

## NCE P-Channel Enhancement Mode Power MOSFET

### Description

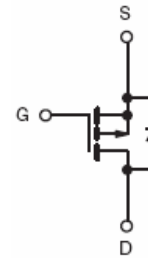
The NCE30P10S uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

### General Features

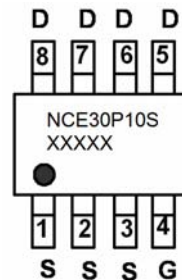
- $V_{DS} = -30V, I_D = -10A$   
 $R_{DS(ON)} < 34m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 21m\Omega @ V_{GS} = -10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package

### Application

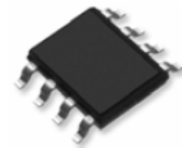
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOP-8 top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE30P10S	NCE30P10S	SOP-8	Ø330mm	12mm	4000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C = 25^\circ C$ )	$I_D$	-10	A
Drain Current-Continuous ( $T_C = 100^\circ C$ )		-7.1	
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-40	A
Maximum Power Dissipation ( $T_C = 25^\circ C$ )	$P_D$	3	W
Maximum Power Dissipation ( $T_C = 100^\circ C$ )		1.3	
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	231	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	41.67	$^\circ C/W$
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## Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-10A$	-	17.6	21	$m\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	-	25.5	34	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-10A$	-	20	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{ISS}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	1253	-	PF
Output Capacitance	$C_{OSS}$		-	181	-	PF
Reverse Transfer Capacitance	$C_{RSS}$		-	158	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-10A,$ $V_{GS}=-10V, R_{GEN}=1\Omega$	-	8	-	nS
Turn-on Rise Time	$t_r$		-	9	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	nS
Turn-Off Fall Time	$t_f$		-	8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-10A, V_{GS}=-10V$	-	24.4	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	6.4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Current (Note 2)	$I_S$		-	-	-10	A
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-10A$	-	-	-1.2	V

### 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.  $E_{AS}$  condition:  $T_J=25^\circ\text{C}, V_{DD}=-15V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics

