

FH16P06D

P-Channel Enhancement Mode MOSFET

Description

The FH16P06D uses advanced trench technology to provide excellent RDS(ON), low gate charge This device is suitable for use in Load Switch,PWM Application, Power management and general purpose

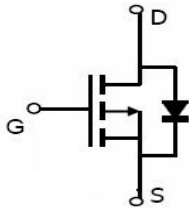
Application

- ◆ Load switch
- ◆ Power Management
- ◆ PWM Applications

Features

- ◆ $V_{DS} = -60V ; I_D = -60A$
 $R_{DS(ON)}(Typ.) = 16 m\Omega @ V_{GS} = -10 V$
 $R_{DS(ON)}(Typ.) = 18 m\Omega @ V_{GS} = -4.5V$
- ◆ Good stability and uniformity
- ◆ 100% avalanche tested
- ◆ Excellent package for good heat dissipation

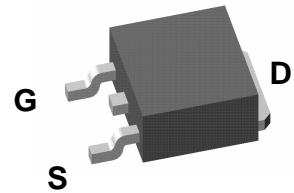
TO-252



Schematic diagram



Marking and pin Assignment



TO-252 top view

Absolute Maximum Ratings

$T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Typical	Units
V_{DSS}	Drain-Source Voltage	-60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$) - Continuous ($T_C = 100^\circ C$)	-60	A
		-36	A
I_{DM}	Drain Current - Pulsed (Note 1)	-240	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy	756	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	270	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.46	W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

* Drain current limited by maximum junction temperature.

Electrical Characteristics

T_c = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _b = -250 μA	-60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -60 V, V _{GS} = 0 V	--	--	-1	μA
		V _{DS} = -48 V, T _c = 125°C	--	--	-10	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V	--	--	-100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _b = -250 μA	-1.1	-1.6	-2.2	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -10 V, I _b = -20 A	--	16.0	19.5	mΩ
		V _{GS} = -4.5 V, I _b = -20 A	-	18.0	22	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = -20 V, V _{GS} = 0 V, f = 1.0 MHz	--	4400	-	pF
C _{oss}	Output Capacitance		--	259	-	pF
C _{riss}	Reverse Transfer Capacitance		--	212	-	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{GS} = -10 V, V _{DS} = -30 V, R _G = 1Ω, I _b = -20 A	--	24	--	ns
t _r	Turn-On Rise Time		--	18	--	ns
t _{d(off)}	Turn-Off Delay Time		--	56	--	ns
t _f	Turn-Off Fall Time		--	30	--	ns
Q _g	Total Gate Charge	V _{DS} = -30 V, I _b = -20 A, V _{GS} = -10 V	--	115	--	nC
Q _{gs}	Gate-Source Charge		--	27.4	--	nC
Q _{gd}	Gate-Drain Charge		--	50	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _s	Maximum Continuous Drain-Source Diode Forward Current	--	--	-60	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	-240	A
V _{SD}	Drain to Source Diode Forward Voltage, V _{GS} = 0 V, I _{SD} = -20 A, T _J = 25°C	--	--	-1.2	V
t _{rr}	Reverse Recovery Time T _J = 25°C, I _F = -20 A, di/dt = 100 A/μs	--	117	-	ns
Q _{rr}	Reverse Recovery Charge T _J = 25°C, I _F = -20 A, di/dt = 100 A/μs	--	420	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J = 25°C, V_{DD} = -25 V, V_G = -5 V, R_G = 25 Ω, L = 0.5 mH, I_{AS}
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 0.5%

