ $V_{GS} = 4.5V$
 $R_{DS(ON)}(Typ.) = 55m\Omega$ @ $V_{GS} = 2.5V$
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface mount package



Schematic diagram



Marking and Pin Assignment



SOT-23 top view

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

parameter	symbol	limit	unit
Drain-source voltage	V_{DS}	30	V
Gate-source voltage	V_{GS}	±12	V
Drain current-continuous ^a @Tj=125°C -pulse ^b	I_D	3.9	A
	I_{DM}	15.5	A
Drain-source Diode forward current	I_S	2	A
Maximum power dissipation	P_D	1.25	W
Operating junction Temperature range	T_j	-55 – 150	°C

Thermal Characteristics

Thermal Resistance junction-to ambient ^a	Rth JA	152	°C/W
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Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.9	1.4	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3.5A$	-	37	46	m Ω
		$V_{GS}=4.5V, I_D=2.5A$	-	40	53	
		$V_{GS}=2.5V, I_D=2.0A$		55	84	
Forward transconductance	g_{fs}	$V_{GS}=5V, I_D=3.0A$	-	18	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=15V, V_{GS}=0V$ $f=1.0MHz$	-	390	-	pF
Output capacitance	C_{OSS}		-	42	-	
Reverse transfer capacitance	C_{RSS}		-	38	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DS}=15V$ $V_{GS}=10V$ $R_L=2.6\text{ ohm}$ $R_{GEN}=3\text{ohm}$	-	3	-	ns
Rise time	t_r		-	2.5	-	
Turn-off delay time	$t_{D(OFF)}$		-	25	-	
Fall time	t_f		-	4	-	
Total gate charge	Q_g	$V_{DS}=15V, I_D=3.0A$ $V_{GS}=4.5V$	-	5	-	nC
Gate-source charge	Q_{gs}		-	1.3	-	
Gate-drain charge	Q_{gd}		-	1.8	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_S=1A$	-	0.8	1.2	V

Notes:

- surface mounted on FR4 board, $t \leq 10\text{sec}$
- pulse test: pulse width $\leq 300\mu\text{s}$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Typical Performance Characteristics

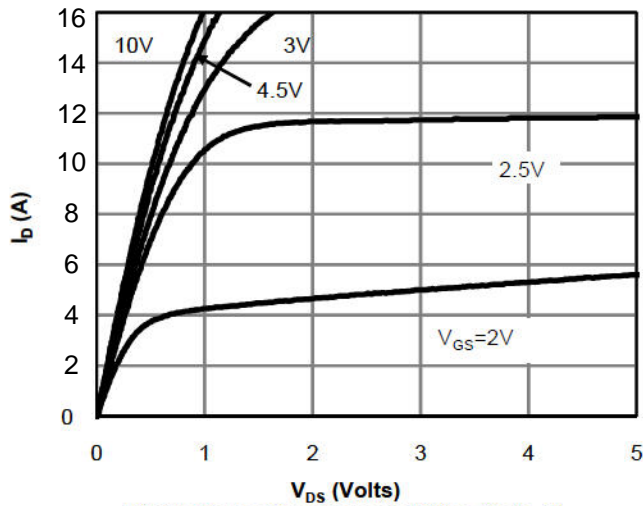


Fig 1: On-Region Characteristics (Note E)

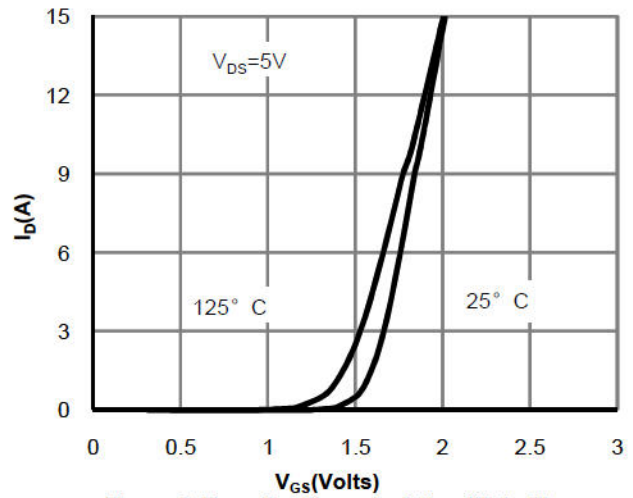


Figure 2: Transfer Characteristics (Note E)

