## Description

The VSM19N03 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} =30V,I_D =19A

$R_{DS(ON)}$ < 6.2mΩ @ V_{GS}=10V

$R_{DS(ON)}$ < 9mΩ @ V_{GS}=4.5V

● High density cell design for ultra low Rdson
● Fully characterized Avalanche voltage and current

Application

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

SOP-8
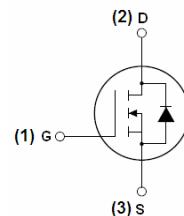
Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM19N03-S8	VSM19N03	SOP-8	Ø330mm	12mm	4000 units

Absolute Maximum Ratings (T_A=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	19	A
Drain Current-Continuous(T_A=100℃)	I_D (100℃)	13.5	A
Pulsed Drain Current	I_{DM}	76	A
Maximum Power Dissipation	P_D	3	W
Single pulse avalanche energy [Note 5]	E_{AS}	210	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient(Note 2)	$R_{\theta JA}$	42	℃/W

Electrical Characteristics (T_A=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	0.7	1.1	1.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	4.9	6.2	mΩ
		V_{GS}=4.5V, I_D=10A	-	6.9	9	
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=12A	5	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	2077	-	PF
Output Capacitance	C_{oss}		-	300	-	PF
Reverse Transfer Capacitance	C_{rss}		-	249.7	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,I_D=10A V_{GS}=10V,R_{GEN}=2.7Ω	-	20	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	60	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=10A, V_{GS}=10V	-	47.6	-	nC
Gate-Source Charge	Q_{gs}		-	4.9	-	nC
Gate-Drain Charge	Q_{gd}		-	10.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=10A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	19	A