P- Channel Typical Characteristics

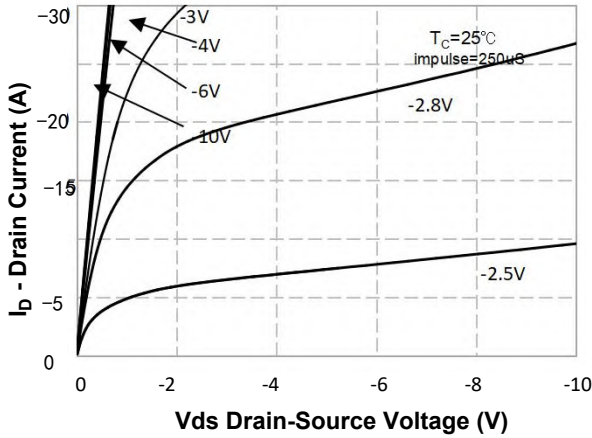


Figure 1. On-Region Characteristics

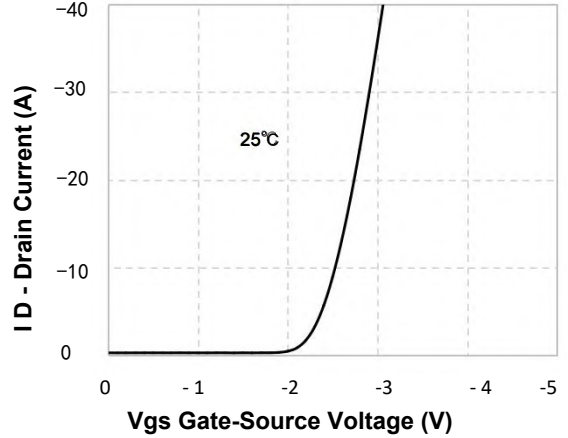


Figure 2. Transfer Characteristics

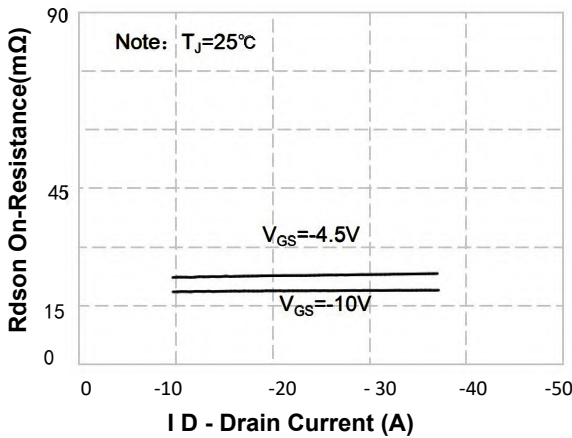


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

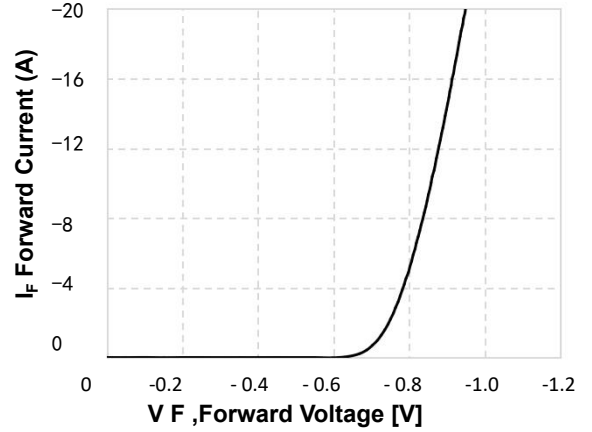


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

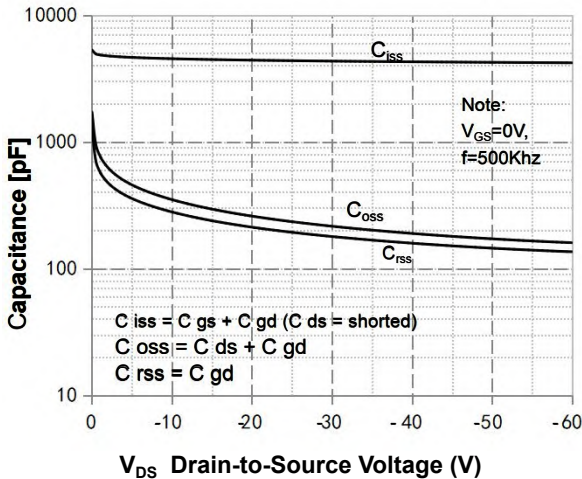


Figure 5. Capacitance Characteristics

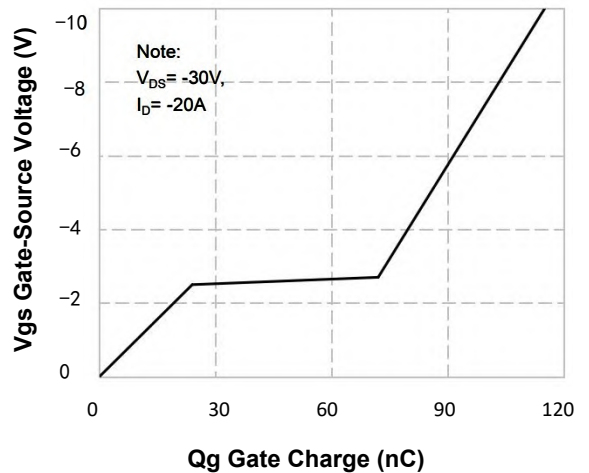


Figure 6. Gate Charge Characteristics

P- Channel Typical Characteristics (Continued)