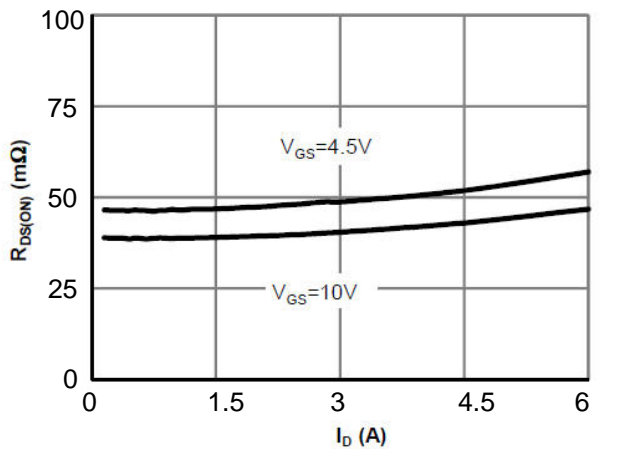


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

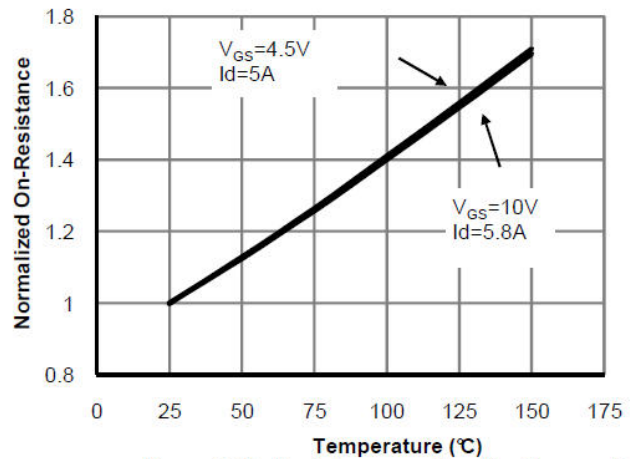


Figure 4: On-Resistance vs. Junction Temperature (Note E)

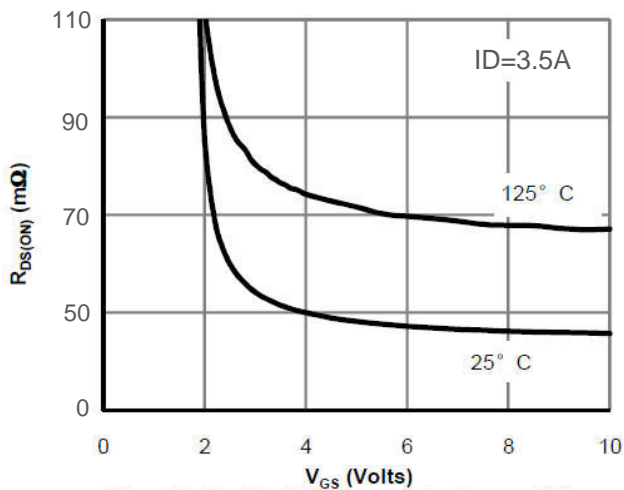


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

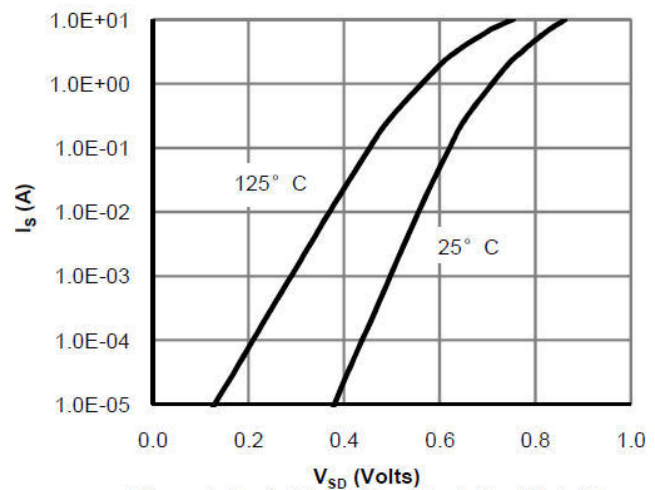


Figure 6: Body-Diode Characteristics (Note E)