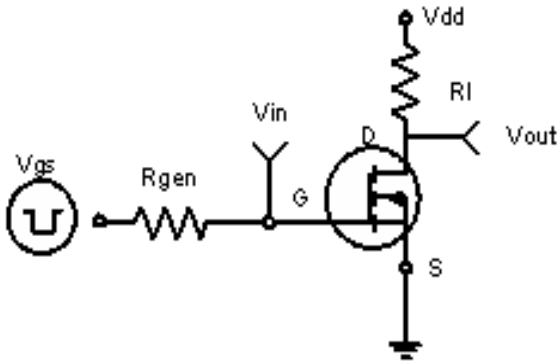


Figure 1: Switching Test Circuit

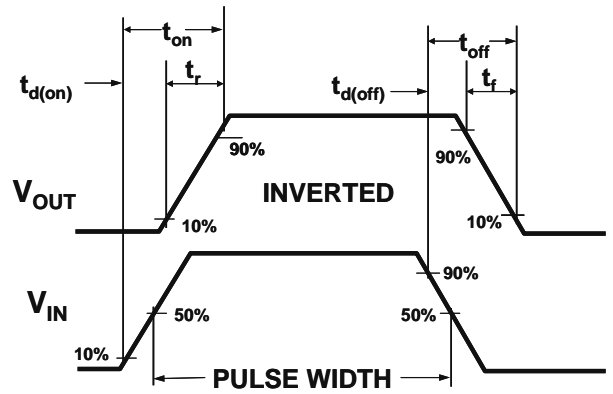


Figure 2: Switching Waveforms

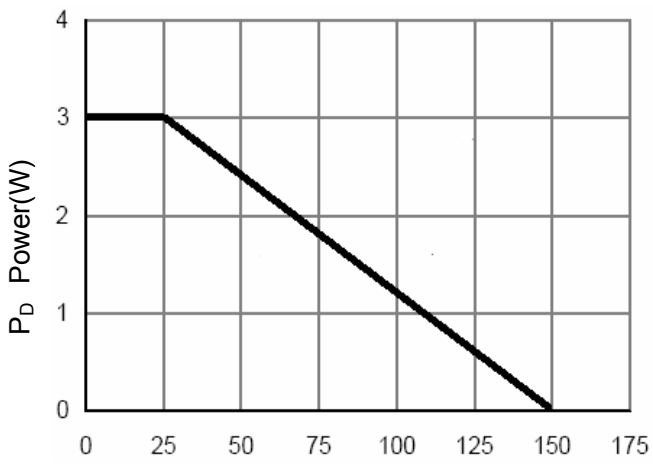


Figure 3 Power Dissipation

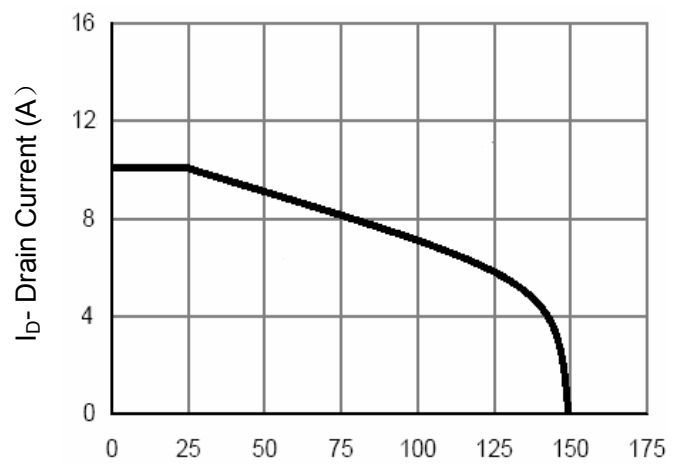


Figure 4 Drain Current

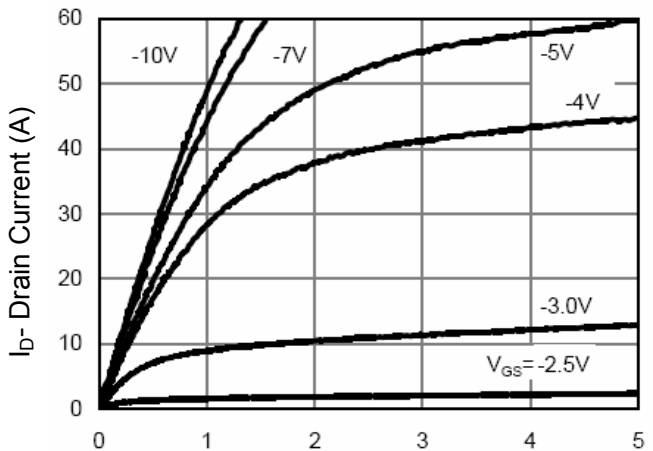