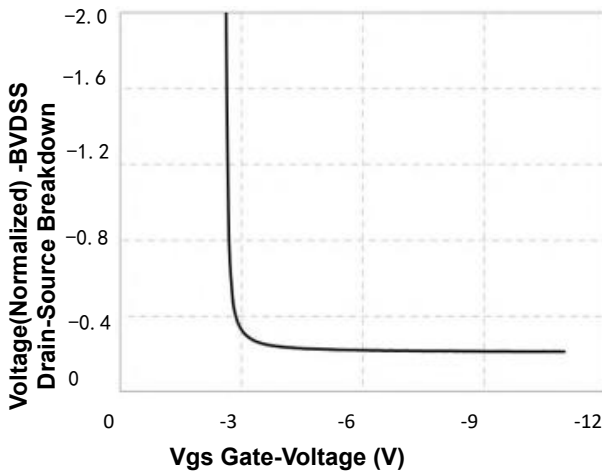


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

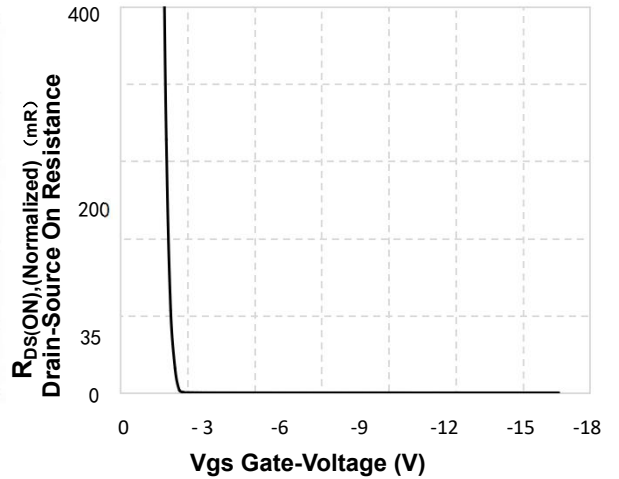


Figure 8. On-Resistance Variation vs Gate Voltage

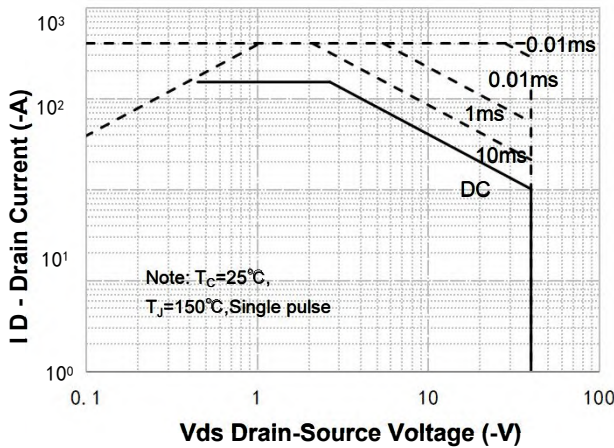


Figure 9. Maximum Safe Operating Area