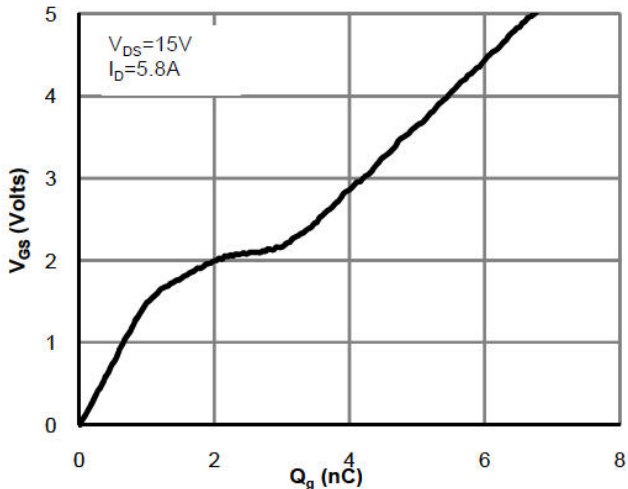


Figure 7: Gate-Charge Characteristics

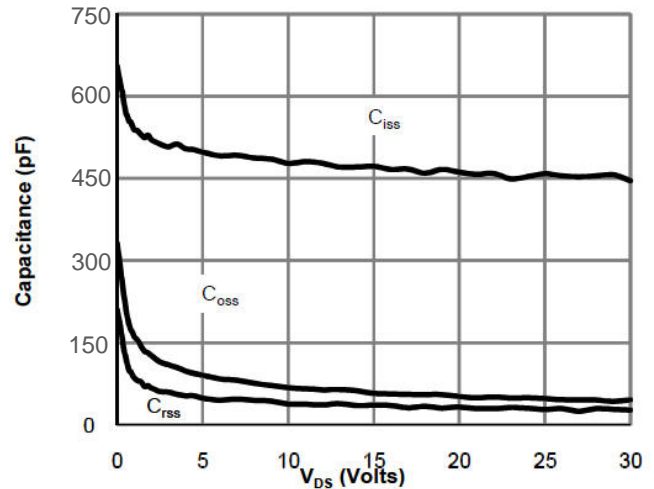


Figure 8: Capacitance Characteristics

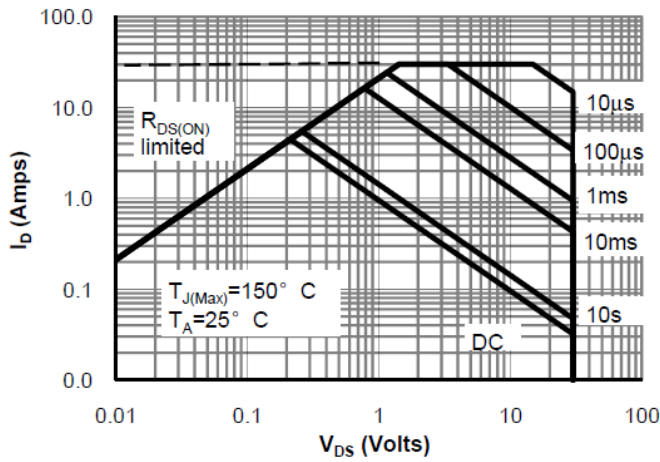


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

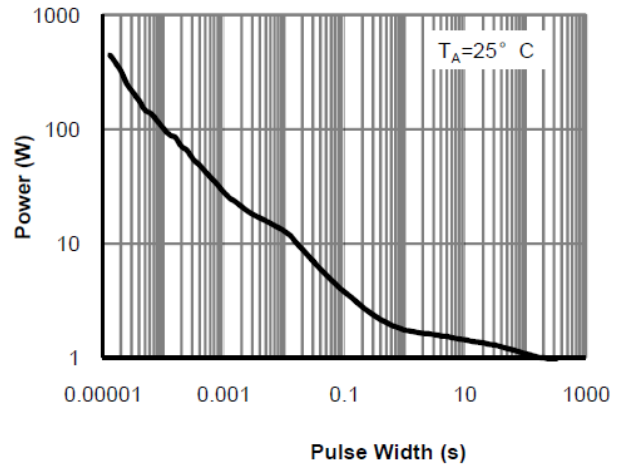