Figure 5 Output Characteristics

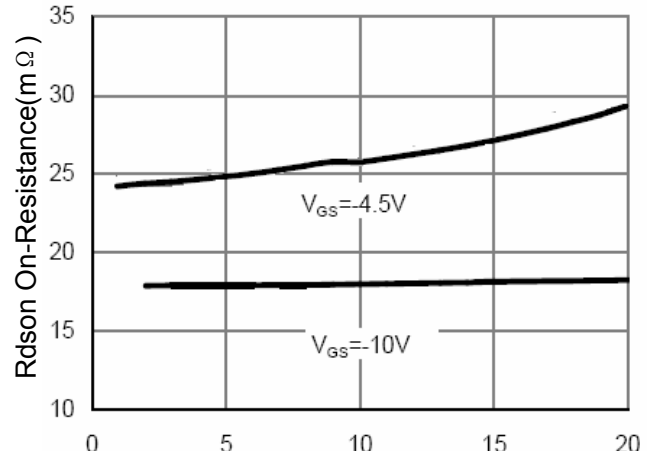


Figure 6 Drain-Source On-Resistance

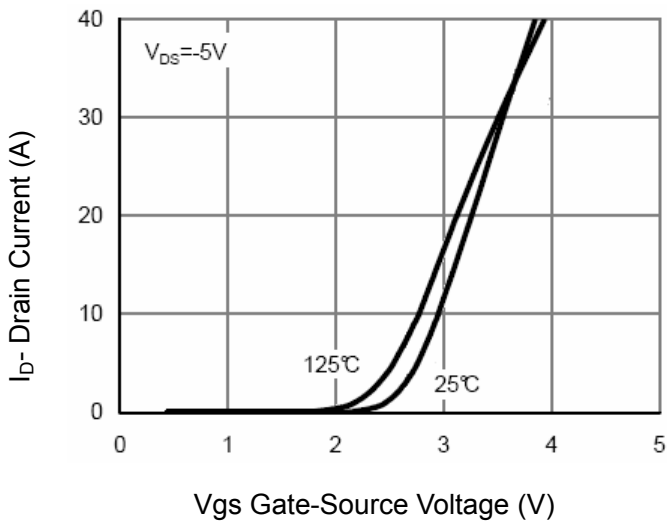


Figure 7 Transfer Characteristics

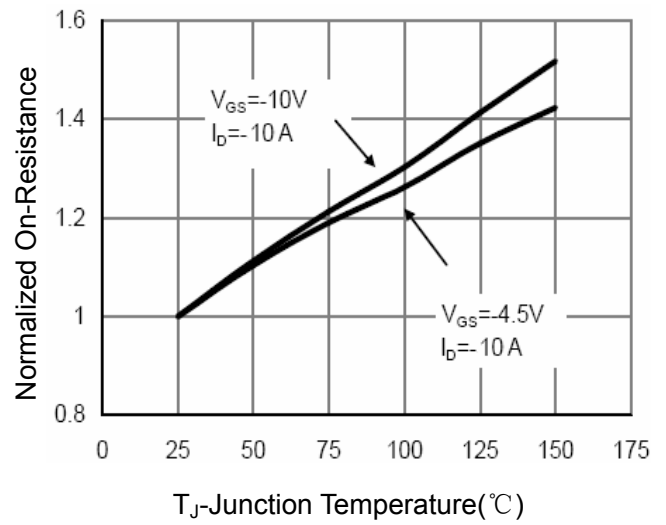


Figure 8 Drain-Source On-Resistance

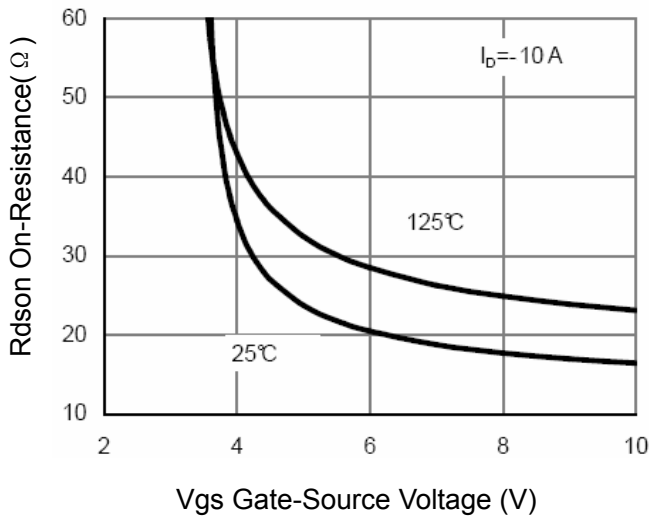


Figure 9 Rdson vs Vgs