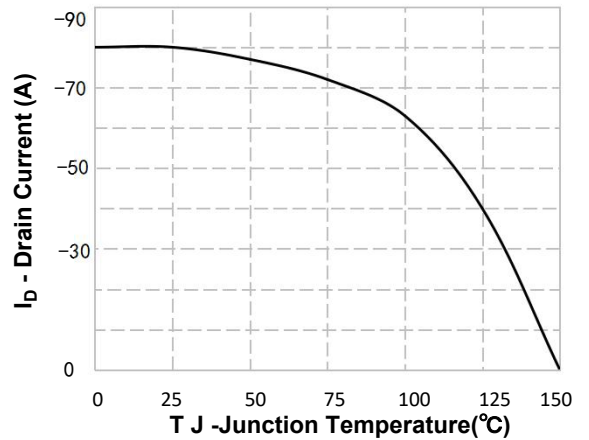


Figure 10. Maximum PContinuous Drain Current vs Case Temperature

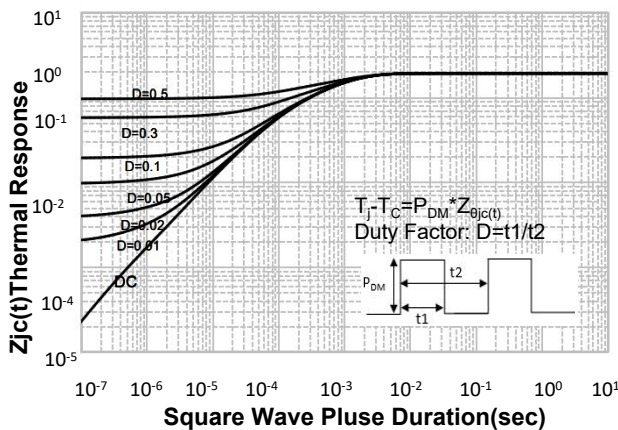
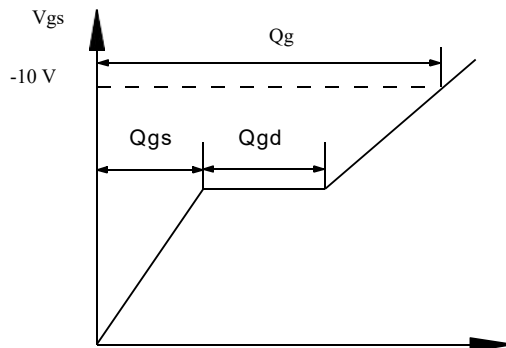
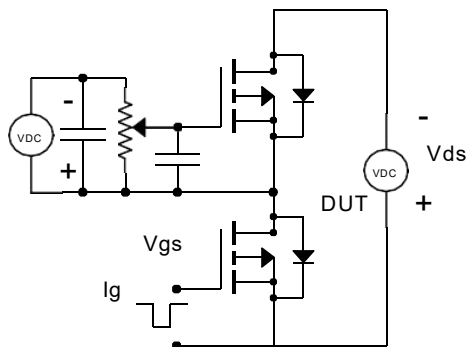
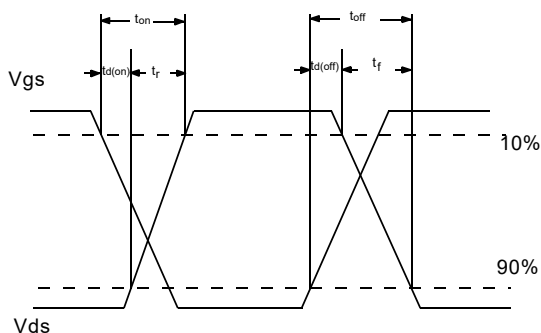
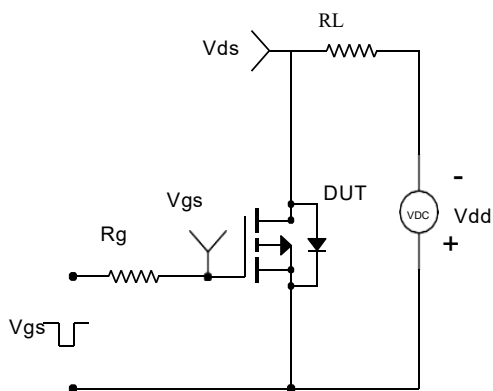