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

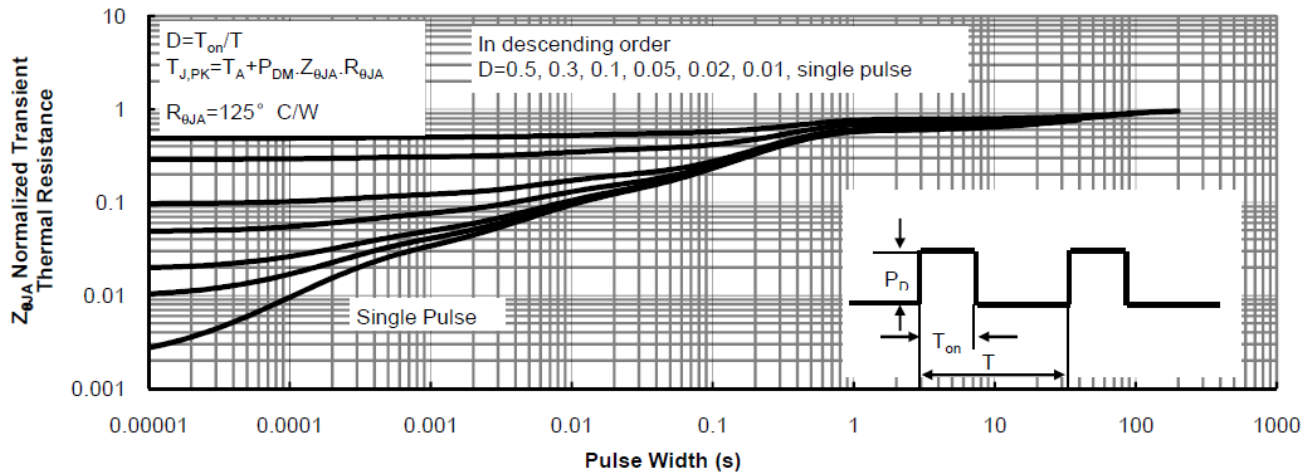
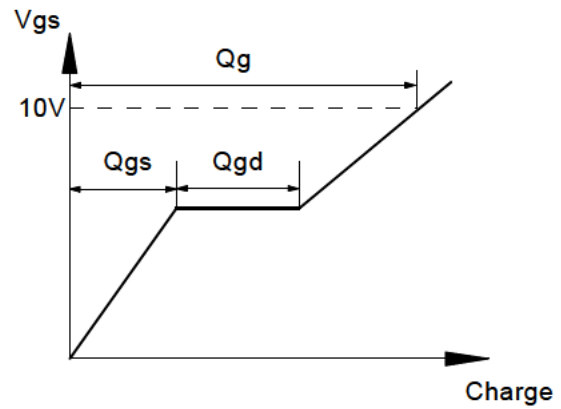
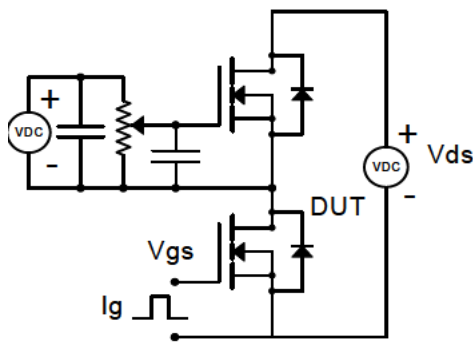


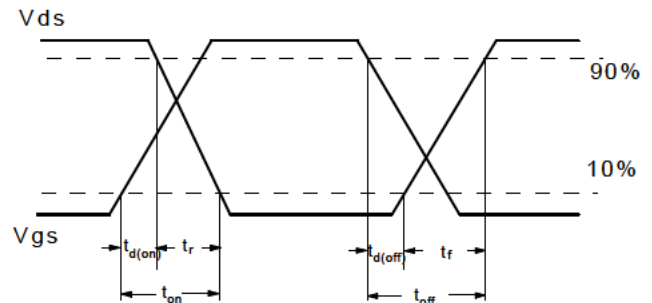
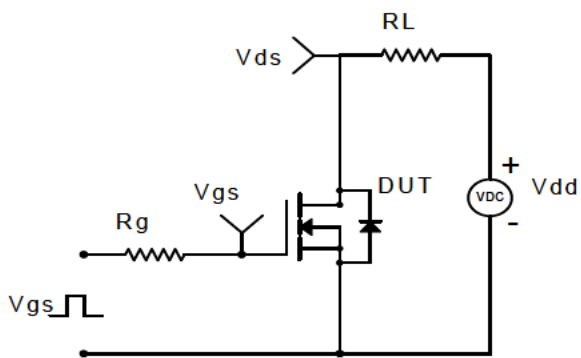
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Gate Charge Test Circuit & Waveform