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

Test Circuit

1) E_{AS} Test Circuits
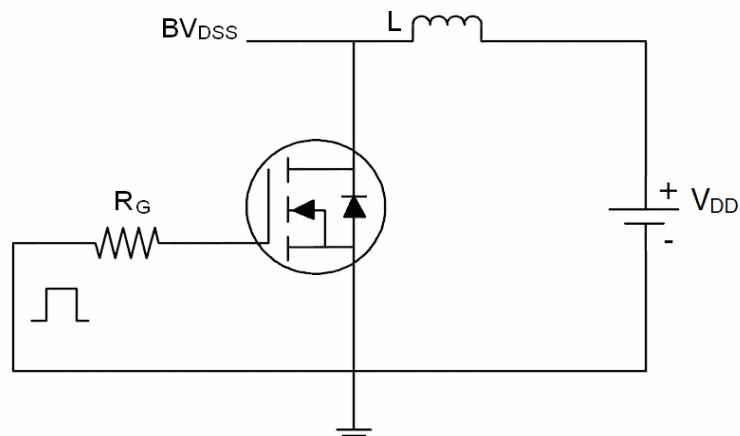


2) Gate Charge Test Circuit
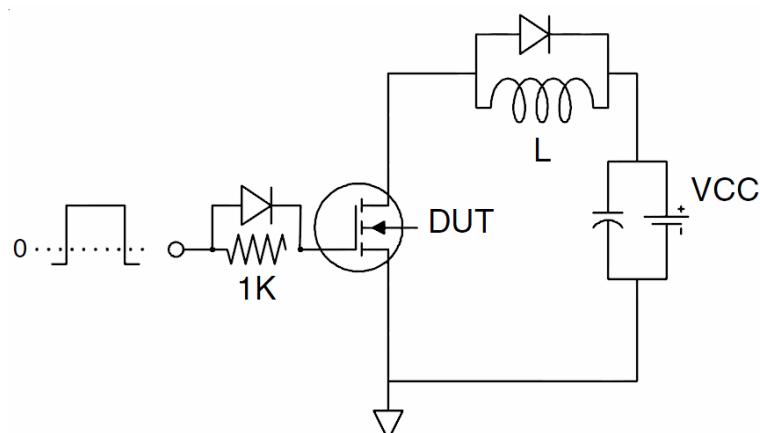
### 3) Switch Time Test Circuit
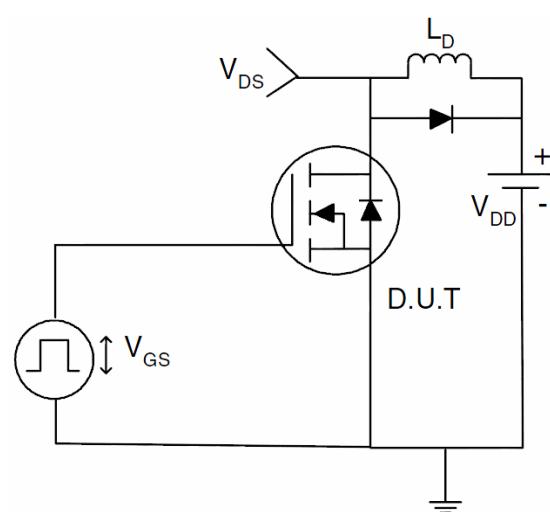
Typical Electrical and Thermal Characteristics (Curves)