Figure 11. Transient Thermal Response Curve

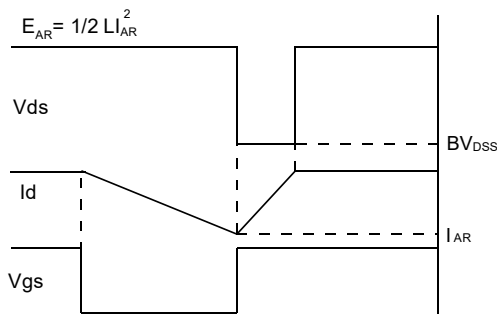
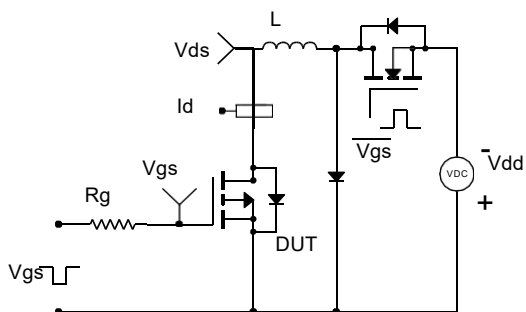
Gate Charge Test Circuit & Waveform



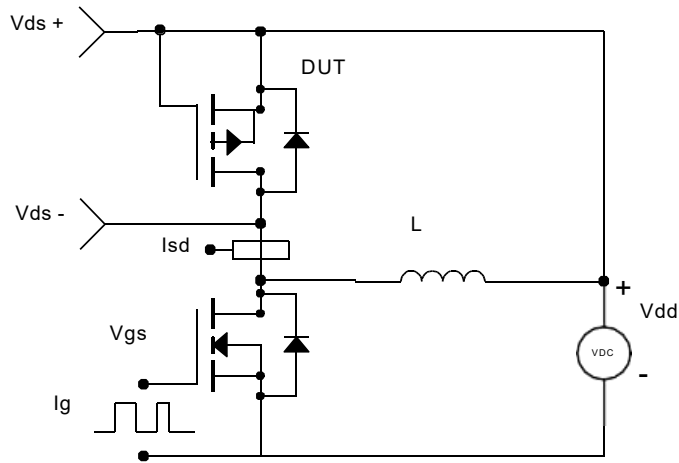
Resistive Switching Test Circuit & Waveforms