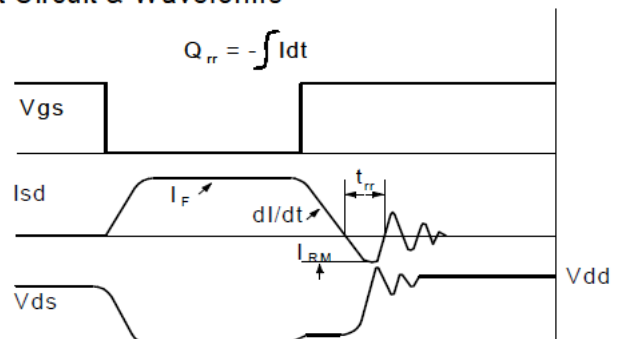
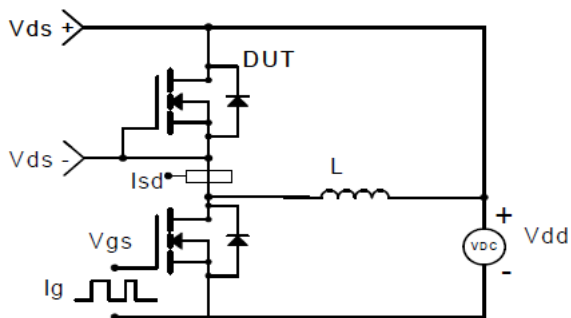


Resistive Switching Test Circuit & Waveforms

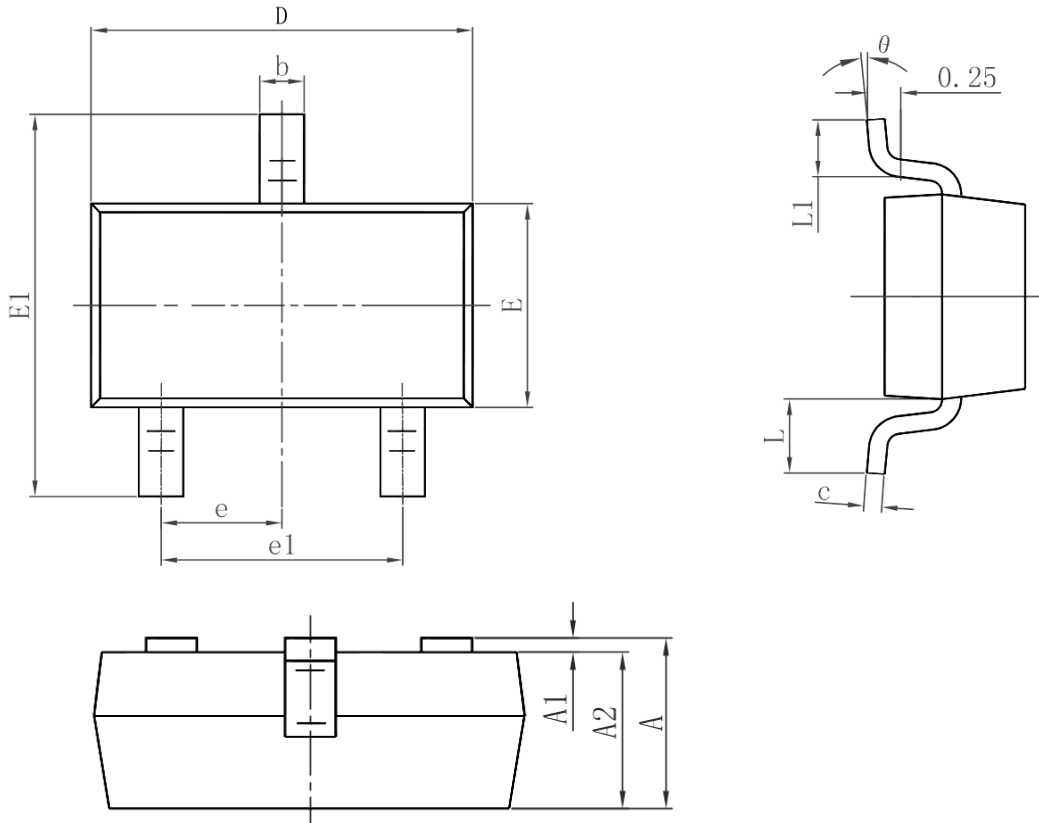
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Information : SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°