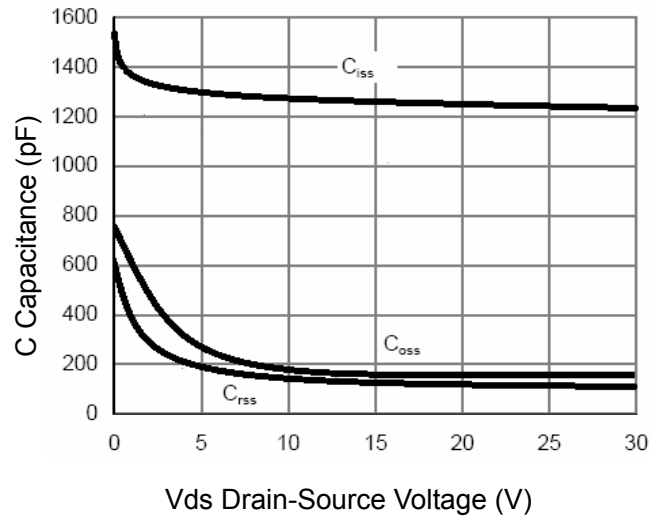


Figure 10 Capacitance vs Vds

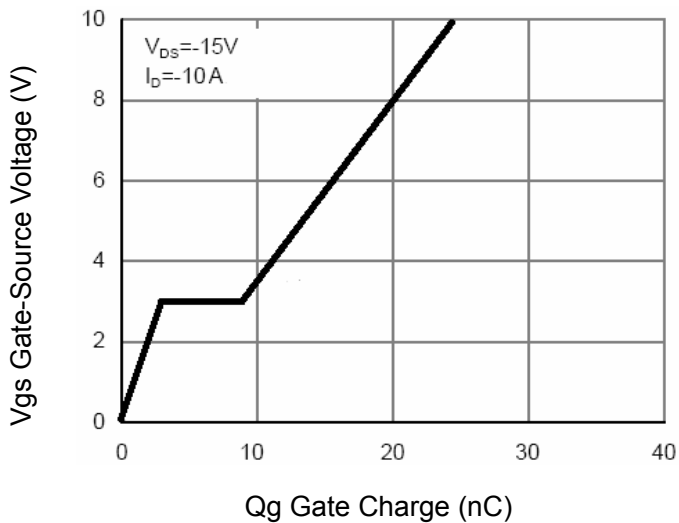


Figure 11 Gate Charge

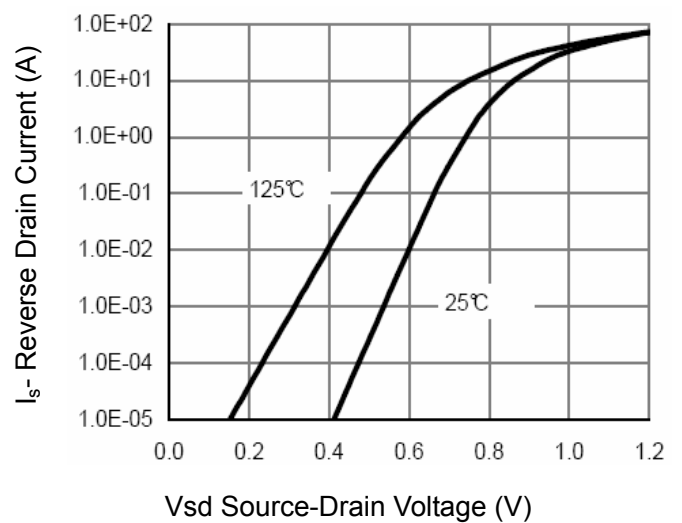


Figure 12 Source- Drain Diode Forward

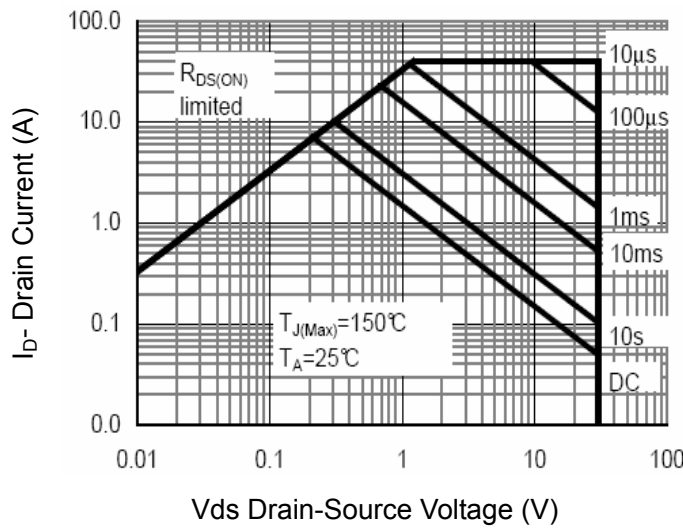


Figure 13 Safe Operation Area

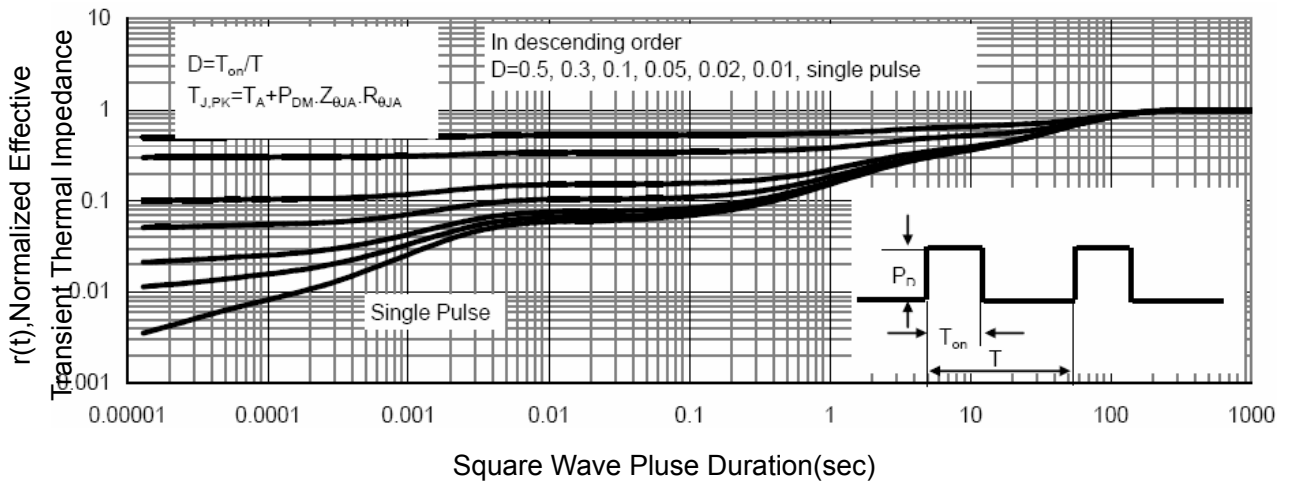