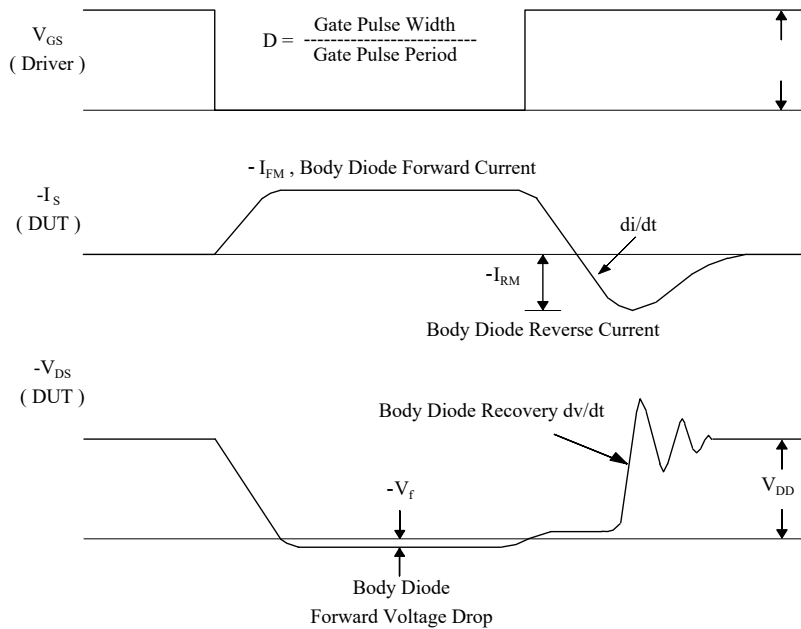
Unclamped Inductive Switching Test Circuit & Waveforms



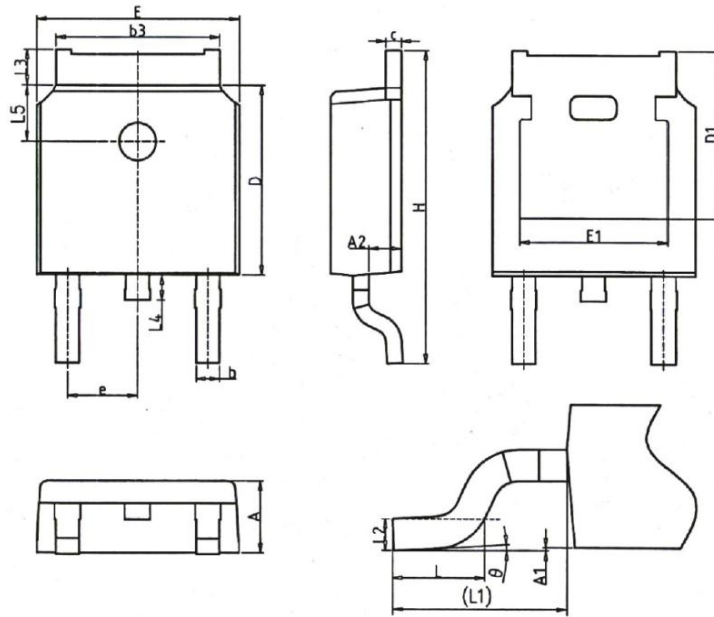
Peak Diode Recovery dv/dt Test Circuit & Waveforms



- dv/dt controlled by R_G
- I_{SD} controlled by pulse period



Package Information : TO-252



COMMON DIMENSIONS						
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.20	2.30	2.38	0.087	0.091	0.094
A1	0.00		0.20	0.000		0.008
A2	0.97	1.07	1.17	0.038	0.042	0.046
b	0.68	0.78	0.90	0.027	0.031	0.035
b3	5.20	5.33	5.46	0.205	0.210	0.215
c	0.43	0.53	0.61	0.017	0.021	0.024
D	5.98	6.10	6.22	0.235	0.240	0.245
D1	5.30REF			0.209REF		
E	6.40	6.60	6.73	0.252	0.260	0.265
E1	4.63	-	-	0.182	-	-
e	2.286BSC			0.090BSC		
H	9.40	10.10	10.50	0.370	0.398	0.413
L	1.38	1.50	1.75	0.054	0.059	0.069
L1	2.90REF			0.114REF		
L2	0.51BSC			0.020BSC		
L3	0.88		1.28	0.035		0.050
L4	0.50		1.00	0.020		0.039
L5	1.65	1.80	1.95	0.065	0.071	0.077
θ	0°		8°	0°		8°