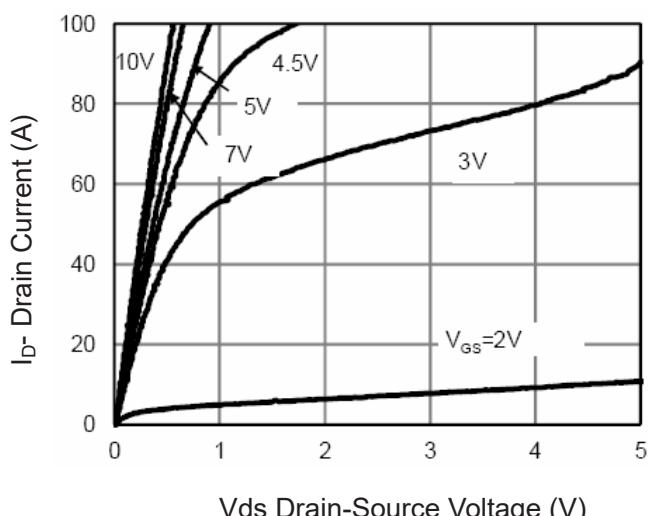
Figure 1 Output Characteristics
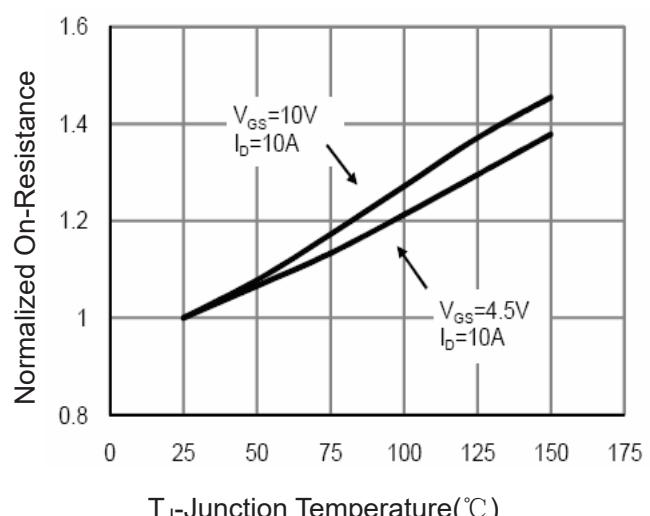
Figure 4 Rdson-Junction Temperature
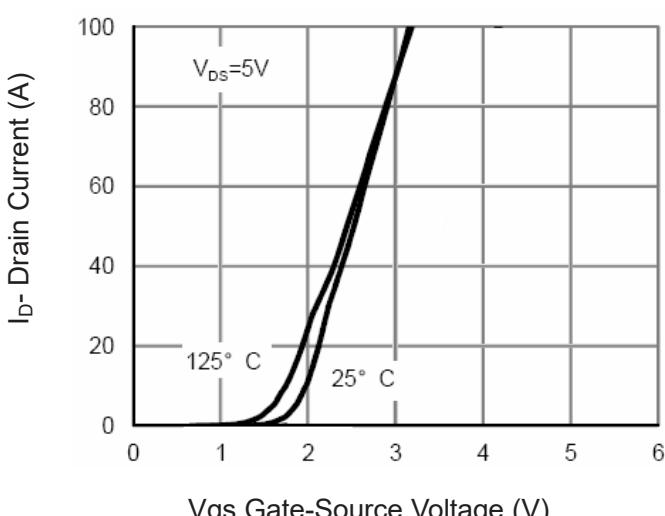
Figure 2 Transfer Characteristics
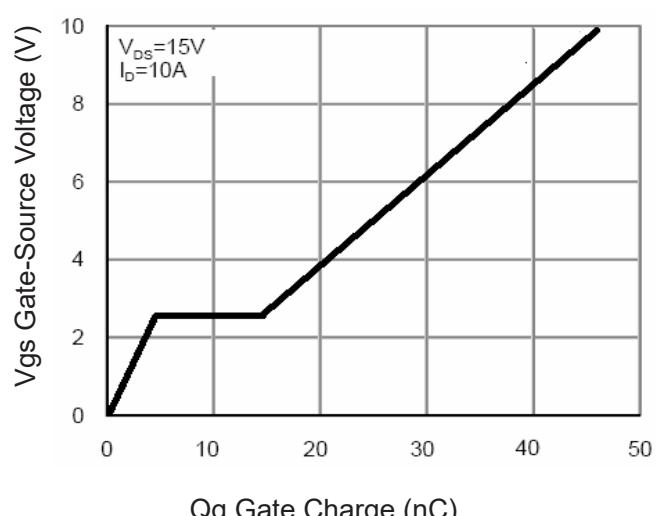
Figure 5 Gate Charge
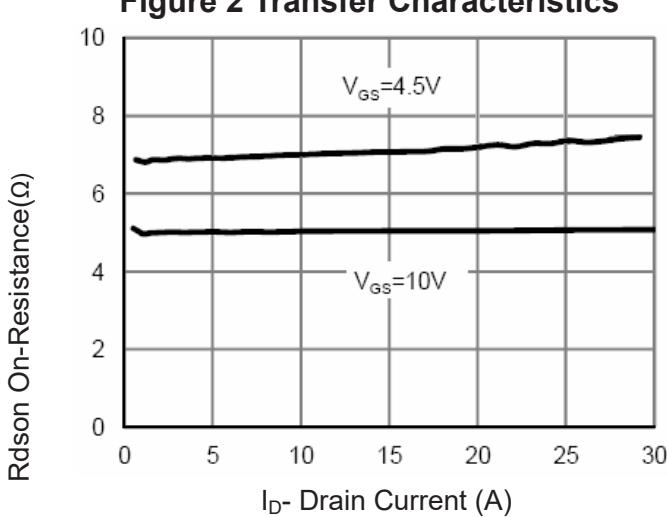