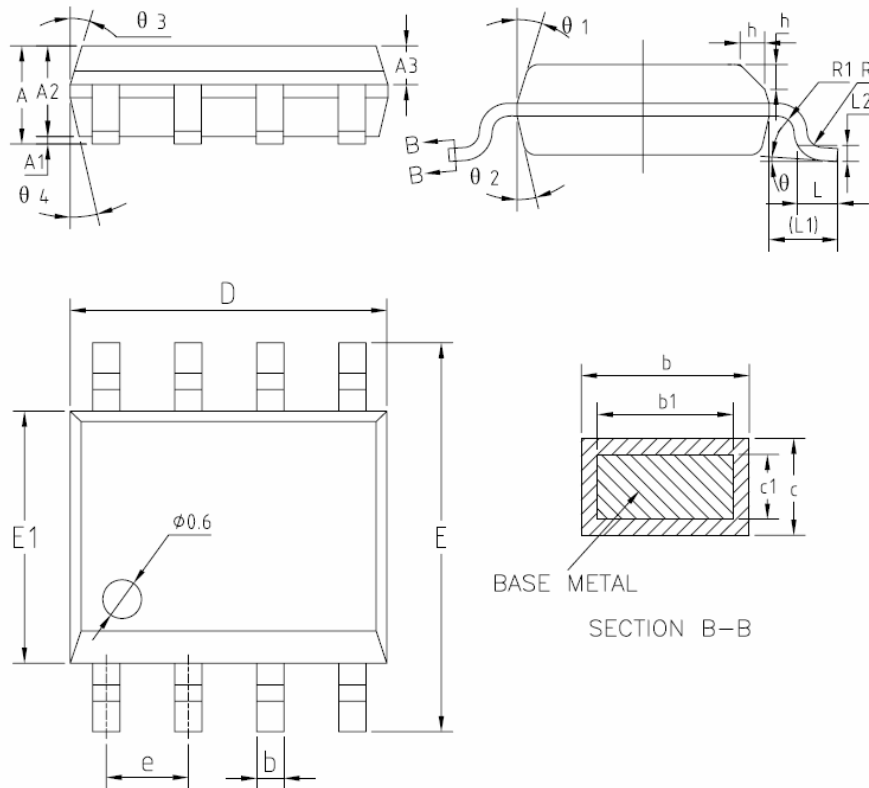


Figure 14 Normalized Maximum Transient Thermal Impedance

## 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
$\theta$	0°	—	8°
$\theta_1$	15°	17°	19°
$\theta_2$	11°	13°	15°
$\theta_3$	15°	17°	19°
$\theta_4$	11°	13°	15°

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