Figure 3 Rdson- Drain Current
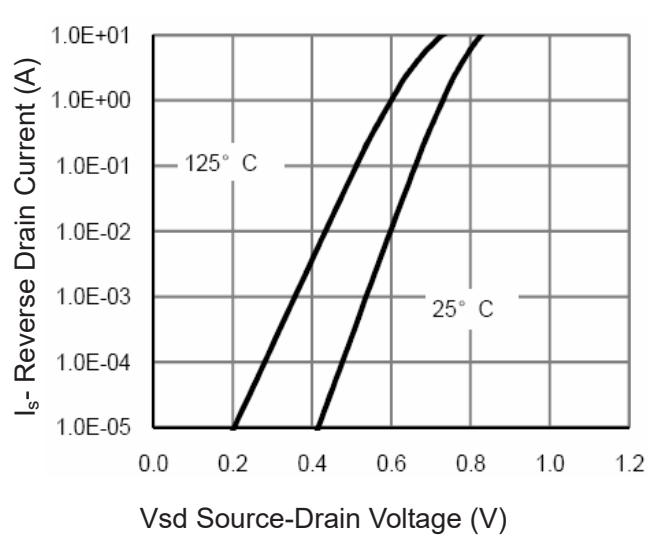
Figure 6 Source- Drain Diode Forward
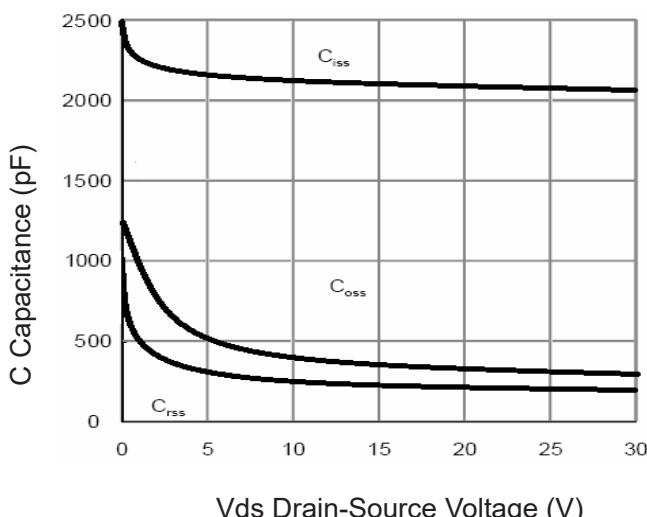
Figure 7 Capacitance vs Vds
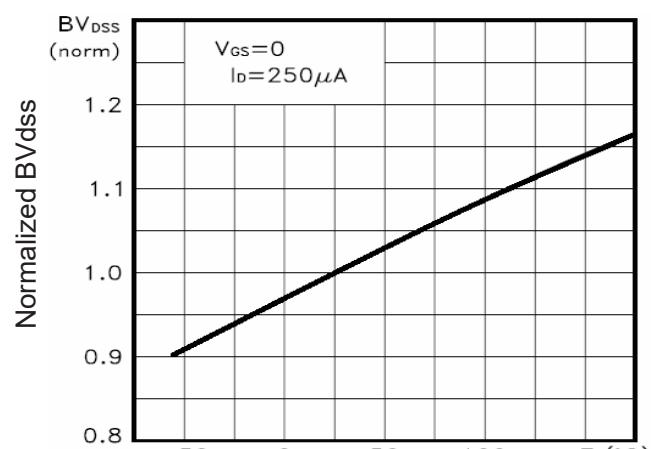
Figure 9 BV$_{DSS}$ vs Junction Temperature
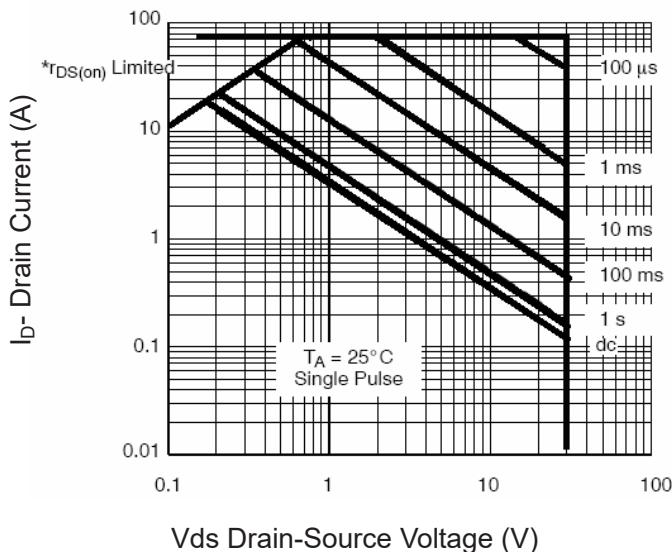
Figure 8 Safe Operation Area
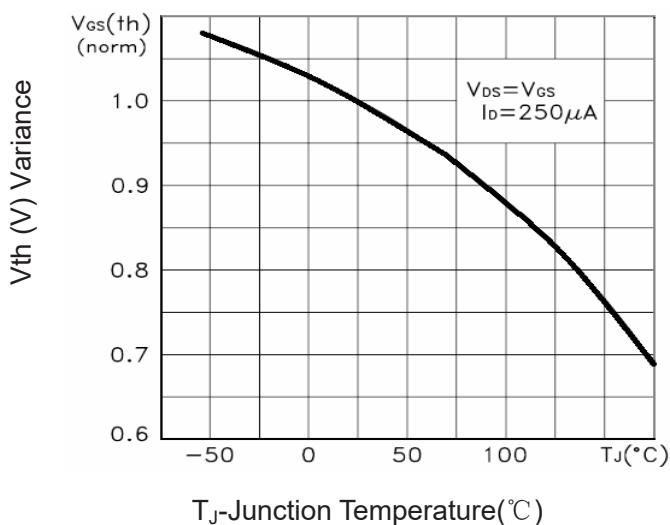
Figure 10 V$_{GS(th)}$ vs Junction Temperature
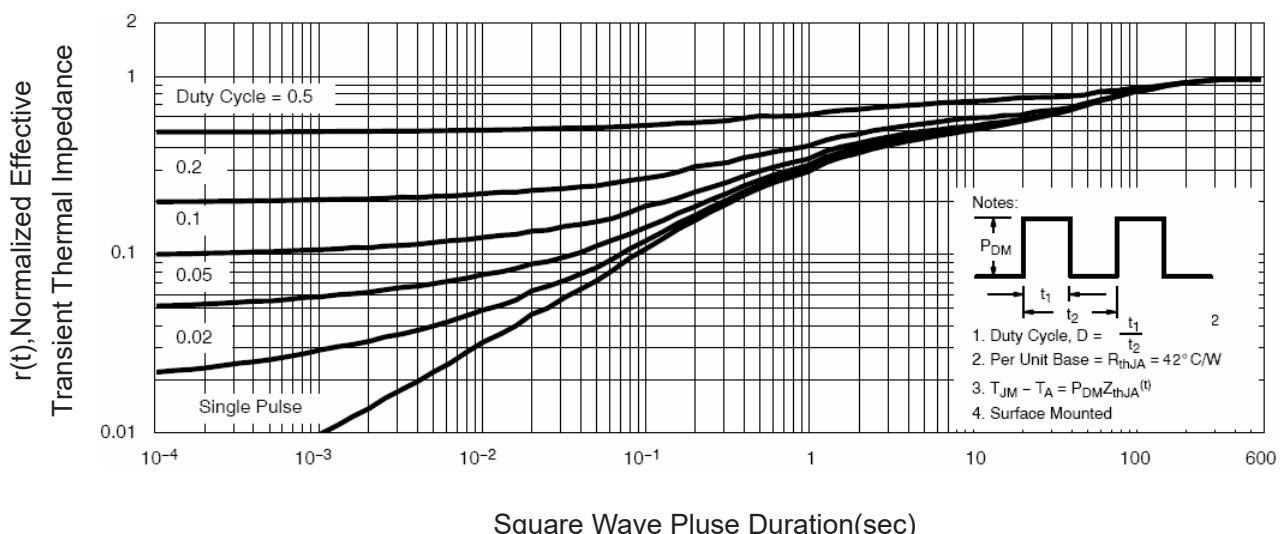
Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information
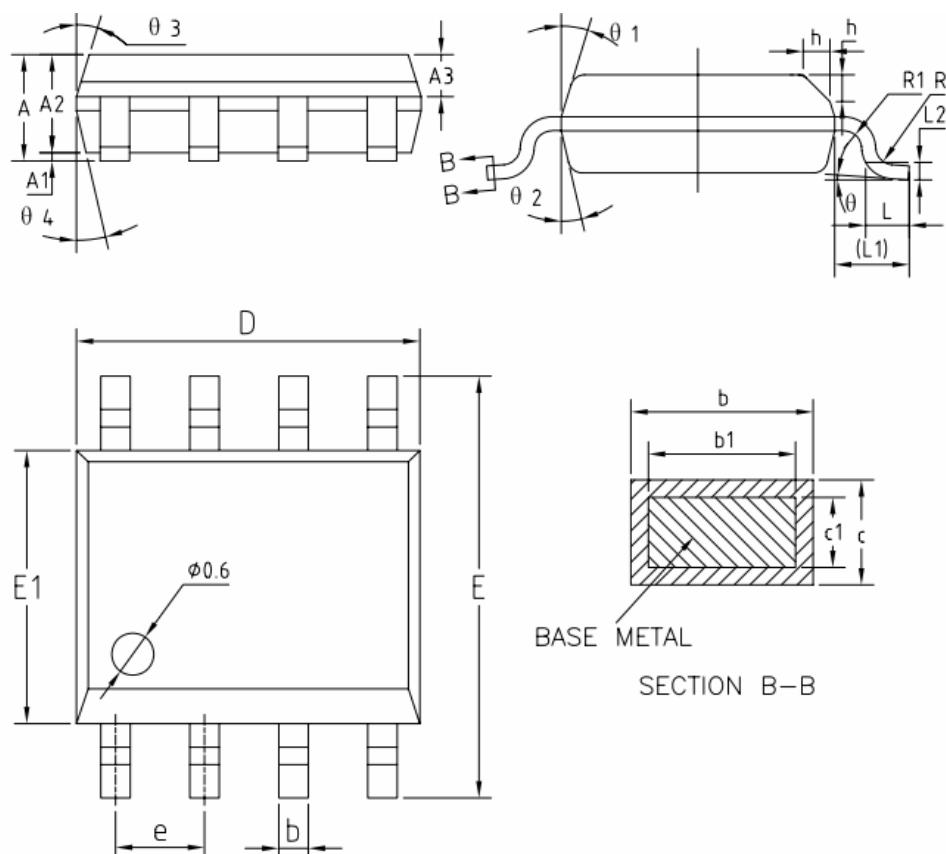
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0˙	–	8˙
θ 1	15˙	17˙	19˙
θ 2	11˙	13˙	15˙
θ 3	15˙	17˙	19˙
θ 4	11˙	13˙	15˙